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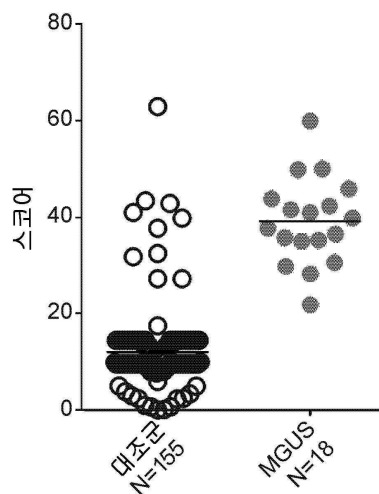
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(54) 발명의 명칭 형질 세포 질환의 검출 방법

(57) 요약

본 발명은 골수종 또는 MGUS와 같은 형질 세포 질환을 검출하는 방법, 형질 세포 질환이 안정한지 또는 진행성인지 결정하는 방법, 질환 재발의 위험을 결정하는 방법, 및 요법에 대한 형질 세포 질환을 갖는 대상에 의한 반응을 결정하는 방법에 관한 것이다.

대표도 - 도3a



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명세서

청구범위

청구항 1

골수종의 검출이 필요한 대상에서 골수종을 검출하는 방법으로서,

대상의 시험 샘플을 적어도 32개의 바이오마커의 발현을 검출하는 데 특이적인 복수의 체제와 접촉시킴으로써 시험 샘플로부터 적어도 32개의 바이오마커의 발현 수준을 결정하는 단계로서, 상기 적어도 32개의 바이오마커는 *ASXL1*, *BHLHE40*, *BTG2*, *COPA*, *FBXW7*, *GNA13*, *IL8*, *JMJD1C*, *LARS2*, *MALAT1*, *MBNL1*, *MCL1*, *NFKBIZ*의 제1 스플라이스 변이체, *NFKBIZ*의 제2 스플라이스 변이체, *NR4A1*의 제1 스플라이스 변이체, *NR4A1*의 제2 스플라이스 변이체, *PDE4B*, *PIAS2*, *PRKAA1*의 제1 스플라이스 변이체, *PRKAA1*의 제2 스플라이스 변이체, *SCYL2*의 제1 스플라이스 변이체, *SCYL2*의 제2 스플라이스 변이체, *SMARCD2*, *SP1*의 제1 스플라이스 변이체, *SP1*의 제2 스플라이스 변이체, *SRSF5*, *TAGAP*, *TANK*, *TLE4*, *TSC22D3*, *UBE2J1*, 및 적어도 하나의 하우스키핑 유전자를 포함하며, 여기서 하우스키핑 유전자는 *TPT1*이고, 스플라이스 변이체들은 하기 표에 확인된 바와 같은 것인 단계:

바이오마커	NCBI 염색체 위치	UniGene ID	RefSeq	엑플리콘 길이	엑손 경계	분석 위치
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<i>NR4A1</i>	Chr. 12: 52022832-52059507	Hs. 524430	NM_001202233.1	79 및 87	3-4 및 7-8	1107 및 1767
<i>PRKAA1</i>	Chr. 5: 40759379-40798195	Hs. 43322	NM_006251.5	93 및 75	2-3 및 5-6	275 및 606
<i>SCYL2</i>	Chr. 12: 100267137-100341724	Hs. 506481	NM_001317784.1	151 및 67	2-3 및 8-9	463 및 1381
<i>SP1</i>	Chr. 12: 53380195-53416446	Hs. 620754	NM_001251825.1	62 및 72	3-4 및 5-6	1631 및 2002

ASXL1, *BHLHE40*, *BTG2*, *COPA*, *FBXW7*, *GNA13*, *IL8*, *JMJD1C*, *LARS2*, *MALAT1*, *MBNL1*, *MCL1*, *NFKBIZ*의 제1 스플라이스 변이체, *NFKBIZ*의 제2 스플라이스 변이체, *NR4A1*의 제1 스플라이스 변이체, *NR4A1*의 제2 스플라이스 변이체, *PDE4B*, *PIAS2*, *PRKAA1*의 제1 스플라이스 변이체, *PRKAA1*의 제2 스플라이스 변이체, *SCYL2*의 제1 스플라이스 변이체, *SCYL2*의 제2 스플라이스 변이체, *SMARCD2*, *SP1*의 제1 스플라이스 변이체, *SP1*의 제2 스플라이스 변이체, *SRSF5*, *TAGAP*, *TANK*, *TLE4*, *TSC22D3*, 및 *UBE2J1* 각각의 발현 수준을 *TPT1*의 발현 수준으로 정규화하는 단계;

각각의 정규화된 발현 수준을 알고리즘에 입력하여 스코어를 생성하는 단계;

스코어를 미리 결정된 컷오프 값과 비교하는 단계; 및

스코어가 미리 결정된 컷오프 값 이상인 경우 대상에서의 골수종의 존재를 확인하거나 스코어가 미리 결정된 컷오프 값 미만인 경우 대상에서의 골수종의 부재를 확인하는 단계로서, 상기 미리 결정된 컷오프 값은 0 내지 100의 등급에서 20인 단계

를 포함하는, 골수종의 검출이 필요한 대상에서 골수종을 검출하는 방법.

청구항 2

제1항에 있어서,

i) 90% 초과인 민감도; 및/또는

ii) 90% 초과인 특이성

를 갖는 방법.

청구항 3

제1항 또는 제2항에 있어서, 바이오마커 중 적어도 하나는 RNA, cDNA, 또는 단백질인 방법.

청구항 4

제3항에 있어서, 바이오마커가 RNA인 경우, RNA는 역전사되어 cDNA를 생산하고, 생산된 cDNA의 발현 수준이 검출되는 것인 방법.

청구항 5

제1항 또는 제2항에 있어서, 시험 샘플이 혈액, 혈청, 혈장, 또는 신생물 조직인 방법.

청구항 6

제1항 또는 제2항에 있어서, 미리 결정된 컷오프 값은 신생물 질환이 없는 대상으로부터 획득된 복수의 참조 샘플로부터 도출되는 것인 방법.

청구항 7

제6항에 있어서, 참조 샘플이 혈액, 혈청, 혈장, 또는 비신생물 조직인 방법.

청구항 8

제1항 또는 제2항에 있어서, 대상은 인간인 방법.

청구항 9

제1항 또는 제2항에 있어서, 알고리즘은 XGB, RF, glmnet, cforest, CART, treebag, knn, nnet, SVM-방사형, SVM-선형, NB, NNET, mlp, 또는 로지스틱 회귀 모델링인 방법.

청구항 10

제9항에 있어서, 알고리즘은 XGB인 방법.

청구항 11

대상에서의 골수종이 안정한지 또는 진행성인지 결정하는 방법으로서,

대상의 시험 샘플을 적어도 32개의 바이오마커의 발현을 검출하는 데 특이적인 복수의 제제와 접촉시킴으로써 시험 샘플로부터 적어도 32개의 바이오마커의 발현 수준을 결정하는 단계로서, 상기 적어도 32개의 바이오마커는 *ASXL1*, *BHLHE40*, *BTG2*, *COPA*, *FBXW7*, *GNA13*, *IL8*, *JMJD1C*, *LARS2*, *MALAT1*, *MBNL1*, *MCL1*, *NFKBIZ*의 제1 스플라이스 변이체, *NFKBIZ*의 제2 스플라이스 변이체, *NR4A1*의 제1 스플라이스 변이체, *NR4A1*의 제2 스플라이스 변이체, *PDE4B*, *PIAS2*, *PRKAA1*의 제1 스플라이스 변이체, *PRKAA1*의 제2 스플라이스 변이체, *SCYL2*의 제1 스플라이스 변이체, *SCYL2*의 제2 스플라이스 변이체, *SMARCD2*, *SPI1*의 제1 스플라이스 변이체, *SPI1*의 제2 스플라이스 변이체, *SRSF5*, *TAGAP*, *TANK*, *TLE4*, *TSC22D3*, *UBE2J1*, 및 적어도 하나의 하우스키핑 유전자를 포함하며, 여기서 하우스키핑 유전자는 *TPT1*이고, 스플라이스 변이체들은 하기 표에 확인된 바와 같은 것인 단계:

바이오마커	NCBI 염색체 위치	UniGene ID	RefSeq	앰플리콘 길이	엑손 경계	분석 위치
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<i>SCYL2</i>	Chr. 12: 100267137-100341724	Hs. 506481	NM_001317784.1	151 및 67	2-3 및 8-9	463 및 1381
<i>SPI1</i>	Chr. 12: 53380195-53416446	Hs. 620754	NM_001251825.1	62 및 72	3-4 및 5-6	1631 및 2002

ASXL1, *BHLHE40*, *BTG2*, *COPA*, *FBXW7*, *GNA13*, *IL8*, *JMJD1C*, *LARS2*, *MALAT1*, *MBNL1*, *MCL1*, *NFKBIZ*의 제1 스플라이스

이스 변이체, *NFKBIZ*의 제2 스플라이스 변이체, *NR4A1*의 제1 스플라이스 변이체, *NR4A1*의 제2 스플라이스 변이체, *PDE4B*, *PIAS2*, *PRKAA1*의 제1 스플라이스 변이체, *PRKAA1*의 제2 스플라이스 변이체, *SCYL2*의 제1 스플라이스 변이체, *SCYL2*의 제2 스플라이스 변이체, *SMARCD2*, *SPI*의 제1 스플라이스 변이체, *SPI*의 제2 스플라이스 변이체, *SRSF5*, *TAGAP*, *TANK*, *TLE4*, *TSC22D3*, 및 *UBE2J1* 각각의 발현 수준을 *TPT1*의 발현 수준으로 정규화하는 단계;

각각의 정규화된 발현 수준을 알고리즘에 입력하여 스코어를 생성하는 단계;

스코어를 미리 결정된 컷오프 값과 비교하는 단계; 및

스코어가 미리 결정된 컷오프 값 이상인 경우 골수종이 진행성이라고 확인하거나 스코어가 미리 결정된 컷오프 값 미만인 경우 골수종이 안정하다고 확인하는 단계로서, 상기 미리 결정된 컷오프 값은 0 내지 100의 등급에서 40인 단계

를 포함하는, 대상에서의 골수종이 안정한지 또는 진행성인지 결정하는 방법.

청구항 12

제11항에 있어서,

i) 90% 초과와 민감도; 및/또는

ii) 90% 초과와 특이성

을 갖는 방법.

청구항 13

제11항 또는 제12항에 있어서, 바이오마커 중 적어도 하나는 RNA, cDNA, 또는 단백질인 방법.

청구항 14

제13항에 있어서, 바이오마커가 RNA인 경우, RNA는 역전사되어 cDNA를 생산하고, 생산된 cDNA의 발현 수준이 검출되는 것인 방법.

청구항 15

제11항 또는 제12항에 있어서, 시험 샘플이 혈액, 혈청, 혈장, 또는 신생물 조직인 방법.

청구항 16

제11항 또는 제12항에 있어서, 미리 결정된 컷오프 값은 신생물 질환이 없는 대상으로부터 획득된 복수의 참조 샘플로부터 도출되는 것인 방법.

청구항 17

제16항에 있어서, 참조 샘플이 혈액, 혈청, 혈장, 또는 비신생물 조직인 방법.

청구항 18

제11항 또는 제12항에 있어서, 대상은 인간인 방법.

청구항 19

제11항 또는 제12항에 있어서, 알고리즘은 XGB, RF, glmnet, cforest, CART, treebag, knn, nnet, SVM-방사형, SVM-선형, NB, NNET, mlp, 또는 로지스틱 회귀 모델링인 방법.

청구항 20

제19항에 있어서, 알고리즘은 XGB인 방법.

청구항 21

골수종을 갖는 대상에서 질환 재발의 위험을 결정하는 방법으로서,

대상의 시험 샘플을 적어도 32개의 바이오마커의 발현을 검출하는 데 특이적인 복수의 제제와 접촉시킴으로써 시험 샘플로부터 적어도 32개의 바이오마커의 발현 수준을 결정하는 단계로서, 상기 적어도 32개의 바이오마커는 *ASXL1*, *BHLHE40*, *BTG2*, *COPA*, *FBXW7*, *GNA13*, *IL8*, *JMJD1C*, *LARS2*, *MALAT1*, *MBNL1*, *MCL1*, *NFKBIZ*의 제1 스플라이스 변이체, *NFKBIZ*의 제2 스플라이스 변이체, *NR4A1*의 제1 스플라이스 변이체, *NR4A1*의 제2 스플라이스 변이체, *PDE4B*, *PIAS2*, *PRKAA1*의 제1 스플라이스 변이체, *PRKAA1*의 제2 스플라이스 변이체, *SCYL2*의 제1 스플라이스 변이체, *SCYL2*의 제2 스플라이스 변이체, *SMARCD2*, *SPI*의 제1 스플라이스 변이체, *SPI*의 제2 스플라이스 변이체, *SRSF5*, *TAGAP*, *TANK*, *TLE4*, *TSC22D3*, *UBE2J1*, 및 적어도 하나의 하우스키핑 유전자를 포함하며, 여기서 하우스키핑 유전자는 *TPT1*이고, 스플라이스 변이체들은 하기 표에 확인된 바와 같은 것인 단계:

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<i>SCYL2</i>	Chr. 12: 100267137-100341724	Hs. 506481	NM_001317784.1	151 및 67	2-3 및 8-9	463 및 1381
<i>SPI</i>	Chr. 12: 53380195-53416446	Hs. 620754	NM_001251825.1	62 및 72	3-4 및 5-6	1631 및 2002

ASXL1, *BHLHE40*, *BTG2*, *COPA*, *FBXW7*, *GNA13*, *IL8*, *JMJD1C*, *LARS2*, *MALAT1*, *MBNL1*, *MCL1*, *NFKBIZ*의 제1 스플라이스 변이체, *NFKBIZ*의 제2 스플라이스 변이체, *NR4A1*의 제1 스플라이스 변이체, *NR4A1*의 제2 스플라이스 변이체, *PDE4B*, *PIAS2*, *PRKAA1*의 제1 스플라이스 변이체, *PRKAA1*의 제2 스플라이스 변이체, *SCYL2*의 제1 스플라이스 변이체, *SCYL2*의 제2 스플라이스 변이체, *SMARCD2*, *SPI*의 제1 스플라이스 변이체, *SPI*의 제2 스플라이스 변이체, *SRSF5*, *TAGAP*, *TANK*, *TLE4*, *TSC22D3*, 및 *UBE2J1* 각각의 발현 수준을 *TPT1*의 발현 수준으로 정규화하는 단계;

각각의 정규화된 발현 수준을 알고리즘에 입력하여 스코어를 생성하는 단계;

스코어를 미리 결정된 컷오프 값과 비교하는 단계; 및

스코어가 미리 결정된 컷오프 값 이상인 경우 대상이 질환 재발의 높은 위험을 갖는다고 확인하거나 스코어가 미리 결정된 컷오프 값 미만인 경우 대상이 질환 재발의 낮은 위험을 갖는다고 확인하는 단계로서, 상기 미리 결정된 컷오프 값은 0 내지 100의 등급에서 40인 단계

를 포함하는, 골수종을 갖는 대상에서 질환 재발의 위험을 결정하는 방법.

청구항 22

제21항에 있어서,

i) 90% 초과인 민감도; 및/또는

ii) 90% 초과인 특이성

을 갖는 방법.

청구항 23

제21항 또는 제22항에 있어서, 바이오마커 중 적어도 하나는 RNA, cDNA, 또는 단백질인 방법.

청구항 24

제23항에 있어서, 바이오마커가 RNA인 경우, RNA는 역전사되어 cDNA를 생산하고, 생산된 cDNA의 발현 수준이 검출되는 것인 방법.

청구항 25

제21항 또는 제22항에 있어서, 시험 샘플이 혈액, 혈청, 혈장, 또는 신생물 조직인 방법.

청구항 26

제21항 또는 제22항에 있어서, 미리 결정된 컷오프 값은 신생물 질환이 없는 대상으로부터 수득된 복수의 참조 샘플로부터 도출되는 것인 방법.

청구항 27

제26항에 있어서, 참조 샘플이 혈액, 혈청, 혈장, 또는 비신생물 조직인 방법.

청구항 28

제21항 또는 제22항에 있어서, 대상은 인간인 방법.

청구항 29

제21항 또는 제22항에 있어서, 알고리즘은 XGB, RF, glmnet, cforest, CART, treebag, knn, nnet, SVM-방사형, SVM-선형, NB, NNET, mlp, 또는 로지스틱 회귀 모델링인 방법.

청구항 30

제29항에 있어서, 알고리즘은 XGB인 방법.

청구항 31

골수종을 갖는 대상에 의한 요법에 대한 반응을 결정하는 방법으로서,

제1 시점에 대상의 제1 시험 샘플을 적어도 31개의 바이오마커의 발현을 검출하는 데 특이적인 복수의 제제와 접촉시킴으로써 제1 시험 샘플로부터 적어도 31개의 바이오마커의 제1 발현 수준을 결정하는 단계로서, 상기 적어도 31개의 바이오마커는 *ASXL1*, *BHLHE40*, *BTG2*, *COPA*, *FBXW7*, *GNA13*, *IL8*, *JMJD1C*, *LARS2*, *MALAT1*, *MBNL1*, *MCL1*, *NFKBIZ*의 제1 스플라이스 변이체, *NFKBIZ*의 제2 스플라이스 변이체, *NR4A1*의 제1 스플라이스 변이체, *NR4A1*의 제2 스플라이스 변이체, *PDE4B*, *PIAS2*, *PRKAA1*의 제1 스플라이스 변이체, *PRKAA1*의 제2 스플라이스 변이체, *SCYL2*의 제1 스플라이스 변이체, *SCYL2*의 제2 스플라이스 변이체, *SMARCD2*, *SP1*의 제1 스플라이스 변이체, *SP1*의 제2 스플라이스 변이체, *SRSF5*, *TAGAP*, *TANK*, *TLE4*, *TSC22D3*, 및 *UBE2J1*을 포함하며, 여기서 스플라이스 변이체들은 하기 표에 확인된 바와 같은 것인 단계:

바이오마커	NCBI 염색체 위치	UniGene ID	RefSeq	애플리곤 길이	엑손 경계	분석 위치
<i>NFKBIZ</i>	Chr. 3: 101827990-101861025	Hs. 319171	NM_001005474.2	62 및 86	6-7 및 12-13	1322 및 2087
<i>NR4A1</i>	Chr. 12: 52022832-52059507	Hs. 524430	NM_001202233.1	79 및 87	3-4 및 7-8	1107 및 1767
<i>PRKAA1</i>	Chr. 5: 40759379-40798195	Hs. 43322	NM_006251.5	93 및 75	2-3 및 5-6	275 및 606
<i>SCYL2</i>	Chr. 12: 100267137-100341724	Hs. 506481	NM_001317784.1	151 및 67	2-3 및 8-9	463 및 1381
<i>SP1</i>	Chr. 12: 53380195-53416446	Hs. 620754	NM_001251825.1	62 및 72	3-4 및 5-6	1631 및 2002

;

제2 시점에 대상의 제2 시험 샘플을 상기 적어도 31개의 바이오마커의 발현을 검출하는 데 특이적인 복수의 제제와 접촉시킴으로써 제2 시험 샘플로부터 상기 적어도 31개의 바이오마커의 제2 발현 수준을 결정하는 단계로서, 제2 시점은 제1 시점 후이고 또한 대상에게 요법을 실시한 후인 단계;

제1 발현 수준을 제2 발현 수준과 비교하는 단계; 및

제2 발현 수준이 제1 발현 수준과 비교하여 유의하게 감소되는 경우 대상이 요법에 대해 반응성이라고 확인하는 단계

를 포함하는, 골수종을 갖는 대상에 의한 요법에 대한 반응을 결정하는 방법.

청구항 32

제31항에 있어서, 제1 시점은 대상에게 요법을 실시하기 전인 방법.

청구항 33

제31항에 있어서, 제1 시점은 대상에게 요법을 실시한 후인 방법.

청구항 34

제31항 내지 제33항 중 어느 한 항에 있어서, 요법은 표적화된 요법을 포함하는 것인 방법.

청구항 35

제34항에 있어서, 표적화된 요법은 프로테아좀 억제제를 포함하는 것인 방법.

청구항 36

제31항 내지 제33항 중 어느 한 항에 있어서, 제2 발현 수준이 제1 발현 수준보다 적어도 25% 낮은 경우 제2 발현 수준은 제1 발현 수준과 비교하여 유의하게 감소되는 것인 방법.

청구항 37

제31항 내지 제33항 중 어느 한 항에 있어서,

i) 90% 초과 의 민감도; 및/또는

ii) 90% 초과 의 특이성

을 갖는 방법.

청구항 38

제31항 내지 제33항 중 어느 한 항에 있어서, 바이오마커 중 적어도 하나는 RNA, cDNA, 또는 단백질인 방법.

청구항 39

제38항에 있어서, 바이오마커가 RNA인 경우, RNA는 역전사되어 cDNA를 생산하고, 생산된 cDNA의 발현 수준이 검출되는 것인 방법.

청구항 40

제31항 내지 제33항 중 어느 한 항에 있어서, 시험 샘플은 혈액, 혈청, 혈장, 또는 신생물 조직인 방법.

청구항 41

제31항 내지 제33항 중 어느 한 항에 있어서, 대상은 인간인 방법.

발명의 설명

기술 분야

[0001] 관련 출원에 대한 상호 참조

[0002] 본 출원은 2017년 7월 21일에 출원된 미국 가출원 제62/535,419호의 이익 및 우선권을 주장하며, 그 내용은 본원에 참고로 포함되어 있다.

[0003] 서열 목록의 참고에 의한 통합

[0004] 2018년 7월 16일에 생성되고 크기가 276 KB인 "LBIO-002_001W0 Seq Listing.txt"라는 명칭의 텍스트 파일의 내용은 본원에 그 전체가 참고로 포함되어 있다.

[0005] 기술분야

[0006] 본 발명은 형질 세포 질환 검출에 관한 것이다.

배경 기술

[0007] 다발성 골수종은 말기 B-계통 또는 형질 세포의 난치성 혈액 악성종양이다. 이 클론성 형질 세포 악성종양은 모든 암 사례의 ~2% 및 혈액 악성종양의 대략 10%를 차지한다. 그것은 미만성 B-세포 림프종 및 만성 림프성 백혈병 다음으로 세 번째로 가장 흔한 B 세포 악성종양이다. 발병률은 미국에서 ~1/100,000 발병률로 추정된다. 2017년에, 상기 질환으로 12,500명의 사망자가 발생하였다. 65세가 넘는 환자가 진단된 환자의 >80%를 차지하며; 백인과 비교하여 흑인에서 발병률이 두 배 증가한다. 지난 50년 동안 상기 질환의 발병률이 크게 증가하였다. 또한, 지난 20년 동안 전체 생존율은 중앙값 ~3.5년에서 ~6년으로 개선되었고, ~50%의 평균 5년 생존율을 갖는다. 이것은 혁신적인 치료법 및 프로테아좀 억제제 및 면역조절 약물의 광범위한 사용에 기인하지만, 많은 환자들은 낮은 무진행 생존율(progression-free survival)을 나타내고 전체 생존율이 낮다. 이것은 골미세환경(osteo-microenvironment) 내에서 종양 이질성, 약물 내성 및 종양의 면역억제 특성을 반영한다.

[0008] 다발성 골수종은 전형적으로 무증상 전구 단계(의미불명의 단클론 감마글로불린혈증(MGUS) 및 무증상 다발성 골수종(SMM)에서 명백한(frank) 질환으로 진행된다. 일부는 MM으로의 빠른 진행을 나타내는 반면, 다른 일부는 평생 지속되는 무통성(indolent) 질환을 갖는다. 상기 질환의 이질성 및 계층 복잡성, 및 특히 클론내 이질성은 질환의 이질적 진화, 요법에 대한 반응뿐만 아니라 "성공적인" 치료 후의 진행을 뒷받침한다.

[0009] 다발성 골수종은 주목할만한 환자간 및 환자내 이질성을 나타낸다. 이것은 과배수성(hyperdiploidy) 및 국소 또는 염색체(Chr) 팔(arm) 획득(gain) 또는 증폭, 예컨대, Chr 1q 또는 손실, 예컨대, Chr 17p, 및 염색체 14 상의 면역글로불린 중쇄 유전자좌를 포함하는 전좌(translocation)를 포함하는 카피 수 변이에 반영된다. 이들은 다발성 골수종 발병의 모든 특징이다. 과배수성 및 염색체 전좌는 가장 흔한 유전적 이상이며, 둘 모두는 일차 사건으로 간주된다. 질환 진행과 관련된 이차 사건은, 예컨대, MYC 종양유전자에서의 전좌 활성화를 포함하지만, 이것은 환자의 하위세트에서 발생한다. 예를 들어, MYC 전좌는, 단독으로, 또는 Chr1q 증폭과 함께, 과배수성 골수종에서 불량한 예후의 하위유형을 확인한다. 세포유전학적 접근법은 유용하긴 하지만 반대 결과를 예측하는 2개의 마커가 동일한 환자에서 공존할 때 문제가 된다. 이들은 또한 적절한 치료 전략을 지시하는데 별로 도움이 되지 않으며, 이들 중 어느 것도 예측 정보를 제공하지 않는다.

[0010] 표준 혈액 기반 바이오마커, 예컨대, 락테이트 탈수소효소, 알부민 또는 $\beta 2$ 마이크로글로불린(예후 마커) 또는 무혈청 경쇄(FLC) 분석(질환 모니터링용)은 진단 및 관리에 중요하지만, 신부전 및 다른 동반질환(comorbidity)을 포함하는 많은 인자에 의해 또는 개별 질환의 세포유전학적 프로파일에 의해 영향을 받는다. 이들은 다발성 골수종의 생물학적 결정인자를 측정하거나 포함하지 않는다.

[0011] 많은 유전자 발현 분석이 단리된 형질 세포로부터 개발되었다. 이들은 골수 흡인물로부터 형질전환된 B-세포를 단리하거나 혈액으로부터 CD138-양성 세포를 포획한 다음, 전사체(transcriptome) 기반 어레이를 수행하는 것을 수반하였다. 이러한 연구는 고위험 환자를 식별하는 MM 세포의 유전자 발현 프로파일을 확인하였다. GEP70(70개의 유전자, 30%는 예후 Chr1 유전자좌에 위치함)은 예후이며; CTNI는 다유전자 동원체(centromere) 증폭 관련 예후 특징이고; IFM15는 세포 주기의 제어와 연관된 15개의 유전자(예후)를 포함하고; HZDC(97개의 유전자 - 세포 사멸 관련) - 예후; PI 특징(50개의 증식 관련 유전자) - 예후; 골수종 세포주로부터 유래된 특징(HMCL - 248개의 유전자 - "고위험 특징"); EMC92는 92-유전자 예후 특징이며; CINGEC - 염색체 불안정성의 척도(160개의 유전자 - 예후) 및 조기 재발의 위험성이 있는 환자를 식별할 수 있는 17개의 유전자 세트. 이러한 많은 특징은 동일한 유전자 또는 활성화 경로를 확인하였고; 이들 모두는 형질 세포의 단리를 필요로 하며; 모두 유전자 발현 어레이 연구를 수행하는 것을 필요로 한다. 이들 특징의 예후 유용성은, 단독으로 또는 다른 예후 유전자 발현 특징 또는 병기 시스템(staging system)과 함께, 입증되었지만, 이들은 최소 잔존 질환을 정의하는데 잘 기능하지 않으며 예측값을 제공하지 않는다.

[0012] 암의 복잡한 성질 및 치료적 반응성은 표준 경로, 예컨대, RAS 및 NF κ B 경로 활성화뿐만 아니라 다른 특징, 예컨대, 면역요법에 대한 반응 등을 포함하는 일련의 "특징"을 포함한다. 예를 들어, 새롭게 진단된 다발성 골수종의 돌연변이 양상은 RAS(43%) 및 NF κ B(17%) 경로에서의 돌연변이에 의해 지배된다. 이들은 예후적이지 않지만 이들은 치료적으로 표적화될 수 있기 때문에 예측적일 수 있다. 따라서, 형질 세포를 단리하거나 골수 흡인물을 사용할 필요 없이 예후적 및 예측적 혈액 유전자 특징을 확인하는 것은 이 질환에 대한 매력적인 액체 생검 접근법이다.

[0013] 최근에, 이러한 접근법(NETest)은 신경내분비 표현형을 갖는 종양에 대해 개발되었다. 이 혈액 기반 51-특이적 mRNA 표적 분석은 특정 표적 세포 집단의 단리를 요구하지 않는다. 전혈에서의 유전자 발현 측정은 조직 수준과 상관관계가 있으므로, 종양, 그의 병리생리학 및 그의 안정에서 진행으로의 진화 상태에 관한 직접적인 정보를 제공한다. 이것은 진단 도구로서 그리고 신경내분비 종양 행동의 대리(surrogate) 마커로서 기능한다. 모든 유전자의 발현은 예후적인 반면; 대사 및 RAS/RAF 경로에 관여하는 유전자의 하위세트는 이 종양 유형을 위한 펩타이드 수용체 방사선요법에 대한 반응을 예측한다.

[0014] 골수종의 경우, 질환 재발에 대한 진단 또는 예후로서 기능하는 전혈 유래 전사체 바이오마커 패널은 없다. 최소 잔존 질환을 결정하고 재발할 사람을 확인하는데 사용될 수 있는 바이오마커가 현재 부족하다. 또한, 클론성 변화의 조기 검출 또는 불량한 예후의 분자 마커의 확인이 필요하다.

발명의 내용

[0015] 특히, MGUS 및 골수종과 같은 형질 세포 질환을 위한 32-유전자 발현 도구가 본원에 개시된다. 그것은 형질 세포 질환의 검출에 대해 높은 민감도 및 특이성(>95%)을 가질 수 있고, 최소 잔존 질환을 진행성, 활성 질환과 구별할 수 있다. 또한, 그것은 요법에 더 이상 반응하지 않는 환자를 검출할 수 있다. 환자 임상 상태(새롭게 진단됨, 안정/차도 또는 재발/불응성)는 >90%의 전체 정확도로 예측될 수 있다.

[0016] 본 개시내용의 일 양태는 (a) 시험 샘플을 적어도 32개의 바이오마커의 발현을 검출하는데 특이적인 복수의 제제와 접촉시킴으로써 대상의 시험 샘플로부터 적어도 32개의 바이오마커의 발현 수준을 결정하는 단계로서, 적어도 32개의 바이오마커는 ASXL1, BHLHE40, BTG2, COPA, FBXW7, GNA13, IL8, JMJD1C, LARS2, MALAT1, MBNL1, MCL1, NFKBIZ(2 스플라이스 변이체), NR4A1(2 스플라이스 변이체), PDE4B, PIAS2, PRKAA1(2 스플라이스 변이체), SCYL2(2 스플라이스 변이체), SMARCD2, SP1(2 스플라이스 변이체), SRSF5, TAGAP, TANK, TLE4, TSC22D3, UBE2J1, 및 적어도 하나의 하우스키핑 유전자를 포함하는 것인 단계; (b) ASXL1, BHLHE40, BTG2, COPA, FBXW7, GNA13, IL8, JMJD1C, LARS2, MALAT1, MBNL1, MCL1, NFKBIZ(2 스플라이스 변이체), NR4A1(2 스플라이스 변이체), PDE4B, PIAS2, PRKAA1(2 스플라이스 변이체), SCYL2(2 스플라이스 변이체), SMARCD2, SP1(2 스플라이스 변이체), SRSF5, TAGAP, TANK, TLE4, TSC22D3, 및 UBE2J1 각각의 발현 수준을 적어도 하나의 하우스키핑 유전자의 발현 수준으로 정규화하여, ASXL1, BHLHE40, BTG2, COPA, FBXW7, GNA13, IL8, JMJD1C, LARS2, MALAT1, MBNL1, MCL1, NFKBIZ(2 스플라이스 변이체), NR4A1(2 스플라이스 변이체), PDE4B, PIAS2, PRKAA1(2 스플라이스 변이체), SCYL2(2 스플라이스 변이체), SMARCD2, SP1(2 스플라이스 변이체), SRSF5, TAGAP, TANK, TLE4, TSC22D3, 및 UBE2J1 각각의 정규화된 발현 수준을 수득하는 단계; (c) 각각의 정규화된 발현 수준을 알고리즘에 입력하여 스코어를 생성하는 단계; (d) 스코어를 제1 미리 결정된 컷오프 값과 비교하는 단계; 및 (e) 보고서를 생성하는 단계로서, 보고서는 스코어가 제1 미리 결정된 컷오프 값 이상인 경우 대상에서의 형질 세포 질환의 존재를 확인하거나 스코어가 제1 미리 결정된 컷오프 값 미만인 경우 대상에서의 형질 세포 질환의 부재를 결정하고, 제1 미리 결정된 컷오프 값은 0 내지 100의 등급에서 20인 것인 단계를 포함하는, 이를 필요로 하는 대상에서 형질 세포 질환을 검출하는 방법에 관한 것이다.

[0017] 일부 구현예에서, 방법은 형질 세포 질환을 갖는 것으로 확인된 대상을 약물 요법으로 치료하는 단계를 추가로 포함한다.

[0018] 일부 구현예에서, 제1 미리 결정된 컷오프 값은 신생물 질환이 없는 대상으로부터 수득된 복수의 참조 샘플로부터 도출된다. 참조 샘플은 혈액, 혈청, 혈장, 또는 비신생물 조직일 수 있다.

[0019] 본 개시내용의 또 다른 양태는 (a) 시험 샘플을 적어도 32개의 바이오마커의 발현을 검출하는데 특이적인 복수의 제제와 접촉시킴으로써 대상의 시험 샘플로부터 적어도 32개의 바이오마커의 발현 수준을 결정하는 단계로서, 적어도 32개의 바이오마커는 ASXL1, BHLHE40, BTG2, COPA, FBXW7, GNA13, IL8, JMJD1C, LARS2, MALAT1, MBNL1, MCL1, NFKBIZ(2 스플라이스 변이체), NR4A1(2 스플라이스 변이체), PDE4B, PIAS2, PRKAA1(2 스플라이스 변이체), SCYL2(2 스플라이스 변이체), SMARCD2, SP1(2 스플라이스 변이체), SRSF5, TAGAP, TANK, TLE4, TSC22D3, UBE2J1, 및 적어도 하나의 하우스키핑 유전자를 포함하는 것인 단계; (b) ASXL1, BHLHE40, BTG2, COPA, FBXW7, GNA13, IL8, JMJD1C, LARS2, MALAT1, MBNL1, MCL1, NFKBIZ(2 스플라이스 변이체), NR4A1(2 스플라이스 변이체), PDE4B, PIAS2, PRKAA1(2 스플라이스 변이체), SCYL2(2 스플라이스 변이체), SMARCD2, SP1(2 스플라이스 변이체), SRSF5, TAGAP, TANK, TLE4, TSC22D3, 및 UBE2J1 각각의 발현 수준을 적어도 하나의 하우스키핑 유전자의 발현 수준으로 정규화하여, ASXL1, BHLHE40, BTG2, COPA, FBXW7, GNA13, IL8, JMJD1C, LARS2, MALAT1, MBNL1, MCL1, NFKBIZ(2 스플라이스 변이체), NR4A1(2 스플라이스 변이체), PDE4B,

PIAS2, PRKAA1(2 스플라이스 변이체), SCYL2(2 스플라이스 변이체), SMARCD2, SP1(2 스플라이스 변이체), SRSF5, TAGAP, TANK, TLE4, TSC22D3, 및 UBE2J1 각각의 정규화된 발현 수준을 수득하는 단계; (c) 각각의 정규화된 발현 수준을 알고리즘에 입력하여 스코어를 생성하는 단계; (d) 스코어를 제2 미리 결정된 컷오프 값과 비교하는 단계; 및 (e) 보고서를 생성하는 단계로서, 보고서는 스코어가 제2 미리 결정된 컷오프 값 이상인 경우 형질 세포 질환이 진행성이라고 확인하거나 스코어가 제2 미리 결정된 컷오프 값 미만인 경우 형질 세포 질환이 안정하다고 확인하고, 제2 미리 결정된 컷오프 값은 0 내지 100의 등급에서 40인 것인 단계를 포함하는, 대상에 서의 형질 세포 질환이 안정한지 또는 진행성인지 결정하는 방법에 관한 것이다.

[0020] 본 개시내용의 또 다른 양태는 (a) 시험 샘플을 적어도 32개의 바이오마커의 발현을 검출하는데 특이적인 복수의 제제와 접촉시킴으로써 치료 후 대상의 시험 샘플로부터 적어도 32개의 바이오마커의 발현 수준을 결정하는 단계로서, 적어도 32개의 바이오마커는 ASXL1, BHLHE40, BTG2, COPA, FBXW7, GNA13, IL8, JMJD1C, LARS2, MALAT1, MBNL1, MCL1, NFKBIZ(2 스플라이스 변이체), NR4A1(2 스플라이스 변이체), PDE4B, PIAS2, PRKAA1(2 스플라이스 변이체), SCYL2(2 스플라이스 변이체), SMARCD2, SP1(2 스플라이스 변이체), SRSF5, TAGAP, TANK, TLE4, TSC22D3, UBE2J1, 및 적어도 하나의 하우스키핑 유전자를 포함하는 것인 단계; (b) ASXL1, BHLHE40, BTG2, COPA, FBXW7, GNA13, IL8, JMJD1C, LARS2, MALAT1, MBNL1, MCL1, NFKBIZ(2 스플라이스 변이체), NR4A1(2 스플라이스 변이체), PDE4B, PIAS2, PRKAA1(2 스플라이스 변이체), SCYL2(2 스플라이스 변이체), SMARCD2, SP1(2 스플라이스 변이체), SRSF5, TAGAP, TANK, TLE4, TSC22D3, 및 UBE2J1 각각의 발현 수준을 적어도 하나의 하우스키핑 유전자의 발현 수준으로 정규화하여, ASXL1, BHLHE40, BTG2, COPA, FBXW7, GNA13, IL8, JMJD1C, LARS2, MALAT1, MBNL1, MCL1, NFKBIZ(2 스플라이스 변이체), NR4A1(2 스플라이스 변이체), PDE4B, PIAS2, PRKAA1(2 스플라이스 변이체), SCYL2(2 스플라이스 변이체), SMARCD2, SP1(2 스플라이스 변이체), SRSF5, TAGAP, TANK, TLE4, TSC22D3, 및 UBE2J1 각각의 정규화된 발현 수준을 수득하는 단계; (c) 각각의 정규화된 발현 수준을 알고리즘에 입력하여 스코어를 생성하는 단계; (d) 스코어를 제3 미리 결정된 컷오프 값과 비교하는 단계; 및 (e) 보고서를 생성하는 단계로서, 보고서는 스코어가 제3 미리 결정된 컷오프 값 이상인 경우 대상이 질환 재발의 높은 위험을 갖는다고 확인하거나 스코어가 제3 미리 결정된 컷오프 값 미만인 경우 대상이 질환 재발의 낮은 위험을 갖는다고 확인하고, 제3 미리 결정된 컷오프 값은 0 내지 100의 등급에서 40인 것인 단계를 포함하는, 형질 세포 질환을 갖는 대상에서 질환 재발의 위험을 결정하는 방법에 관한 것이다.

[0021] 본 개시내용의 또 다른 양태는 (a) 제1 시험 샘플을 적어도 31개의 바이오마커의 발현을 검출하는데 특이적인 복수의 제제와 접촉시킴으로써 제1 시점에 대상의 제1 시험 샘플로부터 적어도 31개의 바이오마커의 제1 발현 수준을 결정하는 단계로서, 적어도 31개의 바이오마커는 ASXL1, BHLHE40, BTG2, COPA, FBXW7, GNA13, IL8, JMJD1C, LARS2, MALAT1, MBNL1, MCL1, NFKBIZ(2 스플라이스 변이체), NR4A1(2 스플라이스 변이체), PDE4B, PIAS2, PRKAA1(2 스플라이스 변이체), SCYL2(2 스플라이스 변이체), SMARCD2, SP1(2 스플라이스 변이체), SRSF5, TAGAP, TANK, TLE4, TSC22D3, 및 UBE2J1을 포함하는 것인 단계; (b) 제2 시험 샘플을 적어도 31개의 바이오마커의 발현을 검출하는데 특이적인 복수의 제제와 접촉시킴으로써 제2 시점에 대상의 제2 시험 샘플로부터 적어도 31개의 바이오마커의 제2 발현 수준을 결정하는 단계로서, 제2 시점은 제1 시점 후 및 대상에게 요법을 실시한 후인 것인 단계; (c) 제1 발현 수준을 제2 발현 수준과 비교하는 단계; 및 (d) 보고서를 생성하는 단계로서, 보고서는 제2 발현 수준이 제1 발현 수준과 비교하여 유의하게 감소되는 경우 대상이 요법에 대해 반응성이라고 확인하는 것인 단계를 포함하는, 요법에 대한 형질 세포 질환을 갖는 대상에 의한 반응을 결정하는 방법에 관한 것이다.

[0022] 일부 구현예에서, 제1 시점은 대상에게 요법을 실시하기 전이다. 일부 구현예에서, 제1 시점은 대상에게 요법을 실시한 후이다. 일부 구현예에서, 요법은 표적화된 요법(예컨대, 프로테아좀 억제제)을 포함한다.

[0023] 상기 양태 중 어느 것의 일부 구현예에서, 형질 세포 질환은 MGUS 또는 골수종이다.

[0024] 상기 양태 중 어느 것의 일부 구현예에서, 적어도 하나의 하우스키핑 유전자는 ALG9, SEPN, YWHAQ, VPS37A, PRRC2B, DOPEY2, NDUFB11, ND4, MRPL19, PSMC4, SF3A1, PUM1, ACTB, GAPD, GUSB, RPLP0, TFRC, MORF4L1, 18S, PPIA, PGK1, RPL13A, B2M, YWHAZ, SDHA, HPRT1, TOX4, 및 TPT1로 이루어진 군으로부터 선택된다.

[0025] 상기 양태 중 어느 것의 일부 구현예에서, 방법은 적어도 75%, 80%, 85%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 또는 99%의 특이성, 민감도, 및/또는 정확도를 가질 수 있다. 상기 양태 중 어느 것의 일부 구현예에서, 방법은 90% 초과 민감도를 갖는다. 상기 양태 중 어느 것의 일부 구현예에서, 방법은 90% 초과 특이성을 갖는다.

[0026] 상기 양태 중 어느 것의 일부 구현예에서, 적어도 32개의 바이오마커 중 적어도 하나는 RNA, cDNA, 또는 단백질

이다. 바이오마커가 RNA인 경우, RNA는 역전사되어 cDNA를 생산할 수 있고, 생산된 cDNA 발현 수준은 검출된다. 상기 양태 중 어느 것의 일부 구현예에서, 바이오마커의 발현 수준은 바이오마커 및 표지된 프로브 또는 프라이머 사이에 복합체를 형성함으로써 검출된다. 바이오마커가 RNA 또는 cDNA인 경우, RNA 또는 cDNA는 RNA 또는 cDNA 및 표지된 핵산 프로브 또는 프라이머 사이에 복합체를 형성함으로써 검출될 수 있다. 바이오마커가 단백질인 경우, 단백질은 단백질 및 표지된 항체 사이에 복합체를 형성함으로써 검출될 수 있다. 표지는 형광 표지일 수 있다.

[0027] 상기 양태 중 어느 것의 일부 구현예에서, 시험 샘플은 혈액, 혈청, 혈장, 또는 신생물 조직이다. 일부 구현예에서, 참조 샘플은 혈액, 혈청, 혈장, 또는 비신생물 조직이다.

[0028] 상기 양태 중 어느 것의 일부 구현예에서, 이를 필요로 하는 대상은 형질 세포 질환으로 진단된 대상, 적어도 하나의 형질 세포 질환 증상을 갖는 대상, 또는 형질 세포 질환이 발생할 소인 또는 가족력을 갖는 대상이다. 일부 구현예에서, 대상은 인간이다.

[0029] 상기 양태 중 어느 것의 일부 구현예에서, 알고리즘은 XGB, RF, glmnet, cforest, CART, treebag, knn, nnet, SVM-방사형, SVM-선형, NB, NNET, mlp, 또는 로지스틱 회귀 모델링이다.

도면의 간단한 설명

[0030] 도 1은 골수종의 정규화된 31개 표적 전사체(26개의 유전자, 5개의 스플라이스 변이체) 마커의 상호작용 및 기능적 분석을 나타내는 그래프이다. 유전자 전사체는 조절 활성의 일반적인 패턴과 일치하는 상호작용체(interactome) 수준에서 유의하게 기능적으로 연관되었다. 2개의 전사체 MCL1 및 COPA는 골수종에서 증폭을 나타내는 것으로 알려진 영역인 염색체 1q와 연관되었다. 기능적 수준에서, 확인된 마커는 혈관신생, 세포자멸사, 면역 반응성, 표현형 정의, 단백질 가공(분비), 증식, RNA 가공 및 생존을 포함하는 일련의 생물학적 과정을 캡처하였다. 많은 전사체는 약물 표적 효능에 대한 잠재적인 약물 표적 또는 마커인 유전자를 코딩하였다.

도 2A-2B는 시험 세트 I에서 MelanomX(26개의 유전자 및 5개의 스플라이스 변이체의 정규화된 발현)에 대한 수신자 조작 곡선 분석 및 지표를 보여주는 그래프이다. 도 2A는 골수종($n=57$) 및 대조군($n=23$)을 구별하기 위한 곡선하 면적(AUC)이 0.99 ± 0.005 ($p < 0.0001$)이었음을 보여주는 그래프이다. 도 2B는 진단으로서 MelanomX에 대한 지표가 민감도 >95%, 특이성 100%, PPV 100%, NPV 88.5%를 갖는다는 것을 보여주는 그래프이다. 시험 세트 I에서 전체 정확도는 96%였다.

도 3A-3B는 MGUS($n=18$) 대 대조군($n=155$)에서의 MyelomX 스코어를 보여주는 그래프이다. 도 3A는 MGUS 환자($n=18$)가 대조군보다 유의하게 더 높은($39 \pm 9\%$, $p < 0.0001$) 스코어를 나타내었음을 보여주는 그래프이다. 대조군 수준은 $12 \pm 8\%$ 였다. 도 3B는 MGUS를 대조군과 구별하기 위한 AUC가 0.97 ± 0.01 ($p < 0.0001$)이었음을 보여주는 그래프이다.

도 4A-4B는 상이한 다발성 골수종 하위그룹에서의 MyelomX 스코어를 보여주는 그래프이다. 도 4A는 새롭게 진단된 환자($n=53$)가 임상적으로 안정한 질환을 갖는 환자($n=56$; 31 ± 20)보다 유의하게 더 높은(75 ± 25 ; $p < 0.0001$) 스코어를 나타내었음을 보여주는 그래프이다. 불응성 질환을 갖는 환자($n=26$)도 더 높은 스코어(92 ± 17 ; $p < 0.0001$ 대 안정한 질환)를 나타내었다. 도 4B는 안정한 질환과 불응성 질환을 구별하기 위한 AUC가 0.97 ± 0.03 ($p < 0.0001$)이었음을 보여주는 그래프이다.

도 5A-5C는 시험 세트 II에서의 MyelomX 스코어를 보여주는 그래프이다. 도 5A는 다발성 골수종($n=81$)에서의 평균 MyelomX 스코어가 대조군($n=155$; 12 ± 8)보다 유의하게 더 높았음을(47 ± 14 , $p < 0.0001$) 보여주는 그래프이다. 도 5B는 골수종 및 대조군을 구별하기 위한 AUC가 0.97 ± 0.01 ($p < 0.0001$)이었음을 보여주는 그래프이다. 도 5C는 진단으로서 MelanomX에 대한 지표(컷오프로서 20을 사용하여)가 민감도 97.5%, 특이성 93.6%, PPV 88.8%, NPV 98.6%를 갖는다는 것을 보여주는 그래프이다. 시험 세트 II에서 전체 정확도는 94%였다.

도 6은 MelanomX에 대한 요법의 효과를 보여주는 그래프이다. 요법은 40명의 환자에서 스코어를 59 ± 14 (요법 전)에서 35 ± 12 로 유의하게($p < 0.0001$) 감소시켰다. 높은 스코어(≥ 40)를 갖는 10명의 환자 모두는 조기(1년 이내)에 재발하였다.

도 7은 MelanomX에 대한 3개월 보르테모지브(bortezomib) 요법의 효과를 보여주는 그래프이다. 요법에 반응한 15명의 환자에서 요법은 스코어를 64 ± 9 (요법 전)에서 23 ± 12 로 유의하게($p < 0.0001$) 감소시켰다. 불응성인 8명의 환자는 상승된 스코어를 나타내었다(60 ± 9 , $p = \text{NS}$ 대 치료 전).

도 8A-8B는 3개의 상이한 골수종 세포주에서의 MyelomX 스코어를 보여주는 그래프 세트이다. 도 8A는 세포주가 상승된 발현 - 60(MM-1R) 내지 86(RPMI-8226) 범위의 MyelomX 스코어를 입증한다는 것을 확인한다. 도 8B는 골수종 또는 다른 형질 세포 질환을 갖지 않는 대상의 혈액에 이들 세포를 첨가하는 것이 검출가능한 유전자 발현 및 스코어를 초래하였음을 확인한다. 혈액 ml당 최소 1개의 세포가 일관되게 확인될 수 있었다.

도 9A-9B는 3명의 상이한 다발성 골수종 환자의 상이한 FAC-분류된(CD138+) 및 일치된 전혈 샘플에서의 MyelomX 스코어를 보여주는 그래프 세트이다. 도 9A는 FACS 샘플 및 전혈로부터의 스코어를 확인하고 스코어가 양성이고 동일하다는 것을 확인한다. 도 9B는 일치된 혈액 샘플과 비교하여 FACS 샘플에서의 유전자 발현이 순환하는 다발성 골수종 세포를 검출하는 분석과 일관되게 매우 일치(상관관계 ~0.90)한다는 것을 확인한다.

발명을 실시하기 위한 구체적인 내용

- [0031] 본 발명의 세부사항은 아래에 첨부된 설명에 제시된다. 본원에 기재된 것과 유사하거나 동등한 방법 및 물질이 본 발명의 실시 또는 시험에 사용될 수 있지만, 예시적인 방법 및 물질이 기재되어 있다. 본 발명의 다른 특징, 목적, 및 이점은 설명 및 청구범위로부터 명백할 것이다. 명세서 및 첨부된 청구범위에서, 단수 형태는 또한 맥락이 달리 명확히 지시하지 않는 한 복수를 포함한다. 달리 정의되지 않는 한, 본원에 사용된 모든 기술 및 과학 용어는 본 발명이 속하는 당업자에 의해 일반적으로 이해되는 것과 동일한 의미를 갖는다. 본 명세서에 인용된 모든 특허 및 간행물은 그 전체가 참고로 본원에 포함된다.
- [0032] 형질 세포 질환(형질 세포 장애 및 형질 세포 증식성 질환으로도 불림)은 전-악성(pre-malignant) 또는 악성 형질 세포의 클론 또는 다수의 클론이 골수종 단백질, 즉, 비정상적인 단클론 항체 또는 이의 부분을 과다생산하고 이를 혈류 내로 분비하는 광범위한 점진적으로 더 심각한 단클론 감마글로불린혈증이다. 형질 세포 질환은 상이한 단계에서 발생할 수 있다. MGUS 단계는 비-IgM MGUS, IgM MGUS, 경쇄 MGUS, 또는 신장 관련 단클론 감마글로불린혈증일 수 있다. 무증상 다발성 골수종(SMM) 단계는 비-IgM SMM, 무증상 발덴스트롬 마크로글로불린혈증, 또는 경쇄 SMM일 수 있다. 악성 상태는 고립성 형질세포종, 비분비성 다발성 골수종, 수반되는 만성 림프성 백혈병/단클론 B-세포 림프구증가증을 갖는 형질 세포 골수종, 발덴스트롬 마크로글로불린혈증, 다발성 골수종, 경쇄 다발성 골수종, 또는 형질 세포 백혈병일 수 있다. 일부 구현예에서, 형질 세포 질환은 MGUS이다. 일부 구현예에서, 형질 세포 질환은 골수종이다.
- [0033] 증상 및 징후는 골수종을 갖는 환자마다 크게 다를 수 있는데, 많은 장기가 골수종에 의해 영향을 받을 수 있기 때문이다. 증상은, 비제한적으로, 뼈 통증, 빈혈, 신부전, 감염, 및 신경학적 증상(예컨대, 나약, 혼란, 피로, 두통, 시각 변화, 망막증, 근통, 장, 방광 조절 상실, 또는 수근관 증후군을 포함할 수 있다.
- [0034] 전통적으로, 골수종은 혈액 검사 또는 소변 검사를 통해 진단될 수 있다. 골수종 세포는 M 단백질 및 베타-2 마이크로글로불린을 생산하며, 이는 혈액 검사에 의해 검출될 수 있다. M 단백질은 또한 소변 검사에 의해 검출될 수 있다. 골수종은 골수의 조사를 통해 진단될 수 있다. 구체적으로, 골수 샘플을 꺼내고, 샘플을 골수종 세포에 대해 조사한다. 전문적인 검사, 예컨대 형광 제자리 혼성화(FISH)는 골수종 세포를 분석하여 이들의 염색체 비정상성을 이해할 수 있다. 골수종 세포의 분열 속도를 측정하기 위한 검사가 또한 수행된다. 다발성 골수종과 관련된 골 문제를 검출하기 위해 영상 검사가 또한 수행될 수 있다. 검사는 X선, MRI, CT 또는 양전자 방출 단층촬영(PET)을 포함할 수 있다.
- [0035] 본 개시내용은 특히 활성 질환을 확인하거나, 치료 반응의 평가를 제공하거나, 재발 위험을 예측하거나, 표준 임상 평가 및 영상과 함께 최소 잔존물을 확인하는데 사용될 수 있는 MyelomX 스코어를 제공한다. 순환하는 형질 세포 질환 전사체의 측정인 MyelomX는 형질 세포 질환을 확인할 수 있고, MyelomX 스코어의 감소는 프로테아좀 억제제 및 면역조절제와 같은 치료적 개입의 효능과 상관관계가 있다. RNA의 표적화된 유전자 발현 프로파일은 형질 세포 질환을 갖는 환자의 생물학적 샘플(예컨대, 말초 혈액)로부터 단리될 수 있다. 이 발현 프로파일은 알고리즘에서 평가되어 출력(예측)으로 변환될 수 있다.
- [0036] 일 양태에서, 본 개시내용은 (a) 시험 샘플을 적어도 32개의 바이오마커의 발현을 검출하는데 특이적인 복수의 제제와 접촉시킴으로써 대상의 시험 샘플로부터 적어도 32개의 바이오마커의 발현 수준을 결정하는 단계로서, 적어도 32개의 바이오마커는 ASXL1, BHLHE40, BTG2, COPA, FBXW7, GNA13, IL8, JMJD1C, LARS2, MALAT1, MBNL1, MCL1, NFKBIZ(2 스플라이스 변이체), NR4A1(2 스플라이스 변이체), PDE4B, PIAS2, PRKAA1(2 스플라이스 변이체), SCYL2(2 스플라이스 변이체), SMARCD2, SP1(2 스플라이스 변이체), SRSF5, TAGAP, TANK, TLE4, TSC22D3, UBE2J1, 및 적어도 하나의 하우스키핑 유전자를 포함하는 것인 단계; (b) ASXL1, BHLHE40, BTG2, COPA, FBXW7, GNA13, IL8, JMJD1C, LARS2, MALAT1, MBNL1, MCL1, NFKBIZ(2 스플라이스 변이체), NR4A1(2 스플

라이스 변이체), PDE4B, PIAS2, PRKAA1(2 스플라이스 변이체), SCYL2(2 스플라이스 변이체), SMARCD2, SP1(2 스플라이스 변이체), SRSF5, TAGAP, TANK, TLE4, TSC22D3, 및 UBE2J1 각각의 발현 수준을 적어도 하나의 하위 스킵핑 유전자의 발현 수준으로 정규화하여, ASXL1, BHLHE40, BTG2, COPA, FBXW7, GNA13, IL8, JMJD1C, LARS2, MALAT1, MBNL1, MCL1, NFKBIZ(2 스플라이스 변이체), NR4A1(2 스플라이스 변이체), PDE4B, PIAS2, PRKAA1(2 스플라이스 변이체), SCYL2(2 스플라이스 변이체), SMARCD2, SP1(2 스플라이스 변이체), SRSF5, TAGAP, TANK, TLE4, TSC22D3, 및 UBE2J1 각각의 정규화된 발현 수준을 취득하는 단계; (c) 각각의 정규화된 발현 수준을 알고리즘에 입력하여 스코어를 생성하는 단계; (d) 스코어를 제1 미리 결정된 컷오프 값과 비교하는 단계; 및 (e) 보고서를 생성하는 단계로서, 보고서는 스코어가 제1 미리 결정된 컷오프 값 이상인 경우 대상에서의 형질 세포 질환의 존재를 확인하거나 스코어가 제1 미리 결정된 컷오프 값 미만인 경우 대상에서의 형질 세포 질환의 부재를 결정하고, 제1 미리 결정된 컷오프 값은 0 내지 100의 등급에서 20인 것인 단계를 포함하는, 이를 필요로 하는 대상에서 형질 세포 질환을 검출하는 방법에 관한 것이다.

[0037] NFKBIZ, NR4A1, PRKAA1, SCYL2, 및 SP1에 대한 스플라이스 변이체의 신원(identity)은 표 2에서 발견될 수 있다.

[0038] 제공된 방법 중에는 MGUS 및 골수종과 같은 형질 세포 질환을 분류하거나 검출할 수 있는 방법이 있다. 일부 구현예에서, 제공된 방법은 인간 생물학적 샘플에서 형질 세포 질환을 확인하거나 분류할 수 있다. 일부 구현예에서, 생물학적 샘플은 혈액, 혈청, 혈장, 또는 신생물 조직이다. 일부 예에서, 방법은 적어도 75%, 80%, 85%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 또는 99%의 특이성, 민감도, 및/또는 정확도로 이러한 정보를 제공할 수 있다.

[0039] 제제는 바이오마커의 검출을 위한 임의의 제제일 수 있으며, 전형적으로 단리된 폴리뉴클레오타이드 또는 단리된 폴리펩타이드 또는 단백질, 예컨대 항체, 예를 들어, 적어도 32개의 바이오마커에 특이적으로 혼성화하거나 결합하는 것들이다.

[0040] 바이오마커는 RNA, cDNA, 또는 단백질일 수 있다. 바이오마커가 RNA인 경우, RNA는 역전사되어 cDNA를 생산할 수 있고(예컨대, RT-PCR에 의해), 생산된 cDNA 발현 수준은 검출된다. 바이오마커의 발현 수준은 바이오마커 및 표지된 프로브 또는 프라이머 사이에 복합체를 형성함으로써 검출될 수 있다. 바이오마커가 RNA 또는 cDNA인 경우, RNA 또는 cDNA는 RNA 또는 cDNA 및 표지된 핵산 프로브 또는 프라이머 사이에 복합체를 형성함으로써 검출될 수 있다. RNA 또는 cDNA 및 표지된 핵산 프로브 또는 프라이머 사이의 복합체는 혼성화 복합체일 수 있다.

[0041] 바이오마커가 단백질인 경우, 단백질은 단백질 및 표지된 항체 사이에 복합체를 형성함으로써 검출될 수 있다. 표지는 임의의 표지, 예를 들어 형광 표지, 발광 표지, 방사성 표지 등일 수 있다. 단백질 수준은 유전자에 의해 코딩된 단백질을 특이적으로 검출하는, 제제, 예컨대 항체를 사용하여, 비제한적으로, 면역침전, ELISA, 웨스턴 블롯 분석, 또는 면역조직화학을 포함하는 방법에 의해 측정될 수 있다.

[0042] 일부 구현예에서, 방법은 시험 샘플을 제공된 제제 중 하나, 보다 전형적으로 복수의 제공된 제제, 예를 들어, 적어도 32개의 바이오마커에 특이적으로 결합하는 폴리뉴클레오타이드의 세트와 접촉시킴으로써 수행된다. 일부 구현예에서, 폴리뉴클레오타이드의 세트는 DNA, RNA, cDNA, PNA, 게놈 DNA, 또는 합성 올리고뉴클레오타이드를 포함한다. 일부 구현예에서, 방법은 RT-PCR, 예컨대, QPCR에 의한 검출 전에 시험 샘플로부터 RNA를 단리하는 단계를 포함한다. 따라서, 일부 구현예에서, 바이오마커, 예컨대 이의 발현 수준의 검출은 RNA의 존재, 부재, 또는 양을 검출하는 것을 포함한다. 일 예에서, RNA는 PCR 또는 혼성화에 의해 검출된다.

[0043] 일부 구현예에서, 폴리뉴클레오타이드는 적어도 32개의 바이오마커 각각에 특이적인 프라이머의 쌍과 같은 센스 및 안티센스 프라이머를 포함한다. 이 구현예의 일 양태에서, 적어도 32개의 바이오마커의 검출은 PCR, 전형적으로 정량적 또는 실시간 PCR에 의해 수행된다. 예를 들어, 일 양태에서, 검출은 역전사에 의해 시험 샘플로부터 cDNA를 생산한 다음, 적어도 32개의 바이오마커의 패널에 특이적으로 혼성화하는 센스 및 안티센스 프라이머의 쌍을 사용하여 cDNA를 증폭하고, 증폭 산물을 검출함으로써 수행된다.

[0044] 시험 샘플은 대상으로부터 취득된 임의의 생물학적 유체일 수 있다. 바람직하게는, 시험 샘플은 혈액, 혈청, 혈장, 또는 신생물 조직이다. 일부 구현예에서, 시험 샘플은 혈액 샘플이다.

[0045] 제1 미리 결정된 컷오프 값은 신생물 질환이 없는 대상으로부터 취득된 복수의 참조 샘플로부터 도출될 수 있다. 바람직하게는, 참조 샘플은 혈액, 혈청, 혈장, 또는 비신생물 조직이다.

[0046] 이를 필요로 하는 대상은 형질 세포 질환으로 진단된 대상, 적어도 하나의 형질 세포 질환 증상을 갖는 대상, 또는 형질 세포 질환이 발생할 소인 또는 가족력을 갖는 대상일 수 있다. 대상은 임의의 포유동물일 수 있다.

바람직하게는, 대상은 인간이다. 용어 "대상" 및 "환자"는 본원에서 상호교환적으로 사용된다.

[0047] 일부 구현예에서, 방법은 시험 샘플에서 적어도 32개의 바이오마커의 수학적으로 도출된 발현 수준 스코어를 결정하는 단계를 추가로 포함할 수 있다. 이것은 0 내지 100의 등급을 갖는 MyelomX 스코어이다. MyelomX 스코어는 예측 분류 알고리즘, 예컨대, XGB, RF, glmnet, cforest, CART, treebag, knn, nnet, SVM-방사형, SVM-선형, NB, mlp, 또는 로지스틱 회귀 모델링으로부터 제작된 분류기(classifier)의 산물이다. 일부 구현예에서, 사용된 예측 분류 알고리즘은 XGB이다.

[0048] 방법은 형질 세포 질환을 갖는 것으로 확인된 대상을 표적화된 요법, 생물학적 요법, 화학요법, 코르티코스테로이드, 줄기 세포 이식, 방사선 요법, 또는 이의 조합으로 치료하는 단계를 추가로 포함할 수 있다. 표적화된 요법은 프로테아좀 억제제의 사용을 포함할 수 있다. 일부 구현예에서, 표적화된 요법은 보르테조미(bortezomib) 및/또는 카르필조미(carfilzomib)를 포함할 수 있다. 생물학적 요법은 면역조절제를 포함할 수 있다. 일부 구현예에서, 생물학적 요법은 탈리도미드(thalidomide), 레날리도미드(lenalidomide), 및/또는 포말리도미드(pomalidomide)를 포함할 수 있다. 화학요법은 임의의 공지된 화학요법 약물을 포함할 수 있다. 코르티코스테로이드는 프레드니손 또는 덱사메타손일 수 있다.

[0049] 본 개시내용은 또한 (a) 시험 샘플을 적어도 32개의 바이오마커의 발현을 검출하는데 특이적인 복수의 제제와 접촉시킴으로써 대상의 시험 샘플로부터 적어도 32개의 바이오마커의 발현 수준을 결정하는 단계로서, 적어도 32개의 바이오마커는 ASXL1, BHLHE40, BTG2, COPA, FBXW7, GNA13, IL8, JMJD1C, LARS2, MALAT1, MBNL1, MCL1, NFKBIZ(2 스플라이스 변이체), NR4A1(2 스플라이스 변이체), PDE4B, PIAS2, PRKAA1(2 스플라이스 변이체), SCYL2(2 스플라이스 변이체), SMARCD2, SP1(2 스플라이스 변이체), SRSF5, TAGAP, TANK, TLE4, TSC22D3, UBE2J1, 및 적어도 하나의 하우스키핑 유전자를 포함하는 것인 단계; (b) ASXL1, BHLHE40, BTG2, COPA, FBXW7, GNA13, IL8, JMJD1C, LARS2, MALAT1, MBNL1, MCL1, NFKBIZ(2 스플라이스 변이체), NR4A1(2 스플라이스 변이체), PDE4B, PIAS2, PRKAA1(2 스플라이스 변이체), SCYL2(2 스플라이스 변이체), SMARCD2, SP1(2 스플라이스 변이체), SRSF5, TAGAP, TANK, TLE4, TSC22D3, 및 UBE2J1 각각의 발현 수준을 적어도 하나의 하우스키핑 유전자의 발현 수준으로 정규화하여, ASXL1, BHLHE40, BTG2, COPA, FBXW7, GNA13, IL8, JMJD1C, LARS2, MALAT1, MBNL1, MCL1, NFKBIZ(2 스플라이스 변이체), NR4A1(2 스플라이스 변이체), PDE4B, PIAS2, PRKAA1(2 스플라이스 변이체), SCYL2(2 스플라이스 변이체), SMARCD2, SP1(2 스플라이스 변이체), SRSF5, TAGAP, TANK, TLE4, TSC22D3, 및 UBE2J1 각각의 정규화된 발현 수준을 얻는 단계; (c) 각각의 정규화된 발현 수준을 알고리즘에 입력하여 스코어를 생성하는 단계; (d) 스코어를 제2 미리 결정된 컷오프 값과 비교하는 단계; 및 (e) 보고서를 생성하는 단계로서, 보고서는 스코어가 제2 미리 결정된 컷오프 값 이상인 경우 형질 세포 질환이 진행성이라고 확인하거나 스코어가 제2 미리 결정된 컷오프 값 미만인 경우 형질 세포 질환이 안정하다고 확인하고, 제2 미리 결정된 컷오프 값은 0 내지 100의 등급에서 40인 것인 단계를 포함하는, 대상에서의 형질 세포 질환이 안정한지 진행성인지 결정하는 방법을 제공한다.

[0050] 제2 미리 결정된 컷오프 값은 질환 진행을 입증하고 있는 형질 세포 질환을 갖는 대상으로부터 획득된 복수의 참조 샘플로부터 도출될 수 있다.

[0051] 본 개시내용은 또한 (a) 시험 샘플을 적어도 32개의 바이오마커의 발현을 검출하는데 특이적인 복수의 제제와 접촉시킴으로써 치료 후 대상의 시험 샘플로부터 적어도 32개의 바이오마커의 발현 수준을 결정하는 단계로서, 적어도 32개의 바이오마커는 ASXL1, BHLHE40, BTG2, COPA, FBXW7, GNA13, IL8, JMJD1C, LARS2, MALAT1, MBNL1, MCL1, NFKBIZ(2 스플라이스 변이체), NR4A1(2 스플라이스 변이체), PDE4B, PIAS2, PRKAA1(2 스플라이스 변이체), SCYL2(2 스플라이스 변이체), SMARCD2, SP1(2 스플라이스 변이체), SRSF5, TAGAP, TANK, TLE4, TSC22D3, UBE2J1, 및 적어도 하나의 하우스키핑 유전자를 포함하는 것인 단계; (b) ASXL1, BHLHE40, BTG2, COPA, FBXW7, GNA13, IL8, JMJD1C, LARS2, MALAT1, MBNL1, MCL1, NFKBIZ(2 스플라이스 변이체), NR4A1(2 스플라이스 변이체), PDE4B, PIAS2, PRKAA1(2 스플라이스 변이체), SCYL2(2 스플라이스 변이체), SMARCD2, SP1(2 스플라이스 변이체), SRSF5, TAGAP, TANK, TLE4, TSC22D3, 및 UBE2J1 각각의 발현 수준을 적어도 하나의 하우스키핑 유전자의 발현 수준으로 정규화하여, ASXL1, BHLHE40, BTG2, COPA, FBXW7, GNA13, IL8, JMJD1C, LARS2, MALAT1, MBNL1, MCL1, NFKBIZ(2 스플라이스 변이체), NR4A1(2 스플라이스 변이체), PDE4B, PIAS2, PRKAA1(2 스플라이스 변이체), SCYL2(2 스플라이스 변이체), SMARCD2, SP1(2 스플라이스 변이체), SRSF5, TAGAP, TANK, TLE4, TSC22D3, 및 UBE2J1 각각의 정규화된 발현 수준을 얻는 단계; (c) 각각의 정규화된 발현 수준을 알고리즘에 입력하여 스코어를 생성하는 단계; (d) 스코어를 제3 미리 결정된 컷오프 값과 비교하는 단계; 및 (e) 보고서를 생성하는 단계로서, 보고서는 스코어가 제3 미리 결정된 컷오프 값 이상인 경우 대상이 질환 재발의 높은 위험을 갖는다고 확인하거나 스코어가 제3 미리 결정된 컷오프 값 미만인 경우 대상이 질환 재발의 낮은

위험을 갖는다고 확인하고, 제3 미리 결정된 컷오프 값은 0 내지 100의 등급에서 40인 것인 단계를 포함하는, 형질 세포 질환을 갖는 대상에서 질환 재발의 위험을 결정하는 방법을 제공한다.

- [0052] 제3 미리 결정된 컷오프 값은 요법에 의해 충분히 제어되고 있는 형질 세포 질환을 갖는 대상으로부터 수득된 복수의 참조 샘플로부터 도출될 수 있다.
- [0053] 본 개시내용은 또한 (a) 제1 시험 샘플을 적어도 31개의 바이오마커의 발현을 검출하는데 특이적인 복수의 제제와 접촉시킴으로써 제1 시점에 대상의 제1 시험 샘플로부터 적어도 31개의 바이오마커의 제1 발현 수준을 결정하는 단계로서, 적어도 31개의 바이오마커는 ASXL1, BHLHE40, BTG2, COPA, FBXW7, GNA13, IL8, JMJD1C, LARS2, MALAT1, MBNL1, MCL1, NFKBIZ(2 스플라이스 변이체), NR4A1(2 스플라이스 변이체), PDE4B, PIAS2, PRKAA1(2 스플라이스 변이체), SCYL2(2 스플라이스 변이체), SMARCD2, SP1(2 스플라이스 변이체), SRSF5, TAGAP, TANK, TLE4, TSC22D3, 및 UBE2J1을 포함하는 것인 단계; (b) 제2 시험 샘플을 적어도 31개의 바이오마커의 발현을 검출하는데 특이적인 복수의 제제와 접촉시킴으로써 제2 시점에 대상의 제2 시험 샘플로부터 적어도 31개의 바이오마커의 제2 발현 수준을 결정하는 단계로서, 제2 시점은 제1 시점 후 및 대상에게 요법을 실시한 후인 것인 단계; (c) 제1 발현 수준을 제2 발현 수준과 비교하는 단계; 및 (d) 보고서를 생성하는 단계로서, 보고서는 제2 발현 수준이 제1 발현 수준과 비교하여 유의하게 감소되는 경우 대상이 요법에 반응성이라고 확인하는 것인 단계를 포함하는, 요법에 대한 형질 세포 질환을 갖는 대상에 의한 반응을 결정하는 방법을 제공한다.
- [0054] 일부 구현예에서, 방법은 형질 세포 질환 치료, 예컨대 약물 요법(예를 들어, 면역요법 또는 표적화된 요법)에 대한 치료 반응성을 예측할 수 있거나, 또는 환자가 형질 세포 질환 치료, 예컨대 약물 요법(예를 들어, 면역요법 또는 표적화된 요법) 후에 임상적으로 안정하게 되는지 또는 이에 반응성 또는 비반응성인지 여부를 결정할 수 있다. 일부 경우에, 방법은 적어도 75%, 80%, 85%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 또는 99%의 특이성, 민감도, 및/또는 정확도로 이를 수행할 수 있다.
- [0055] 일부 구현예에서, 제1 및 제2 시험 샘플은 동일한 유형일 수 있다. 일부 구현예에서, 제1 및 제2 시험 샘플은 상이한 유형일 수 있다.
- [0056] 일부 구현예에서, 요법은 약물 요법일 수 있다. 약물 요법은 면역요법, 표적화된 요법, 화학요법, 또는 이의 조합일 수 있다. 일부 구현예에서, 요법은 방사선 요법일 수 있다.
- [0057] 일부 구현예에서, 제1 시점은 대상에게 요법을 실시하기 전이다. 일부 구현예에서, 제1 시점은 대상에게 요법을 실시한 후이다. 제2 시점은 제1 시점 후 며칠, 몇 주 또는 몇 개월일 수 있다. 예를 들어, 제2 시점은 제1 시점 후 적어도 1일, 적어도 7일, 적어도 14일, 적어도 30일, 적어도 60일, 또는 적어도 90일일 수 있다.
- [0058] 일부 구현예에서, 제2 발현 수준이 제1 발현 수준보다 적어도 10% 낮은 경우 제2 발현 수준은 제1 발현 수준과 비교하여 유의하게 감소된다. 일부 구현예에서, 제2 발현 수준이 제1 발현 수준보다 적어도 20% 낮은 경우 제2 발현 수준은 제1 발현 수준과 비교하여 유의하게 감소된다. 일부 구현예에서, 제2 발현 수준이 제1 발현 수준보다 적어도 25% 낮은 경우 제2 발현 수준은 제1 발현 수준과 비교하여 유의하게 감소된다. 일부 구현예에서, 제2 발현 수준이 제1 발현 수준보다 적어도 30% 낮은 경우 제2 발현 수준은 제1 발현 수준과 비교하여 유의하게 감소된다. 일부 구현예에서, 제2 발현 수준이 제1 발현 수준보다 적어도 40% 낮은 경우 제2 발현 수준은 제1 발현 수준과 비교하여 유의하게 감소된다. 일부 구현예에서, 제2 발현 수준이 제1 발현 수준보다 적어도 50% 낮은 경우 제2 발현 수준은 제1 발현 수준과 비교하여 유의하게 감소된다. 일부 구현예에서, 제2 발현 수준이 제1 발현 수준보다 적어도 60% 낮은 경우 제2 발현 수준은 제1 발현 수준과 비교하여 유의하게 감소된다. 일부 구현예에서, 제2 발현 수준이 제1 발현 수준보다 적어도 70% 낮은 경우 제2 발현 수준은 제1 발현 수준과 비교하여 유의하게 감소된다. 일부 구현예에서, 제2 발현 수준이 제1 발현 수준보다 적어도 80% 낮은 경우 제2 발현 수준은 제1 발현 수준과 비교하여 유의하게 감소된다. 일부 구현예에서, 제2 발현 수준이 제1 발현 수준보다 적어도 90% 낮은 경우 제2 발현 수준은 제1 발현 수준과 비교하여 유의하게 감소된다.
- [0059] 일부 구현예에서, 방법은 제3 시험 샘플을 적어도 32개의 바이오마커의 발현을 검출하는데 특이적인 복수의 제제와 접촉시킴으로써 제3 시점에 대상의 제3 시험 샘플로부터 적어도 32개의 바이오마커의 제3 발현 수준을 결정하는 단계로서, 제3 시점은 제2 시점 후인 것인 단계를 추가로 포함한다. 방법은 발현 수준 변화의 경향을 나타내는 플롯을 생성하는 단계를 추가로 포함할 수 있다.
- [0060] 본 개시내용은 또한 (a) 형질 세포 질환으로 진단된 환자 또는 형질 세포 질환을 갖는 것으로 의심되는 대상의 시험 샘플로부터 하기 32개의 바이오마커로 본질적으로 구성되는 바이오마커의 발현 수준을 결정하는 단계: ASXL1, BHLHE40, BTG2, COPA, FBXW7, GNA13, IL8, JMJD1C, LARS2, MALAT1, MBNL1, MCL1, NFKBIZ(2 스플라이스

변이체), NR4A1(2 스플라이스 변이체), PDE4B, PIAS2, PRKAA1(2 스플라이스 변이체), SCYL2(2 스플라이스 변이체), SMARCD2, SP1(2 스플라이스 변이체), SRSF5, TAGAP, TANK, TLE4, TSC22D3, UBE2J1, 및 적어도 하나의 하우스키핑 유전자; (b) ASXL1, BHLHE40, BTG2, COPA, FBXW7, GNA13, IL8, JMJD1C, LARS2, MALAT1, MBNL1, MCL1, NFKBIZ(2 스플라이스 변이체), NR4A1(2 스플라이스 변이체), PDE4B, PIAS2, PRKAA1(2 스플라이스 변이체), SCYL2(2 스플라이스 변이체), SMARCD2, SP1(2 스플라이스 변이체), SRSF5, TAGAP, TANK, TLE4, TSC22D3, 및 UBE2J1 각각의 발현 수준을 적어도 하나의 하우스키핑 유전자의 발현 수준으로 정규화하여, ASXL1, BHLHE40, BTG2, COPA, FBXW7, GNA13, IL8, JMJD1C, LARS2, MALAT1, MBNL1, MCL1, NFKBIZ(2 스플라이스 변이체), NR4A1(2 스플라이스 변이체), PDE4B, PIAS2, PRKAA1(2 스플라이스 변이체), SCYL2(2 스플라이스 변이체), SMARCD2, SP1(2 스플라이스 변이체), SRSF5, TAGAP, TANK, TLE4, TSC22D3, 및 UBE2J1 각각의 정규화된 발현 수준을 수득하는 단계; (c) 각각의 정규화된 발현 수준을 알고리즘에 입력하여 스코어를 생성하는 단계; 및 (d) 스코어를 제1 미리 결정된 컷오프 값과 비교하는 단계를 포함하는 분석을 제공한다.

[0061] 본 개시내용은 또한 (a) 형질 세포 질환으로 진단된 환자 또는 형질 세포 질환을 갖는 것으로 의심되는 대상의 시험 샘플로부터 하기 32개의 바이오마커로 구성되는 바이오마커의 발현 수준을 결정하는 단계: ASXL1, BHLHE40, BTG2, COPA, FBXW7, GNA13, IL8, JMJD1C, LARS2, MALAT1, MBNL1, MCL1, NFKBIZ(2 스플라이스 변이체), NR4A1(2 스플라이스 변이체), PDE4B, PIAS2, PRKAA1(2 스플라이스 변이체), SCYL2(2 스플라이스 변이체), SMARCD2, SP1(2 스플라이스 변이체), SRSF5, TAGAP, TANK, TLE4, TSC22D3, UBE2J1, 및 적어도 하나의 하우스키핑 유전자; (b) ASXL1, BHLHE40, BTG2, COPA, FBXW7, GNA13, IL8, JMJD1C, LARS2, MALAT1, MBNL1, MCL1, NFKBIZ(2 스플라이스 변이체), NR4A1(2 스플라이스 변이체), PDE4B, PIAS2, PRKAA1(2 스플라이스 변이체), SCYL2(2 스플라이스 변이체), SMARCD2, SP1(2 스플라이스 변이체), SRSF5, TAGAP, TANK, TLE4, TSC22D3, 및 UBE2J1 각각의 발현 수준을 적어도 하나의 하우스키핑 유전자의 발현 수준으로 정규화하여, ASXL1, BHLHE40, BTG2, COPA, FBXW7, GNA13, IL8, JMJD1C, LARS2, MALAT1, MBNL1, MCL1, NFKBIZ(2 스플라이스 변이체), NR4A1(2 스플라이스 변이체), PDE4B, PIAS2, PRKAA1(2 스플라이스 변이체), SCYL2(2 스플라이스 변이체), SMARCD2, SP1(2 스플라이스 변이체), SRSF5, TAGAP, TANK, TLE4, TSC22D3, 및 UBE2J1 각각의 정규화된 발현 수준을 수득하는 단계; (c) 각각의 정규화된 발현 수준을 알고리즘에 입력하여 스코어를 생성하는 단계; 및 (d) 스코어를 제1 미리 결정된 컷오프 값과 비교하는 단계를 포함하는 분석을 제공한다.

[0062] 일부 구현예에서, 적어도 하나의 하우스키핑 유전자는 ALG9, SEPN, YWHAQ, VPS37A, PRRC2B, DOPEY2, NDUFB11, ND4, MRPL19, PSMC4, SF3A1, PUM1, ACTB, GAPD, GUSB, RPLP0, TFRC, MORF4L1, 18S, PPIA, PGK1, RPL13A, B2M, YWHAZ, SDHA, HPRT1, TOX4, 및 TPT1로 이루어진 군으로부터 선택된다. 일부 구현예에서, 하우스키핑 유전자는 TPT1이다.

[0063] 일부 구현예에서, 2개 이상의 하우스키핑 유전자는 발현 수준을 정규화하는데 사용될 수 있다. 예를 들어, 2개의 하우스키핑 유전자가 사용되는 경우, 방법은 (1) ASXL1, BHLHE40, BTG2, COPA, FBXW7, GNA13, IL8, JMJD1C, LARS2, MALAT1, MBNL1, MCL1, NFKBIZ(2 스플라이스 변이체), NR4A1(2 스플라이스 변이체), PDE4B, PIAS2, PRKAA1(2 스플라이스 변이체), SCYL2(2 스플라이스 변이체), SMARCD2, SP1(2 스플라이스 변이체), SRSF5, TAGAP, TANK, TLE4, TSC22D3, 및 UBE2J1 각각의 발현 수준을 제1 하우스키핑 유전자의 발현 수준으로 정규화하는 단계; (2) ASXL1, BHLHE40, BTG2, COPA, FBXW7, GNA13, IL8, JMJD1C, LARS2, MALAT1, MBNL1, MCL1, NFKBIZ(2 스플라이스 변이체), NR4A1(2 스플라이스 변이체), PDE4B, PIAS2, PRKAA1(2 스플라이스 변이체), SCYL2(2 스플라이스 변이체), SMARCD2, SP1(2 스플라이스 변이체), SRSF5, TAGAP, TANK, TLE4, TSC22D3, 및 UBE2J1 각각의 발현 수준을 제2 하우스키핑 유전자의 발현 수준으로 정규화하는 단계; 및 (3) 제1 정규화된 발현 수준 및 제2 정규화된 발현 수준을 평균화하여 평균화된 정규화된 발현 수준을 수득하는 단계를 포함할 수 있다.

[0064] 형질 세포 질환 바이오마커 및 하우스키퍼의 서열 정보가 표 1에 나타나 있다.

[0065]

표 1. 형질 세포 질환 바이오마커/하우스키퍼 서열 정보

유전자명	RefSeq 기탁 번호	서열	서열 번호
<i>ASXL1</i>	NM_011646 03.1	CACACCCACG GCAGACACGC ACGCACCCGG GCGCCGAAGG GAAAGCCGCG TCTCGCCCTC CCGCCCCGCC GTCGGTCTTG TCTCAGTCCC TCAGCAGAGC GGGAAAGCGG AGGCCGAGC CGTGACCTCT GACCCCGTGG TTATGCGGAG CCGCCGCATT CCTTAGCGAT CGCGGGGCG CCGCCGCTGC CGCCGTGGGC GACTGACGCA GCGCGGGCGC GTGGAGCCGC CGCCGCCCT CCCCACCCGC CGCTCTCGCG CCAGCCGGTC CCCGCGTGCC CGCCCTTCT CCGCGGCCGC ACCCGAGACC TCGCGCGCCG CCGTGCCAC GCGCCCCCCC CACCGCCGCC GCGCCCCAG CCCCGCGCCA CCGCCCCAGC CCGCCAGCC CGGAGGTCCC GCGTGGAGCT GCCGCCGCCG CCGGGGAGAA GGATGAAGGA CAACAGAAAG AAGAAGAAGG AGCGCACGTG GGCCGAGGCC GCGCGCCTGG TATTAGAAAA CTAATCGGAT GCTCAATGA CACCAGAAAC GATTCTGCAG GTCATAGAGG CAGAAGGACT AAAGGAAATG AGAAGTGGGA CTTCCTCTCT CGCATGCCTC AATGCTATGC TACATTCCAA TTCAAGAGGA GGAGAGGGGT TGTTTATAA ACTGCCTGGC CGAATCAGCC TTTCACGCT CAAGGTGTGA GCCACTGCAC CAGGCCCTT CATCTTAATT TTAATATATC TTGAATAAA CACCATTTGA TGAACCTGCT GTAAGCTTGG GAGTGGTCTG TTAGTCTACA GCTTGTGTCT GAGATGTGCT AATTGAATAT TTGCTCAGTA CCTCATCTTA	1

[0066]

		ACTGCCTTTG GCTTTATGTT GCTTATCCTT CATAGTATCT TGTTCAATGG CCTTTACAT CCATAGGCAT CACTTCTCTG ATATTCGTTG TGCTCTTTA ATGGATTAAT GGTITGCTTG GTTGGTTTCT CTAGTTAGAC TGTAAGTCC TTGAGAGCAG AGTCTGTATT TTATTAATTA CCCACAGTAC TAGGTACATA GTTGCCCTCA ATAAATATAT ATTAAATGAA AAAAAAAAAA AAAA	
<i>BHLHE40</i>	NM_003670. 2	CGCTTCCCCG CCGCCCCAC TTCTCATTTA CTTGGCTCGC ACGGCGCAGA CAGACCGCGC AGGGAGCACA CACCGCCAGT CTGTGCGCTG AGTCGGAGCC AGAGGCCGCG GGGACACCGG GCCATGCACG CCCCCAATG AAGCTGCATC TCAAAGCCGA AGATTCCAGC AGCCAGGGG ATTTCAAAGA GCTCAGACTC AGAGGAACAT CTGCGGAGAG ACCCCGAAG CCCTCTCCAG GGCAGTCTC ATCCAGACGC TCCGCTAGTG CAGACAGGAG CGCGCAGTGG CCGCGGCTCG CCGCGCCATG GAGCGGATCC CCAGCGCGCA ACCACCCGCC GCCTGCCTGC CCAAAGCACC GGGACTGGAG CACGGAGACC TACCAGGGAT GTACCTTGCC CACATGTACC AAGTGTACAA GTCAAGACGG GGAATAAAGC GGAGCGAGGA CAGCAAGGAG ACCTACAAAT TGCCGCACCG GCTCATCGAG AAAAAGAGAC GTGACCGGAT TAACGAGTGC ATCGCCCAGC TGAAGGATCT CCTACCCGAA CATCTCAAAC TTACAACCTT GGGTCACTTG GAAAAAGCAG TGGTTCTTGA ACTTACCTTG AAGCATGTGA AAGCACTAAC AAACCTAATT GATCAGCAGC AGCAGAAAAAT CATTGCCCTG CAGAGTGGTT TACAAGCTGG TGAGCTGTCA GGGAGAAATG TCGAAACAGG TCAAGAGATG TTCTGCTCAG GTTTCAGAC ATGTGCCCCG GAGGTGCTTC AGTATCTGGC CAAGCACGAG AACACTCGGG ACCTGAAGTC TTCGCAGCTT GTCACCCACC TCCACCGGGT GGTCTCGGAG CTGCTGCAGG GTGGTACCTC CAGGAAGCCA TCAGACCCAG CTCCAAAGT GATGGACTTC AAGGAAAAAC CCAGTCTCC GGCCAAAGGT TCGGAAGGTC CTGGGAAAAA CTGCGTGCCA GTCATCCAGC GGACTTTCGC TCATCGAGT GGGGAGCAGA GCGGCAGCGA CACGGACACA GACAGTGGCT ATGGAGGAGA ATCGGAGAAG GCGCACTTGC CAGTGAGCA GCCGTGCTTC AAAAGTGACC ACGGACGCGA GTTCACGATG GGAGAAAGGA TCGGCGCAAT TAAGCAAGAG TCCGAAGAAC CCCCACAAA AAAGAACCAG ATGCAGCTTT CGGATGATGA AGGCCATTT ACTAGCAGTG ACCTGATCAG CTCCCCGTTT CTGGGCCAC ACCACACCA GCCTCCTTC TGCCTGCCCT TCTACCTGAT CCCACCTTCA GCGACTGCCT ACCTGCCCAT GCTGGAGAAG TGCTGGTATC CCACCTCAGT GCCAGTGCTA TACCCAGGCC TCAACGCCTC TGCCGCAGCC CTCTTAGCT TCATGAACCC AGACAAGATC TCGGCTCCCT TGCTCATGCC CCAGAGACTC CTTTCTCCCT TGCCAGCTCA TCCGTCCGTC GACTCTTCTG TCTTGCTCCA AGCTCTGAAG CCAATCCCCC CTTTAAACTT AGAAACCAAA GACTAAACTC TCTAGGGGAT	2

[0067]

		CCTGCTGCTT TGCTTTCCTT CCTCGCTACT TCCTAAAAAG CAACAAAAAA GTTTTTGTGA ATGCTGCAAG ATGTTGTCAT TGTGTATACT GAGATAATCT GAGGCATGGA GAGCAGATTG AGGGTGTGTG TGTGTGTGTG TGTGTGTGTA TGTGCGTGTG CGTGCACATG TGTGCCTGCG TGTGGGTATA GGACTTTAAA GCTCTTTTG GCATAGGGAA GTCACGAAGG ATTGCTTGAC ATCAGGAGAC TTGGGGGGGA TTGTAGCAGA CGTCTGGGCT TTTCCCCACC CAGAGAATAG CCCCCTTCGA TACACATCAG CTGGATTTTC AAAAGCTTCA AAGTCTTGGT CTGTGAGTCA CTCTTCAGTT TGGGAGCTGG GTCTGTGGCT TTGATCAGAA GGTACTTTCA AAAGAGGGCT TTCCAGGGCT CAGCTCCCAA CCAGCTGTTA GGACCCACC CTTTTCCTT TATTGTCGAC GTGACTCACC AGACGTCGGG GAGAGAGAGC AGTCAGACCG AGCTTTCCTG TAACATGGGG AGGTAGCAGG CACTGGCATA GCACGGTAGT GGTGTGGGGA GGTTCGCGA GGTCTGCTCC CCACCCCTGC CTCGGAAGAA TAAAGAGAAT GTAGTTCCCT ACTCAGGCTT TCGTAGTGAT TAGCTTACTA AGGAACTGAA AATGGGCCCC TTGTACAAGC TGAGCTGCC CGGAGGGAGG GAGGAGTTC CTGGGCTTCT GGCACCTGTT TCTAGGCCTA ACCATTAGTA CTTACTGTGC AGGGAACCAA ACCAAGGTCT GAGAAATGCG GACACCCCGA GCGAGCACCC CAAAGTGCA AAAGCTGAGT AAAAGCTGC CCCCTTCAAA CAGAACTAGA CTCAGTTTTT AATTCCATCC TAAAACTCT TTTAACCAAG CTTAGCTTCT CAAAGGCCTA ACCAAGCCTT GGCACCGCA GATCCTTTCT GTAGGCTAAT TCCTCTTGCC CAACGGCATA TGGAGTGTC TTATTGCTAA AAAGGATTCC GTCTCCTTCA AAGAAGTTTT ATTTTGGTC CAGAGTACTT GTTTTCCGA TGTGTCCAGC CAGCTCCGCA GCAGCTTTC AAAATGCACT ATGCCTGATT GCTGATCGTG TTTTAACCTT TTCTTTCTCT GTTTTTATTT TGGTATTAAG TCGTTGCCTT TATTGTAAA GCTGTATATA ATATATATTA TATAAATATA TAAAAAGGA AAATGTTCA GATGTTTATT TGTATAATTA CTTGATTAC ACAGTGAGAA AAAATGAATG TATTCCTGTT TTTGAAGAGA AGAATAATTT TTTTTTCTC TAGGGAGAGG TACAGTGT ATATTTTGA GCCTTCCTGA AGGTGTAAAA TTGTAAATAT TTTTATCTAT GAGTAAATGT TAAGTAGTTG TTTTAAAAA CTTAATAAAA TAATTCCTT CCTGTGGAAG AGAAAAAAA AAAAAAAAA AAAAAAAAAA A	
BTG2	NM_006763.2	CAGGGTAACG CTGTCTTGTG GACCCGCACT TCCACCCGA GACCTCTCAC TGAGCCCGAG CCGCGCGCGA CATGAGCCAC GGGAAGGGAA CCGACATGCT CCGGAGATC GCCGCCGCCG TGGGCTTCCT CTCCAGCCTC CTGAGGACCC GGGGCTGCGT GAGCGAGCAG AGGCTTAAGG TCTCAGCGG GGCCTCCAG GAGGCACTCA CAGAGCACTA CAAACACCAC TGGTTTCCCG AAAAGCCGTC CAAGGGCTCC GGCTACCGCT GCATTTCGAT CAACCACAAG ATGGACCCCA TCATCAGCAG GGTGGCCAGC CAGATCGGAC TCAGCCAGCC CCAGCTGCAC CAGCTGCTGC	3

	CCAGCGAGCT GACCTGTGG GTGGACCCCT ATGAGGTGTC CTACCGCATT GGGGAGGACG GCTCCATCTG CGTCTTGTA GAGGAGGCCC CACTGGCCGC CTCCTGTGGG CTCCTCACCT GCAAGAACCA AGTGCTGCTG GGCCGGAGCA GCCCCTCAA GAACTACGTG ATGGCAGTCT CCAGCTAGGC CTTCCGCCC CCGCCCTGGG CGCCGCCGTG CTCATGCTGC CGTGACAACA GGCCACCACA TACCTCAACC TGGGGAACG TATTTTTAAA TGAAGAGCTA TTTATATATA TTATTTTTTT TTAAGAAAGG AGGAAAAGAA ACCAAAAGTT TTTTTTAAGA AAAAAATCC TTCAAGGGAG CTGCTTGGA GGGCCCTCCC CAGGTGCCTT TGGAGAGAAC TGTTGCGTGC TTGAGTCTGT GAGCCAGTGT CTGCCTATAG GAGGGGGAGC TGTTAGGGGG TAGACCTAGC CAAGGAGAAG TGGGAGACGT TTGGCTAGCA CCCCAGGAAG ATGTGAGAGG GAGCAAGCAA GGTTAGCAAC TGTGAACAGA GAGGTCGGGA TTTGCCCTGG GGGAGGAAGA GAGGCCAAGT TCAGAGCTCT CTGTCTCCCC CAGCCAGACA CCTGCATCCC TGGCTCCTCT ATTACTCAGG GGCATTCTG CCTGGACTTA AACAACTA TGTATCTTT TCTTTTATTT TTCTAATGAG GTCCTGGGCA GAGAGTGAAA AGGCCTCTCC TGATTCCTAC TGTCTAAGC TGCTTTTCTT GAAATCATGA CTGTGTTCTA ATTCTACCCT CAGGGGCGCTG TAGATGTTGC TTTCCAGCCA GGAATCTAAA GCTTTGGGTT TTCTGAGGGG GGGGAGGAGG GAACTGGAGG TTATTGGGGT TAGGATGGAA GGGAACTCTG CACAAAACCT TTGCTTTGCT AGTGCTGCTT TGTGTGTATG TGTGGCAAAT AATTGGGGG TGATTTGCAA TGAATTTTG GGACCCAAAG AGTATCCACT GGGGATGTTT TTGGCCAAA ACTCTTCCTT TTGGAACCA ATGAAAGTCT TGATGCTGCT GCCATGATCC CTTTGAGAGG TGGCTCAAAA GCTACAGGGA ACTCCAGGTC CTTTATTACT GCCTTCTTTT CAAAAGCACA ACTCTCCTCT AACCTCCCC TCCCCCTCC CTTCTGGTCG GGTCATAGAG CTACCGTATT TTCTAGGACA AGAGTTCTCA GTCATGTGC AATATGCCCC CTGGGTCCCA GGAGGGTCTG GAGGAAAACCT GGCTATCAGA ACCTCCTGAT GCCCTGGTGG GCTTAGGGAA CCATCTCTCC TGCTCTCCTT GGGATGATGG CTGGCTAGTC AGCCTTGCA GTATTCCTTG GCTGAATGGG AGAGTGCCCC ATGTTCTGCA AGACTACTTG GTATTCTTGT AGGGCCGACA CTAATAAAAA GCCAAACCTT GGGCACTGTT TTTTCTCCTT GGTGCTCAGA GCACCTGTGG GAAAGGTTGC TGTCTGTCTC AGTACAATCC AAATTTGTCG TAGACTTGTG CAATATATAC TGTGTGGGT TGGAGAAAAG TGGAAAGCTA CACTGGGAAG AACTCCCTT CTTCAATTT CTCAGTGACA TTGATGAGGG GTCTCAAAA GACCTCGAGT TTCCCAAACC GAATCACCTT AAGAAGGACA GGGCTAGGGC ATTTGGCCAG GATGGCCACC CTCCTGCTGT TGCCCTTAG TGAGGAATCT TCACCCCACT TCCTTACCC CAGGTTCTC CTCCCACAG CCAGTCCCCT TTCCTGGATT TCTAACTGC TCAATTTTGA CTCAAAGGTG CTATTTACCA AACACTCTCC CTACCCATT CTGCCAGCTC TGCTCCTTT TCAACTCTCC ACATTTTGTA	
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[0069]

		TTGCCTTCCC AGACCTGCTT CCAGTCTTTA TTGCTTTAAA GTTCACTTTG GGCCACAGA CCCAAGAGCT AATTTTCTGG TTTGTGGGT GAAACAAAGC TGTGAATCAC TGCAGGCTGT GTTCTTGCAT CTGTCTGCA AACAGGTCCC TGCTTTTAA GAAGCAGCCT CATGGTCTCA TGCTTAATCT TGTCTCTCTT CTCTTCTTTA TGATGTTTCA TTTAAAAACA AAAAAACCCC TGAGCTGGAC TGTGAGCAG GCCTGTCTCT CCTATTAAAGT AAAAATAAAT AGTAGTAGTA TGTTTGTAAG CTATTCTGAC AGAAAAGACA AAGGTTACTA ATTGTATGAT AGTGTTTTTA TATGGAAGAA GTACAGCTT ATGGACAAAT GTACACCTTT TTGTTACTTT AATAAAAAATG TAGTAGGATA AAAAAAAA	
COPA	NM_0 010983 98.1	AGAAGGGAGA CAGTGGCGGT CGCGGCGGGG CCGATCCGAG AGTTCCCCCT AGAGAACGGA GCTCACGGGC GGGGAGGCCT CACCTGCTAG TAGGACGCAG AAAGACAGAA GGCAGAGGAG ACCCCGACTT CCCGGGTCAG CCCAGAGCC ACCCCCTGCC GTAGCCATCT TGCCTCTCTG CTGAGCGGAA GCCCCCGTTC GGCTCCTGTC TGTTAGCGGC CTCTCTAGGC TACCACTGAC ACCGTCTCTG TGGCCCGGAG CTAAGAGAC CGGAAGTTCG TGTTTCCAGG CGCTTCCGGA AACC CGGGA GAGGGTCGCT GACGTGGAGG CGTCCGAAGG GCAGCAGGGT GTGTGCGGGC TCGGATTAAG ACATCGGAGT CGGAGACCTG AGAGATGTTA ACCAAATTG AGACCAAGAG CGCGCGGGTC AAAGGGCTCA GCTTTCACCC CAAAAGACCT TGGATCCTGA CTAGTTTACA TAATGGGGTC ATCCAGTTAT GGGACTATCG GATGTGCACT TCATTGACA AGTTTGATGA ACATGATGGT CCAAGTGCAG GCATTGACTT CCATAAGCAG CAGCCACTGT TCGTCTCTGG AGGAGATGAC TATAAGATTA AGGTTTGGAA TTACAAGCTT CGCGCTGTC TTTTACATT GCTTGGGCAC TTAGATTATA TTCGCACCAC GTTTTTTCAT CATGAATATC CCTGGATTCT GAGTGCCCTC GATGATCAGA CCATCCGAGT GTGGAAGTGG CAATCTAGAA CCGTGTGTTG TGTGTTAACA GGGCACAACC ATTATGTGAT GTGTGCTCAG TTCCACCCCA CAGAAGACTT GGTAGTATCA GCCAGCCTGG ACCAGACTGT GCGCGTTTGG GATATTTCTG GTCTGAGGAA AAAAAACCTG TCCCCTGGTG CGGTGGAATC GGATGTGAGA GGAATAACTG GGGTTGATCT ATTTGGAATC ACAGATGCAG TGGTGAAGCA TGTAAGTAG GGTACGATC GTGGAGTAAA CTGGGCTGCC TTCCACCCCA CTATGCCCTT TATTGTATCT GGGGCAGATG ATCGTCAAGT GAAGATCTGG CGCATGAATG AATCAAAGGC ATGGGAGGTT GATACCTGCC GGGGCCATTA CAACAATGTA TCTTGTGCCG TCTTCCACCC TCGCCAAGAG TTGATCCTCA GCAATTCTGA GGACAAGAGT ATTCGAGTCT GGGATATGTC TAAGCGGACT GGGGTTCAGA CTTTCCGCAG AGACCATGAT CGTTTCTGGG TCCTAGCTGC TCACCCTAAC CTTAACCTCT TTGCAGCAGG CCATGATGGT GGTATGATTG TGTTTAAAGCT GGAACGGGAA CGGCCAGCCT ATGCTGTTC TGGCAATATG CTACACTATG TCAAGGACCG ATTCTTACGA CAGCTGGATT TCAACAGCTC	4

[0070]

	CAAAGATGTA GCTGTGATGC AGTTGCGGAG TGGTTCCAAG TTTCCAGTAT TCAATATGTC ATACAATCCA GCAGAAAAATG CAGTCCTGCT TTGTACAAGA GCTAGCAATC TAGAGAATAG TACCTATGAC CTGTACACCA TCCCTAAAAGA TGCTGACTCC CAGAATCCTG ATGCGCCTGA AGGGAAAACGA TCCTCAGGCC TGACAGCCGT TTGGGTCGCT CGAAATCGGT TTGCTGTCCT AGATCGGATG CATTGCTTC TGATCAAGAA TCTGAAGAAT GAGATCACCA AAAAGGTACA GGTGCCAAC TGTGATGAGA TCTTCTATGC TGGCACAGGC AATCTCCTGC TTCGAGATGC GGACTCTATC AACTCTTTG ACGTACAGCA GAAGCGGACT CTGGCATCTG TGAAGATTC TAAAGTGAAA TACGTTATCT GGTCAGCAGA CATGTCACAT GTAGCACTAC TAGCCAAACA CGAACACTCA TGCCCTTTGC CTCTACAGC CATTGTGATC TGTAACCGCA AACTGGATGC TTTATGTAAC ATTCATGAGA ACATTGCTGT CAAGAGTGGG GCCTGGGATG AGAGTGGGGT ATTTATCTAT ACCACAAGCA ACCACATCAA ATATGCTGTC ACCACTGGGG ACCACGGGAT CATTGCAACT CTGGATTTAC CCATCTATGT CACACGGGTG AAGGGCAACA ATGTATACTG CCTAGACAGG GAGTGTGCTC CCCGGGTACT CACCATTGAT CCCACTGAGT TCAAATTCAG GCTGGCCCTG ATCAACAGAA AATATGATGA GGTACTGCAC ATGGTGAGGA ATGCCAACT AGTTGGCCAG TCTATTATTG CTTATCTCCA GAAGAAGGGC TATCCTGAAG TGGCACTGCA TTTTGTCAAG GATGAGAAAA CTCGCTTTAG TCTGGCACTG GAGTGTGGAA ACATTGAGAT TGCTCTGGAA GCAGCCAAAG CACTGGATGA CAAGAACTGC TGGGAAAAGC TGGGAGAAAGT GGCCCTGCTG CAGGGGAACC ACCAGATTGT GGAATGTGC TATCAGCGTA CAAAAAATT TGACAAACTT TCCTTCCTGT ATCTTATCAC TGGCAACTTA GAAAAAATTC GCAAGATGAT GAAGATTGCT GAGATCAGAA AGGACATGAG TGGCCACTAT CAGAATGCCC TATACCTGGG TGATGTGTCA GAGCGTGTGC GGATCCTGAA GAACTGTGGA CAGAAGTCCC TGGCCTATCT CACAGCTGCT ACCCATGGCT TAGATGAAGA AGCTGAGAGC CTAAAGGAGA CATTTGACCC AGAGAAGGAG ACAATCCCAG ACATTGACCC TAATGCCAAG CTGCTCCAGC CACCTGCACC TATCATGCCA TTGGATACCA ATTGGCCTTT ATTGACTGTA TCCAAAGGAT TTTTGAAGG CACCATTGCC AGCAAAGGGA AGGGAGGAGC ACTGGCTGCT GACATTGACA TTGACACTGT TGGTACAGAG GGCTGGGGAG AGGATGCAGA GCTGCAGTTG GATGAAGATG GGTGTTGTGA GGCTACAGAA GGTGTTGGGG ATGATGCTCT TGGCAAGGGA CAGGAAGAAG GAGGTGGCTG GGATGTAGAA GAAGATCTGG AGCTCCCTCC TGAGCTGGAT ATATCCCCTG GGGCAGCTGG TGGGGCTGAA GATGGTTTCT TTGTGCCCCC AACCAAGGGA ACAAGTCCAA CTCAGATCTG GTGTAATAAC TCTCAGCTTC CAGTTGATCA CATCCTGGCA GGCTCTTTCG AAACAGCCAT GCGGCTCCTT CATGACCAAG TAGGGGTAAT CCAGTTTGGC CCCTACAAGC AACTGTTCTT ACAGACATAC GCCCGAGGCC GCACAACCTA TCAGGCTCTG CCCTGCCTAC CCTCCATGTA	
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[0071]

	TGGCTATCCT AATCGCAACT GGAAGGATGC AGGGCTGAAG AATGGTGTAC CAGCTGTGGG CCTGAAGCTT AATGACCTCA TCCAACGGTT GCAGCTGTGC TACCAGCTCA CCACAGTTGG CAAAATTGAG GAGGCTGTGG AAAAAATCCG TTCCATCCTT CTCAGTGTGC CACTTCTGT TGTGGACAAT AAACAAGAGA TTGCAGAGGC CCAGCAGCTC ATCACCATTT GCCGTGAGTA CATTGTGGGT TTGTCCGTGG AGACAGAAAG GAAGAAGCTG CCCAAAGAGA CTCTAGAACA GCAGAAGCGC ATCTGTGAGA TGGCAGCCTA TTTCACCCAC TCAAACCTGC AGCCTGTGCA CATGATCCTG GTGCTGCGTA CAGCCCTCAA TCTGTTCTTC AAGCTCAAGA ACTTCAAGAC AGCTGCCACC TTTGCTCGGC GCCTACTAGA ACTCGGGCCC AAGCCTGAGG TGGCCCAACA GACCCGAAAA ATCCTGTCTG CCTGTGAGAA GAATCCACA GATGGCTACC AGCTCAATTA TGACATGCAC AACCCCTTGT ACATTGTGC TGCATCATAT CGGCCCATCT ACCGTGGAAA GCCAGTAGAA AAGTGTCCAC TCAGTGGGGC CTGCTATTCC CCTGAGTTCA AAGGTCAAAT CTGCAGGGTC ACCACAGTGA CAGAGATTGG CAAAGATGTG ATTGGTTTAA GGATCAGTCC TCTGCAGTTT CGCTAAGGCC CCCTTTGTGT GCATGGGTCA GTCACCATAT GTTCCCCCA GAGAATGTGT CTATATCCTC CTTCTAACAG CACCTTCCCC CTGCAGCTAC TCTTCAGATC TGGCTCTCTG TACCCTAAAA CCTAGTATCT TTTTCTTTC TATGGAATAA CCGAAGGTCT AAAGTTGACT TTTTGAGGT CTTCTCAACT TGACTACAGT TGTGCTCATA ATTGTCTTGT CCTTTCAGC TTAATTATTT TAAGGAACAA ATGAAAACTC TGGGTGGGT GGAGTGGCTC ATACCTGTAA TCCAGCACT TTGGGAGGCT ACGGTGGGCA GATCATCTGA GGCCAGGAGT TCGAGACCTG CCTGGCCAAC ATGGCAACAC CCCGTCTCTA ATAAAAAAT AAAAAATTAGC CTGGCATGGT AGCATGCGCC TATAGTCCCA GCTGCTCAGG AGGCTGAGGC ATGAGAATCG CTTGAACCTA GGAGGTGGAG GTTGCATTCA ACTGAGATCA TACCACTTCA TTCCAGCCTG GGTGACAGAG CAAGACTCTG TCTCAAAAAA AAAAAAAGG AAAACTCTGT GATGGACATT TGTTTAGTAA ATCCCTTCAG TATTTATCCC TCCTTTCCCC ACAGCAGCTT TCTTTCCTGT CAACTAGAAA GGAGCAGGAT GTAATAAATA CATTTTGGTG TGAAGAGGCC ACACCAACTC TTAATCATCT CCCATTTTCC TTAGACATTT AAATTTCAAG GCAGGTACCC TCTGTGTA CTGAAAATTG AAGAAGTTAT TTGGTTTTC AAAATGCACA CTGCGGGTTA TTGATTGTGTT CTTTACAACT ATGTGTTCTA TATTTCTCAC ACTAAATAAA TCTCTATGAG AGCTTCTTGA CTGGGCCATT TATTTCTTGG ACACTCTCAT GTTCTTGTTC ACCCATGCAG GCACCCACC AAAGTACATA TCTTCCTTCC AGTAATAATT TTAAATTACA AAATAAACAT CCACTATTGG AAAAAAAAAA AAAAAGCTAG CCGGGCATGG TGGTGGGTGC CTGTAATCCC AGCTACTCTG GAGGTGAGG CAGAGGATTG CTTGAACCCG GGAGGCGGAG GTTGCAGTAA GCTGAGATCG CGCCACCGCA CTCCAGCCTG GGCGACAGAG TGAGACTCCA TCTCAAAAAA AAAGAAAGAA	
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[0072]

		AAAAAGAAGC ACATGTTTTT CATAGGGTAT ATATGAGGAC CTAAACTGCT GTGAAAATGA TAGAAAGCAA GTAGCTCCCT TATTCTGTTT TTGATTGCAG CCTTTTATCT TTGCTAATT ATAGCAATAT TTATTGAGCA CCTGCCATGT GACTGTCACT GTCTAGATA TTTTACATGT AATATACAGA TAAAAGAATA GTACTTTATA TATATTACAA TGATACAAATG ATTACATTAA CAATACAATA TTTTGCTTGT CATATGCTAA GAATAATTGG GTAGAGTGAC ATTACTGTGC CTTCGATTAA AATAAGTACT TTTTTGCGTG TTAAATTCAT GTTTTCAATA AATAATAAAT GCATATAGTT GAAAAATCAG TAAATA	
FBXW7	NM_0 010134 15.1	AGACAGGTCA GGACATTGGG TAGGGGAAGG TTGAAAGACA AAAGCAGCAG GCCTTGGGTT CTCAGCCTTT TAAAACTAT TATTAAATAT ATATTTTAA AATTTAGTGG TTAGAGCTTT TAGTAATGTG CCTGTATTAC ATGTAGAGAG TATTCTGCAA CCAAGAGGAG TTTTAAATG TCAAAACCGG GAAAACCTAC TCTAAACCAT GGCTTGGTTC CTGTTGATCT TAAAAGTGCA AAAGAGCCTC TACCACATCA AACTGTGATG AAGATATTTA GCATTAGCAT CATTGCCCAA GGCCTCCCTT TTTGTCGAAG ACGGATGAAA AGAAAGTTGG ACCATGGTTC TGAGGTCCG TCTTTTCTT TGGGAAAGAA ACCATGCAAA GTCTCAGAAT ATACAAGTAC CACTGGGCTT GTACCATGTT CAGCAACACC AACAACTTTT GGGGACCTCA GAGCAGCCAA TGGCCAAGG CAACAACGAC GCCGAATTAC ATCTGTCCAG CCACCTACAG GCCTCCAGGA ATGGCTAAAA ATGTTTCAGA GCTGGAGTGG ACCAGAGAAA TTGCTTGCTT TAGATGAACT CATTGATAGT TGTGAACCAA CACAAGTAAA ACATATGATG CAAGTGATAG AACCCAGTT TCAACGAGAC TTCATTTTAT TGCTCCCTAA AGAGTTGGCA CTCTATGTGC TTTCATTCTT GGAACCCAAA GACCTGCTAC AAGCAGCTCA GACATGTGCG TACTGGAGAA TTTTGGCTGA AGACAACCTT CTCTGGAGAG AGAAATGCAA AGAAGAGGGG ATTGATGAAC CATTGCACAT CAAGAGAAGA AAAGTAATAA AACCAGGTTT CATAACAGT CCATGGAAAA GTGCATACAT CAGACAGCAC AGAATTGATA CTAAGTGGAG GCGAGGAGAA CTCAAATCTC CTAAGGTGCT GAAAGGACAT GATGATCATG TGATCACATG CTTACAGTTT TGTGGTAACC GAATAGTTAG TGGTTCTGAT GACAACACTT TAAAAGTTTG GTCAGCAGTC ACAGGCAAAAT GTCTGAGAAC ATTAGTGGGA CATAACAGTG GAGTATGGTC ATCACAATG AGAGACAACA TCATCATTAG TGGATCTACA GATCGGACAC TCAAAGTGTG GAATGCAGAG ACTGGAGAAAT GTATACACAC CTTATATGGG CATACTTCCA CTGTGCGTTG TATGCATCTT CATGAAAAAA GAGTTGTTAG CGGTTCTCGA GATGCCACTC TTAGGGTTTG GGATATTGAG ACAGGCCAGT GTTTACATGT TTTGATGGGT CATGTTGCAG CAGTCCGCTG TGTTCATAT GATGGCAGGA GGGTTGTTAG TGGAGCATAT GATTTTATGG TAAAGGTGTG GGATCCAGAG ACTGAAACCT GTCTACACAC GTTGCAGGGG	5

[0073]

	CATACTAATA GAGTCTATTC ATTACAGTTT GATGGTATCC ATGTGGTGAG TGGATCTCTT GATACATCAA TCCGTGTTTG GGATGTGGAG ACAGGGAATT GCATTACAC GTTAACAGGG CACCAGTCGT TAACAAGTGG AATGGAATC AAAGACAATA TTCTTGTC TC TGGGAATGCA GATTCTACAG TTAATCTG GGATATCAAA ACAGGACAGT GTTACAAAC ATTGCAAGGT CCCAACAAGC ATCAGAGTGC TGTGACCTGT TTACAGTTCA ACAAGAACTT TGTAAATTACC AGCTCAGATG ATGGAAGTGT AAAACTATGG GACTTGAAAA CGGGTGAATT TATTCGAAAC CTAGTCACAT TGGAGAGTGG GGGGAGTGGG GGAGTTGTGT GGCGGATCAG AGCCTCAAAC ACAAGCTGG TGTGTGCAGT TGGGAGTCGG AATGGGACTG AAGAAACCA GCTGCTGGTG CTGGACTTTG ATGTGGACAT GAAGTGAAGA GCAGAAAAGA TGAATTTGTC CAATTGTGTA GACGATATAC TCCCTGCCCT TCCCCTGCA AAAAGAAAAA AAGAAAAGAA AAAGAAAAAA ATCCCTTGTT CTCAGTGGTG CAGGATGTTG GCTTGGGGCA ACAGATTGAA AAGACCTACA GACTAAGAAG GAAAAGAAGA AGAGATGACA AACCATAACT GACAAGAGAG GCGTCTGCTG TCTCATCACA TAAAAGGCTT CACTTTTGAC TGAGGGCAGC TTTGCAAAAT GAGACTTTCT AAATCAAACC AGGTGCAATT ATTTCTTTAT TTTCTTCTCC AGTGGTCATT GGGCAGTGT AATGCTGAAA CATCATTACA GATTCTGCTA GCCTGTCTT TTACCACTGA CAGCTAGACA CCTAGAAAG AACTGCAATA ATATCAAAAC AAGTACTGGT TGACTTTCTA ATTAGAGAGC ATCTGCAACA AAAAGTCATT TTTCTGGAGT GAAAAGCTT AAAAAATTA CTGTGAATTG TTTTGTACA GTTATCATGA AAAGCTTTTT TTTTTTTTTT TTGGCCAACC ATTGCCAATG TCAATCAATC ACAGTATTAG CCTCTGTTAA TCTATTTACT GTTGCTTCCA TATACATTCT TCAATGCATA TGTGCTCAA AGGTGGCAAG TTGTCTGGG TTCTGTGAGT CCTGAGATGG ATTTAATTCT TGATGCTGGT GCTAGAAGTA GGTCTTCAA TATGGGATTG TTGTCCCAAC CTTGTACTGT ACTCCAGTG GCCAACTTA TTTATGCTGC TAAATGAAAG AAAGAAAAAA GCAATTATT TTTTTTATT TTTTCTGC TGTGACGTTT TAGTCCCAGA CTGAATTCCA AATTGCTCT AGTTGGTTA TGGAAAAAG ACTTTTTGCC ACTGAACTT GAGCCATCTG TGCTCTAAG AGGCTGAGAA TGAAGAGTT TCAGATAATA AAGAGTGAAG TTGCTGCA AGTAAAGAAT TGAGAGTGTG TGCAAAGCTT ATTTCTTTT ATCTGGGCAA AAATTAAC ACATTCCTTG GAACAGAGCT ATTACTTGCC TGTCTGTGG AGAACTTTT CTTTTGAGG GCTGTGGTGA ATGGATGAAC GTACATCGTA AACTGACAA AATATTTTAA AAATATATAA AACACAAAAT TAAAATAAAG TTGCTGGTCA GTCTTAGTGT TTTACAGTAT TTGGGAAAAC AACTGTTACA GTTTATTGC TCTGAGTAAC TGACAAAGCA GAACTATTC AGTTTTGTA GTAAAGGCGT CACATGCAA CAAACAAAAT GAATGAAACA GTCAAATGGT TTGCTCATT CTCCAAGAGC CACAACCTCA GCTGAACTGT GAAAGTGGTT TAACACTGTA TCCTAGGCGA	
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[0074]

		TCTTTTTC TCCTTCTGTT TATTTTTTIG TTTGTTTTAT TTATAGTCTG ATTTAAAACA ATCAGATTCA AGTTGGTTAA TTTTAGTTAT GTAACAACCT GACATGATGG AGGAAAACAA CCTTTAAAGG GATTGTGTCT ATGGTTTGAT TCACCTAGAA ATTTATTTT CTTATAACTT AAGTGCAATA AAATGTGTTT TTTCATGTTA	
	NM_0 06572. 5	CTCCTTCCT CCCTCCCTCC CCCGCTGTCC TGGCCCGCCC TGCCCGGCCC GCCCTGCGAG TCAGTTCGCT GGTTCCTCC CTCCCTGGGC GCGCTCGGGC CGCCGCCGCG CTCCCGCCC TCGAGCCTCG GTGCCGGAGC CGCCGCCGCG CGGAGGAGGA GGTGGAGGGA GCCGGAGGGG CCCGCCGAGG CGCGGGCGGC GGCGGCAAGA TGGCGGACTT CCTGCCGTCG CGGTCCGTGC TGTCCTGTGT CTTCCCGGC TGCCTGCTGA CGAGTGGCGA GGCCGAGCAG CAACGCAAGT CCAAGGAGAT CGACAAATGC CTGTCTCGGG AAAAGACCTA TGTGAAGCGG CTGGTGAAGA TCCTGCTGCT GGGCGCGGGC GAGAGCGGCA AGTCCACCTT CCTGAAGCAG ATGCGGATCA TCCACGGGCA GGAATTCGAC CAGCGCGCGC GCGAGGAGTT CCGCCCCACC ATCTACAGCA ACGTGATCAA AGGTATGAGG GTGCTGGTTG ATGCTCGAGA GAAGCTTCAT ATTCCCTGGG GAGACAATC AAACCAACAA CATGGAGATA AGATGATGTC GTTTGATACC CGGGCCCCCA TGGCAGCCCA AGGAATGGTG GAAACAAGGG TTTTCTTACA ATATCTTCCT GCTATAAGAG CATTATGGGC AGACAGCGGC ATACAGAAATG CCTATGACCG GCGTCGAGAA TTTCAACTGG GTGAATCTGT AAAATATTTC CTGGATAACT TGGATAAAT TGGAGAACCA GATTATATTC CATCACAACA AGATATTCTG CTTGCCAGAA GACCCACCAA AGGCATCCAT GAATACGACT TTGAAATAAA AAATGTTCTT TCAAAATGG TTGATGTAGG TGGTCAGAGA TCAGAAAGGA AACGTTGGTT TGAATGTTTC GACAGTGTA CATCAATACT TTTCTTGTT TCCTCAAGTG AATTTGACCA GTTGCTTATG GAAGATCGAC TGACCAATCG CCTTACAGAG TCTCTGAACA TTTTGAAAC AATCGTCAAT AACCGGTTT TCAGCAATGT CTCCATAATT CTGTTCTTAA ACAAGACAGA CTTGCTTGAG GAGAAGGTGC AAATTGTGAG CATCAAAGAC TATTTCTAG AATTGGAAG GGATCCCCAC TGCTTAAGAG ACGTCCAAAA ATTCCTGGTG GAATGTTTCC GGAACAAACG CCGGGACCAG CAACAGAAGC CCTTATACCA CCACTTCACC ACTGCTATCA ACACGGAGAA CATCCGCCTT GTTTTCCGTG ACGTGAAGGA TACTATTCTG CATGACAACC TCAAGCAGCT TATGCTACAG TGATGTACAA AAGACTTGCT GTTTAAATAT CTTTTGTGT TTTGATGTT TTTGTTTGT TTTGTTTTT AAAATAGCAG TTTACAACCA GAATTAGAAC AATCTTAAT CTACGTTTAA CTCTTGAAA ATCTTAGTAC TTTTCTGCG GCCTTTGGTT TGTGGCTGAA AGCTGTTGAG TGACTCATCG CCAAGATTG CTGTAATGCA GGCTTTGATC TGTTTCACCA TGGCTTCTAT TCAAGTCCAG TAAAACCTC CCAGCTGACC TCAGACTAGG CATATTTAG GCTTTAAAT ATTCTACTTT CCAAAGTGA TTTCTCTGCA GTGCCAAGTA	6
	<i>GNA13</i>		

[0075]

	TCAAAGGTGT CCTTAAATAC TTGTAGGGAT GAGGTTAGGA ATATTCAGTT CCAAAACAAG ATATCTTCTG TCCGCCTTAC ATATAGCAGT GACACTTGTT GCCTAACTTT ATGGTGACCT CCTATTTTGT AAGGGCTGTT AGAAGTTCTA TCTAAGAAAT GGCATTCTGT AGGTTTATAG AAGGTTTAGC CTCATATTT TAATTGCTTG TATACACAAC AGCTGTTTTG CTTTATAGATT TCTGTGTTTC TGAAGGTAAT GTTCTTCCTG TTTTCAAGTT TACATAAGGA TCTTTGGTCT GATGCTGATG AAGAGTTCAC AGGTGGTATG GGAGAGCAAA AGGCAAGCTA ATGCTGTTTA CCGTGTTTTG GTCAAACGTA ACGAGTGAAA TAGAATTTGC CTTTCTCATA TTTAATTATC ATGTAGTTTA ATGTACCATA TGTGAAACAT TCTGGCCATA GCAGCAACTA AAAACTGCAA GCAACTTGGT AACAGAACTT TCTAAATAAA CTTAACCTGT TCCAGAATGT CATGTATTTG ACTTTTAAGC CCTATCTCAG TTGGTCAGTA AAGACCAATC CTTACTGTAG GAAATCATTG TTGTATCATC ACAAACATCT ATCTTTTGCT GTCCTGTCCA GTCCCATCAA CTCCACACTG TGCCATTTGT GGCATCGTTT TGTTTATTTG GAGTTTGCTA AGGGCAGTAT TTTTCTGTCA AGACTATTCA AGAAGGCATT ATTTGAGATT CCTGTTTCATT CTTGGTGTGT CTCTAACAGA TACAGTATGT ATACATTTGT ATAATTGTTG TTGTTGAAAAG TCCAGCTTTT TTGAGGTATA TTTTAAATGT TTTAAGGATG CTCTAAAGGA TCAGTAGTAA TTTTTTTAGT TCGCACCTAA AGATGATTAC ATTGACCTCC CCCGACTGCT TACCAAATTA AAATGTGTCC ACGAAGTAGC TTTGTGATCG CAGATACATT CATAGTGAAC TCATCAGAAT GGCTGGTTTG CAGTACTGAA ATACTATCTT CTAGGCTGTA TGTAAGTCTA CAATTAGAGA AACAGAAGTC CAAGGCTGGC GACAGCTTGA AAAGTCTGAC AGCTTTTCTA CTTTTCCTGA AAATTTTAAG ACTGTGATAT CTGTCAATTT ACTGTATAGC TGACTGTGTA CTCAGGTATT TTATTTGGTCC TTGAAAAGATT GGTCGTTATG GATCACCCAG CCTTTCCAAG TCAGTGGCTG TTGTTCTGTC TTGCTGTCTG ATACGAGAGT GGGGCTTTTC AGTGAACATA CCAGGGATTG TTCTTGACAT ACCTGACTTT TCTCACATTT GAACCTCCAC TATCATTGTA TCCATATAAC TTCTAGCATT TTCATGCCAT GGTAATCCAT GAGCTACACA TACGTAGCCC GGCACCGTGA TGCAAGTTCA TGGTATCGTG CATGTTTCGTG GTATCATGGT ATCATTTCATG CGTGTTTGAA TAGTTCTACA TCTAGTGCTT CTGCCCCAAA AGAATACATT GTTTAAATTC ACAAATTTAG CATAATTGCA GTGCTAATGA ATATCGGAAT ATGTGCACAG TAACATTTGG ACTATTCATT GGAGAGTTTA CCCATACATT TAGCAAATTG AATGGCCAAA ACATTTGACT CCAGTGAGGG CTCAAGTTAG ATCCCTATAG AAAGAGGACA CTTCATCTTA CTTAAGTCAT AGTTAAGATC TGTGATACGA ACCATAGATA TTGCCTGACA AAGCAGAAAT CACCAAGTTT CCCCCTTTTG AATTACCACC AAGAAGTGTT GAAACACCAA ATAGATATCA TGTTATTTTG GGCATTTGCA GTTTTCTTCC CTGCTGCATG TAATGTCCTA GAATCAACAT TCTTTTAAAA TCTAGACTAT ATTTTGAGGC AATGAATTAC	
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[0076]

	TTATATTCAA CTTAGGCTTG TTTTGACATT CAGTAGAACT TTAAGTTCAA TCTAAAGGCT TCAGTCCACA TTTTITTATA CGTTGTATTT TAAAAACGTT TGAAAGGAGT CTTACACCTG TATCATGAAA ACTGAATCCT TTTGAAATAC CACTATATGA AGAGAGAGAT GAAATTTAGT GAACAGAATT GAAAAGGTGC TCATAATTTT ACTATGCAAA CTTACCCCAG TCTCTAAAAA AGTAATTTAG ATTTAAAGTT CTTTGATGTA TTTGATTTTC TAAATCTTTA TGGTTATGAT TTGGAATAAA ATGTGCCTAA TCCTGTGTTA CATTCTGTTT TTAATCTGA ATGCCTTCTC ATTTAATTCT GAGGAAATAT CACACAAGTG TCTTCATTGA CCTTGAAGAA ATGTATATAC AGTTGCCTTA TAAAACAACA TAAATTTAGA CCATAACTTT TATAGAGAAA GGGTTTTGTC AAATGTTTTT TGAAAATCTG AGTAATTCAA AGCATGCCTC TGCCCCTTTA ATATTTTTAA TAACCTGCAT TGTGCTGTC TGCCAAATAT TAAATTGAAA TCTTCATTTC AATTTTATTA TCTGGAAAGG GCACTGGATT GCTCTGCAAC CAAAGAAAGC AATATGGAAT GAAAAAATC ATTCACTTTT GTCTTATTTT CTTTTAAGGT GTATTGGCAT GTAATTTGCA TAGAGAAGGT CCTCTGGTTA GTCTCTCAA TTGAGGCTGT TTAGGGAAAT CCTTATTCAG TTGGTGGCAG TGGTTGGTTT AAAGTAGAAG GAAATAAGAT CGCCTTAATA CCAGAAATGA TTAGAAGTGC TGATTTAGAT TCAACAAATA CCATATGTCC TTATCATTTT TTGTAAAGAAG AAATTGGTTA AGTCCTAACT TTCAATGTGT ACCCAAATAC TTGTATTAT GCTTTTGATA AAATGTATTT TCAGCATTA TACACATCCG ATTATGCCTT ATTTATATAT GAAGAATAAA GTTACCATGT TACACTGTTA TGTCTAAAA TTCAAAATCAC TATTTGAGAA ACCCTCAAAT TGGTGCCTTC ATTATATAAT GATACATTTA GACAAAACCC CAACTAAGC CATTTGAAAC AAGATTCTCT CCATTGCAGT TTGTAGCAAT GTTATTTCTG TGTATGTCAT GAGAAGGCTA AATATCAGTG TTAATTTCTT GTTTGAATCC GTGAAATCAT GCCTGTAAAG CCCAAACATT TGTAACAAAC TCCCTAATAA ATTTAGAGAA AGTCACTCTG TTACCATTTT ATTTATTTTA GTTTTATTTG AGAAATTAAG ACCAGAAGTT TTGCTCATGT CTTTTCACT TGGAAATCTG ACTTAGTACC TAGTTAATTT GTCTCTCTCC CATCATTTTA AGGCGTTCGC TTCTGTAAAT CACAGATGAT CTGTCCTTGT GTTGTGCTGC TTGACTAAAA GCACTGTTTT GTTTTGTTTT GTTTTGTTTT TTAATGATAG GATACAGGGT GGCTTTTCAG TCTAGTAAAC ATGAGGAGGG GAGAGATTGT GGGTGGGTGT GGGTGTGTCC GCATGTCCA AATACAGCAC ATGCCCATTT TTTTATGGTA CGAGGTTAGG GCTTATTAAT AAATGTATAC TAGATCTTGA AGTGTAAAGT TAAGTCTGAA CATTTTAAAC AAGTTGGACT TTATGGCTTT TTCAAGTTCC ATCAAGTAGA TACTAGTCTT AGGCTGGTAG GTGATTAACA ACATCATTTG GAGTACAGTG TTTGTACCAC TAGCATTCTT ATGCTGTGAC TTGAACGTGT AGTTAGCATT TAAGTTATGT TCACTCTTGT AGCATTACAG TCTTACCATC TGGTTTCAA TGCGAGAGCT TATATGAACA TTGTTTTGAA AGCATGAATG	
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[0077]

		ATATGGCAAT ATTTTATGTC TTGATAAGGA GAGTTTTGTG ACATATACAA ATCTGCTGTT GATGATGAAA GTTTACAGGT GGATCAGAGT ATGCTGGAAC TCAGTGTGCA TAAAAATTCA GTCAGTGAAT ATCACTGAAC GTCATATACT ACTTGGTATG TGACTTTGGT TTGTGTAAAG AAAGCTTGTA TATAATATTT TTTGCCATAG TAAGTGAGAA ATTGTCCTTA ATCATGCCTG TTTGATGGTA CTAGGAAAAGA AAGGGGTAGA GATTAAATCT TGCACAGTAT AAGCAACAGT GCAACAAACT ATGCCATTTA CCTTTTACCT CTTACTTGAA GGCAGAATCG CAAAACGTTT GAAATGGCTT TTCTAAACTA CTCTACTCTG GTGAGAGCTC ATTTACCACA AGAAGCCTTA TAAAAAGTA TATTTTGTA TAACCCCGTA GATACTGTAC CTAACAAAAC ATGACTCGTA TTAGCTCTAT AAAATATTIG TGGCTTAGGA TTTTTTTTT ACATATATCT TTTTATAACT TTCCAGGAAC TAAGCACATT ATCTGATAAT TGTGTAAAT TTTTGTGCA GTGCTTTAGT TCAGGATGGG CAATAAATTA TTTCTAAAGG AGGTCTAAAA GTGGAAGAA TGGTTTGATT TTATAAAATG AGTTGCTAGT TCATTACAGC TTTTACTTT TGTACATATT TTGCAAAAACA TTTGCTCTT GCTATTAATA TTTGCTTGT AAAAATTACT GACATTTAAT AAACATTTGT AAACAATTCA AAAAAAAAAA AAAAAA	
IL8	NM_00584.3	GAGGGTGCAT AAGTTCTCTA GTAGGGTGAT GATATAAAAA GCCACCGGAG CACTCCATAA GGCACAAACT TTCAGAGACA GCAGAGCACA CAAGCTTCTA GGACAAGAGC CAGGAAGAAA CCACCGGAAG GAACCATCTC ACTGTGTGTA AACATGACTT CCAAGCTGGC CGTGGCTCTC TTGGCAGCCT TCCTGATTTC TGCAGCTCTG TGTGAAGGTG CAGTTTGGC AAGGAGTGCT AAAGAACTTA GATGTCAGTG CATAAAGACA TACTCCAAAC CTTTCCACCC CAAATTTATC AAAGAACTGA GAGTGATTGA GAGTGGACCA CACTGCGCCA ACACAGAAAT TATTGTAAAG CTTTCTGATG GAAGAGAGCT CTGTCTGGAC CCAAGGAAA ACTGGGTGCA GAGGGTTGTG GAGAAGTTTT TGAAGAGGGC TGAGAATTCA TAAAAAAT CATTCTCTGT GGTATCCAAG AATCAGTGAA GATGCCAGTG AAACCTCAAG CAAATCTACT TCAACACTTC ATGTATTGTG TGGGTCTGTT GTAGGGTTGC CAGATGCAAT ACAAGATTCC TGGTTAAAT TGAATTCAG TAAACAATGA ATAGTTTTTC ATTGTACCAT GAAATATCCA GAACATACTT ATATGTAAAG TATTATTTAT TTGAATCTAC AAAAACAAC AAATAATTTT TAAATATAAG GATTTTCCTA GATATTGCAC GGGAGAATAT ACAAATAGCA AAATTGAGGC CAAGGGCCAA GAGAATATCC GAACTTTAAT TTCAGGAATT GAATGGGTTT GCTAGAATGT GATATTGAA GCATCACATA AAAATGATGG GACAATAAAT TTTGCCATAA AGTCAAAATTT AGCTGGAAAT CCTGGATTTT TTTCTGTAA ATCTGGCAAC CCTAGTCTGC TAGCCAGGAT CCACAAGTCC TTGTTCCACT GTGCCTTGGT TTCTCCTTTA TTCTAAGTG GAAAAAGTAT TAGCCACCAT CTTACCTCAC AGTGATGTTG TGAGGACATG TGGAAGCACT TTAAGTTTTT TCATCATAAC ATAAATTATT	7

[0078]

		TTCAAGTGTA ACTTATTAAC CTATTTATTA TTTATGTATT TATTTAAGCA TCAAATATTT GTGCAAGAAT TTGGAAAAAT AGAAGATGAA TCATTGATTG AATAGTTATA AAGATGTTAT AGTAAATTTA TTTTATTTTA GATATTAAAT GATGTTTTAT TAGATAAAATT TCAATCAGGG TTTTATAGATT AAACAAACAA ACAATTGGGT ACCCAGTTAA ATTTTCATTT CAGATAAAACA ACAAATAAAT TTTTAGTATA AGTACATTAT TGTTTATCTG AAATTTTAAT TGAAC TAACA ATCCTAGTTT GATACTCCA GTCTGTGCAT TGCCAGCTGT GTTGGTAGTG CTGTGTGAA TTACGGAATA ATGAGTTAGA ACTATTAAAA CAGCCAAAAC TCCACAGTCA ATATTAGTAA TTTCTTGCTG GTTGAACCTT GTTTATTATG TACAAATAGA TTCTTATAAT ATTATTTAAA TGACTGCATT TTTAAATACA AGGCTTTATA TTTTAACTT TAAGATGTTT TTATGTGCTC TCCAAATTTT TTTTACTGTT TCTGATTGTA TGGAAATATA AAAGTAAATA TGAACATTT AAAAATATAAT TTGTTGICAA AGTAAAAAAA AAAAAAAA	
JMID1C	NM_0012829 48.1	CTCGTTCTCA TTTGGGTGTC TGCACGTGTG GAAGCTACTG CACTGTGTTT CCACGCAGAC AGAGTACAGT GGGAAAGGCT TTCTCCAGCT GATGGATGGC TGTTCCTTTT ATTGGAGTA TCTTACTGGT TATGTAAGCG ACCTCGAGAG AATTATCCT GACCCAGATC GGAGGATGCA GTAGTGCTTC AGCTGCAGGA TTTCTTAGTC GTTAACACCA CAGTGCTGAT GACAAAGAGC GAGTTGTAAT CCTCATCACT GCCAGGGCTG AGCCAGAGCA GACAGAAAAAT CGTCATTGCG TCGTTGGAGA CTGTGTAAGT TACAGCTCCT GCTTCGTTCT GTGGTCTTGG CTTTCTTCC TATACAATGA CGCCGCTGCA AGTGAGCTCA GAAATGCTTG GTTTGAGAGC CATTTGCCTG TGATTTTGA AGACTAAAGA AGTATTTACA CTAGATACTC TTCCAGAACA AAATAGAAAT TTCAGCAAAT ACTTACTGAC CTTTAAAGCC TTGTGTGGA TTTCTGAGAT TTAAAGATAC TTTAAAATTC TCAAGAACAA AACTTTCAAA CCTCTGGTTG AAAGAAATAT ACCCAGTTCA GTCAGTGCAG TAGAATTCCT TGTAGATAAG CAACTGGATT TTTAACTGA AGATAGTGCC TTTCAGCCCT ACCAGGACGA CATAGACAGC CTAAACCCAG TTCTCAGGGA CAACCCGCGAG CTTCATGAGG AAGTGAAAGT CTGGGTAAAG GAACAAAAGG TTCAGGAGAT TTTTATGCAA GGTCTTATT CCTTAAATGG ATACAGAGTG AGAGTATATA GACAAGACTC TGCCACCCAG TGGTTTACTG GCATAATTAC TCATCATGAT CTCTCACCC GCACCATGAT CGTTATGAAT GATCAGGTAC TAGAACCACA GAATGTCGAT CCTTCTATGG TTCAAATGAC CTTTCTAGAT GATGTTGTTC ACTCTTGTGTT AAAAGGTGAA AATATTGGCA TTACATCACG ACGCAGGTCT CGTGCCAATC AAAACGTCAA CGTGTTTAC AGCCATTATA CACGTGCCCA AGCAAATAGT CCCAGACCAG CAATGAACCT CCAAGCTGCT GTACCAAAAC AGAATACACA CCAGCAACAG CAACAAAGAA GTATCCGTCC AAATAAGAGG AAGGGCTCAG ATAGCAGTAT ACCAGATGAA	8

[0079]

	GAGAAGATGA AGGAGGAAAA ATATGATTAT ATATCACGAG GAGAAAATCC TAAAGGTAAA AACAAACACT TGATGAATAA AAGAAGGAAA CCTGAGGAGG ATGAAAAGAA ACTAAATATG AAAAGACTTC GAACTGACAA TGTTTCAGAC TTTTCTGAGA GCAGTGACTC AGAAAATTCA AATAAGAGAA TAATAGATAA TTCCTCAGAA CAGAAGCCAG AGAATGAATT GAAAAATAAA AATACTTCAA AAATAAATGG AGAAGAAGGA AAACCCCAT ATAATGAGAA GGCAGGAGAA GAGACCCTAA AAAATAGCCA GCCTCCCTGG GATCAAATAC AGGAAGATAA AAAACATGAA GAAGCAGAGA AGCGGAAGTC TGTTGACACT CAGCTTCAAG AAGATATGAT TATTCATTCTG TCAGAACAGT CCACAGTTTC TGATCATAAT TCTAATGATT TACTTCCTCA GGAATGCAAT ATGGATAAAA CACATACCAT GGAATTGCTA CCAAAGGAGA AGTTTGTATC CAGACCACCC ACACCAAAAT GTGTTATTGA TATTACAAAT GACACTAATT TAGAAAAGGT GGCTCAGGAA AACTCAAGTA CCTTGGCCT TCAGACACTT CAGAAAATGG ATCCTAATGT TAGTGATTCA AAACACTCTA TTGCAAATGC AAAAATCTTG GAAACAGCAA AAAAAGATTG TGACCAGAGC TGGGTCAGTG ATGTAGTTAA AGTGGATCTA ACCCAATCAA GTGTTACAAA TGCTTCTTCA GGAAATGATC ACTTGAACAT GGAAAAAGAG AAGTATGTCT CTTACATTTC TCCTTTAAGT GCAGTTTCTG TCATGGAAGA TAAGCTGCAT AAGCGAAGTC CACCTCCAGA GACTATAAAA TCTAACTTA ATACTTCAGT AGATACTCAC AAGATAAAAT CCAGCCCATC ACCTGAAGTT GTTAAACCCA AAATAACTCA TTCTCCTGAT TCTGTAAGT CTAAGGCCAC TTATGTGAAC AGCCAAGCTA CTGGTGAAAG AAGATTGGCA AATAAGATAG AACATGAGCT ATCAAGATGC AGTTTTCATC CAATTCCTAC TCGAAGCAGT ACATTAGAAA CTACAAAGAG TCCTCTTATC ATTGATAAAA ATGAGCATTT TACAGTTTAC AGAGATCCTG CACTTATTGG GTCAGAAACA GGAGCTAATC ATATTTACCC TTCCTAAGC CAGCATCCTT TTCCTCTTCA CTCCTCATCT CATAGAACCT GTTTAAATCC AGGTACCCAT CATCCTGCCT TAACTCCTGC ACCCCATTTA CTAGCCGGAT CATCTAGTCA AACTCCATTA CCTACCATTA ACACTCATCC TCTGACTAGT GGTCACACC ATGCTGTTCA TCACCCTCAT TTAATTCCTA CTGTGTTACC TGGAGTGCCT ACTGCCTCCT TACTTGGTGG CCACCCACGA CTAGAGAGTG CTCATGCCAG CAGCTTGAGC CACTTAGCGC TAGCACACCA GCAACAACAA CAGTTGTTAC AGCACCAGTC ACCTCATCTT CTTGGACAAG CCCATCCTTC TGCTTCATAT AATCAGCTTG GACTTTATCC AATTATTGG CAGTATCCAA ATGGAACACA TGCATACTCA GGAATTGGTT TGCCCTTCTTC TAAGTGGGTT CACCAGAAA ATGCAGTTAA TGCTGAAGCT TCATTAAGGA GGAATTCTCC CAGTCCTTGG CTACATCAGC CCACCCCTGT GACCTCAGCA GATGGTATTG GATTACTTAG TCACATTCCT GTCAGACCTT CCAGTGCAGA GCCTCATCGG CCTCTTAAAA TTACAGCCCA TTCCAGTCCA CCATTGACAA AAACCTTAGT AGATCATCAT AAGGAAGAAT TAGAAAAGAA AGCTTTTATG	
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[0080]

	GAACCATTAC GGTCTGTTGC ATCCACATCA GCCAAAAATG ACCTGGATCT AAATAGGTCA CAGACTGGAA AAGATTGTCA CTTACATAGG CATTTTGTGG ATCCAGTATT AAATCAGTTA CAGAGGCCAC CCCAGGAGAC TGGAGAGAGG TTAACAAAT ACAAAGAGGA ACACCGTCGA ATTCTTCAAG AAAGTATTGA TGTGTCTCCC TTTACAATA AAATCAAGGG ACTTGAGGGT GAGAGAGAGA ATTAATCCAG AGTGGCATCA TCATCTTCCA GTCCTAAAAG CCATATCATC AAACAAGATA TGGATGTAGA ACGCTCAGTA TCAGATCTTT AAAAAATGAA GCACTCAGTG CCTCAGAGTT TACCCCAAAG TAACTATTTT ACTACATTGT CTAATAGTGT GGTCAATGAA CCACCAAGAT CATACCCATC CAAAGAAGTT TCAAATATTT ACGGTGATAA ACAGAGTAAT GCCCTTGAG CGGCAGCAGC TAATCCTCAA ACTCTGACTT CATTTATAAC ATCTCTTTCA AAGCCTCCAC CTTTGATTAA ACACCAACCA GAAAGTGAAG GTTAGTAGG CAAGATACCA GAACATCTTC CACATCAGAT TGCATCTCAC TCAGTAACAA CCTTCAGAAA TGATTGTAGG AGTCCTACCC ATTTGACAGT TTCTTCTACA AATACACTCC GCAGTATGCC TGCATTACAT AGAGCACCAG TATTTACCC ACCAATCCAT CACAGCCTGG AAAGAAAGGA AGGCAGCTAT AGTAGTCTTT CCCCTCCAAC TTTAACTCCG GTGATGCCAG TAAATGCTGG TGGTAAAGT CAAGAATCAC AGAAGCCTCC AACTCTAATA CCCGAACCAA AAGACTCCCA GGCAAAATTT AAGAGTTCTT CAGAACAGAG TTTGACGGAG ATGTGGAGAC CTAATAATAA CCTCAGCAAA GAGAAAACGT AATGGCATGT GGAGAAAAGC AGCGGAAAAGT TACAGGCTGC TATGGCATCT GTCATTGTGC GTCCATCTTC TAGTACAAAA ACTGATAGTA TGCCAGCAAT GCAGTTAGCT TCTAAAGATC GAGTTAGTGA AAGATCTTCA GCTGGGGCAC ATAAACAGA TTGCCTCAA CTAGCAGAAG CCGGAGAAAC TGGAAGAATC ATTTTGCCAA ATGTGAATTC AGACAGTGTT CACACAAAAT CTGAAAAAAA CTTTCAGGCT GTCTCACAGG GCAGTGTTCC CAGTTCAGTC ATGTCTGCTG TAAATACGAT GTGTAATACC AAAACGGATG TAATCACATC TGCTGCCGAT ACTACCAGTG TTTCCAGCTG GGGTGGTTCA GAAGTAATTT CCTCTTTATC AAATACCATT TTGGCCTCTA CATCATCAGA ATGTGTATCT TCAAAAAGTG TCAGTCAGCC AGTGGCTCAA AAACAAGAAT GCAAGGTCAG CACCACAGCA CCAGTTACAT TAGCCAGTAG TAAGACAGGA AGTGTTGTTT AACCCAGTTC TGGGTCTCA GGCACAACGT ATTTTATCCA TTTAAAAAAG CACAAGGCAG CATTGGCTGC AGCTCAGTAT AAAAGTAGTA ATGCCAGTGA GACTGAACCT AATGCTATAA AAAATCAGAC ACTTTCAGCC TCCCTTCCTC TGGATAGCAC TGTAATCTGT AGTACAATTA ACAAAGCAAA CTCTGTAGGA AATGGGCAAG CTTCCCAGAC AAGTCAACCA AACTACCATA CTAAACTGAA AAAGGCCTGG CTCACCAGAC ACTCAGAAGA AGATAAAAAAT ACTAATAAAA TGGAAAAATC AGGGAATTCT GTATCAGAAA TTATTAAGCC ATGTTCTGTC AACTTAATAG CCTCTACATC TAGTGATATA CAAAATAGTG TAGATAGTAA GATCATAGTT	
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[0081]

	GATAAATATG TAAAAGATGA TAAAGTCAAC AGGAGAAAAG CCAAAAGAAC TTATGAATCT GGCTCTGAAA GTGGAGACTC AGATGAAAGT GAAAGCAAGT CAGAGCAAAG GACTAAAAGA CAACCTAAGC CAACTTACAA AAAGAAGCAA AATGATTTC AAAAGAGAAA AGGTGAAATA GAAGAAGATT TGAACCCAA TGGAGTTCTC AGCAGGAGTG CCAAAGAAAG AAGTAACTG AAGTTGCAAA GCAACAGTAA TACTGGCATT CCTCGTTCAG TATTGAAAGA TTGGCGTAAA GTCAAGAAGC TGAAGCAAAC TGGGGAATCC TTTTACAGG ATGACTCCTG CTGTGAGATA GGGCCTAATT TACAAAAGTG TCGAGAATGT AGACTTATTC GCAGTAAAAA AGGAGAAGAA CCAGCTCACT CACCAGTATT TTGTAGATTT TACTACTTTA GACGGTTGTC ATTTAGTAAA AACGGAGTAG TTAGAATAGA TGGTTTCTCT TCTCCTGACC AATATGATGA TGAAGCTATG AGTTTGTGGA CACATGAAAA TTTTGAAGAT GATGAAGTAG ATATAGAGAC TTCTAAATAT ATCTTGGATA TAATAGGTGA TAAGTTCTGT CAATTAGTAA CATCTGAAAA AACAGCTTTG TCCTGGGTGA AAAAGGATGC CAAAATTGCC TGGAAAAGAG CAGTGAGAGG AGTCCGGGAG ATGTGTGATG CATGTGAAGC AACATTGTTT AACATTCACT GGGTCTGCCA AAAATGTGGA TTTGTGGTCT GCTTAGATTG TTACAAAGCA AAGGAAAGGA AGAGTTCTAG AGATAAAGAA CTATATGCTT GGATGAAGTG TGTGAAGGGA CAGCCTCATG ATCACAACA TTTAATGCCA ACCCAAATTA TACCTGGTTC TGTTTGGACA GATCTTCTAG ATGCCATGCA CACTCTTAGG GAAAAATATG GTATTAAATC CCATTGTCAT TGTACTAACA AACAGAAATTT ACAAGTTGGA AATTTTCTTA CAATGAATGG TGTATCTCAA GTTTTACAGA ATGTTCTTAA TCACAGTAAT AAAAATTTCTC TGTGCATGCC TGAGTCTCAG CAGCAAAATA CTCCTCCGAA GTCTGAGAAA AATGGTGGCA GCAGCCCAGA GAGTGATGTA GGCACAGATA ACAAGTTAAC TCCTCCAGAA TCCCAGTCAC CACTGCACTG GTTAGCAGAT CTGTCAGAGC AAAAAGCCAG AGAGGAAAAA AAAGAAAACA AAGAACTTAC CCTTGAAAAC CAAATTAAAG AAGAAAGAGA ACAAGACAAC TCTGAATCTC CAAATGGCAG AACATCACCT CTGTGTGCCC AGAATAATGA ACAAGGCTCA ACCTTACGGG ATTTGCTGAC TACAACAGCT GGAAAGCTAC GTGTGGGGTC TACAGATGCT GGCATTGCCT TTGCCCCAGT ATATTCAATG GGAGCCCCAA GTAGCAAAAG TGGACGGACT ATGCCTAACA TTCTTGATGA CATAATTGCT TCAGTTGTTG AAAACAAAAT TCCACCAAGT AAAACCTCCA AGATAAATGT AAAACCAGAG CTAAAGAAG AGCCTGAAGA AAGCATAATA TCTGCAGTGG ATGAAAATAA TAAATTATAC AGTGATATAC CACATTCTTG GATCTGTGAG AAGCATATTT TATGGCTTAA GGATTATAAG AATAGCAGTA ATTGGAAGCT TTTCAAAGAA TGTTGGAAAC AAGGACAGCC TGCAGTGGTT TCTGGTGTGC ATAAGAAAAT GAACATTAGC CTATGGAAGG CGGAATCAAT TAGTCTTGAT TTTGGAGACC ACCAAGCTGA TCTCCTGAAC TGCAAAGATA GCATCATTTT AAATGCCAAT GTTAAGGAAT TCTGGGATGG TTTGAAGAA	
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[0082]

		GTTTCAAAAC GGCAGAAAAA CAAGAGTGGA GAAACAGTTG TTTTAAAAAT GAAAGACTGG CCTTCAGGAG AAGACTTCAA GACTATGATG CCAGCAAGAT ACGAAGATCT TTTAAAAAGT CTGCCATTGC CAGAATATTG TAATCCAGAA GGAAAATTCA ATTTGGCCTC TCATTGGCCA GGATTTTTTG TACGTCCTGA TCTAGGACCC AGGTTGTGCA GTGCCTATGG TGTAGTTGCT GCTAAAGATC ATGATATAGG AACAACAAAT CTCCATATTG AAGTTTCTGA TGTGTAAAT ATACTAGTTT ATGTTGGCAT AGCAAAAAGG AATGGCATT CTTCAAAAGC AGGAATTCTC AAGAAAATTG AGGAAGAAGA TTTGGATGAC ATTTTAAGGA AAAGATTGAA GGAATCAAGT GAAATACCTG GTGCTCTGTG GCATATTTAT GCTGGGAAAG ATGTTGACAA GATAAGGGAA TTTCTTCAA AGATTTCAAA AGAACAAAGG CTTGAAGTTC TACCAGAACA TGATCCAATA CGTGACCAAA GTTGGTATGT GAACAAAAAG CTCCTGCAAA GGCTGCTTGA AGAATATGGA GTCAGAACCT GTACTCTTAT TCAGTTCCTT GGTGATGCTA TTGTTTTGCC AGCGGGAGCA CTTTCATCAGG TTCAGAATTT TCACAGCTGT ATTCAGGTAA CTGAAGATTT TGTGTCTCCA GAACATCTTG TAGAGTCATT TCATTTAACA CAGGAAGTGA GACTTTTGAA GGAAGAAATC AATTATGATG ATAAACTACA GGTAAAAAT ATTTTGTATC ATGCAGTCAA AGAAATGGTG AGAGCCTTGA AGATACACGA GGATGAAGTA GAGGATATGG AAGAAAATTA AGTGTGATCC AGTTTGATAT TTTAGGTTG TTGAAGTGGG ATTACTTAAC CTTGAATGAT GATATGTATG CACACTGACT TTAAGCTTCA TAAAACCATC AGTGCCAAGA AATTCTCTTT GTAGTAATTA CTTGTTACTG ACACCACAGC AGTATAGCAT ATGTCACAGC TCCTGTGATT CAATGTTATA AAACAAGCAG AATTTTAAAA GCAGCACTAT ATAGCTGTTT TGTATTATAG TGTATATGAT GTTTGTGAAA ATGCCAGATT TAAAAATGATG TATTTATTTT TGGTAAAAAA TAAAAATTC TATGCTATAT TGTGATCAA GTGTAAATGT GACCTTGATC AGTTTACTAA AATTACTGAT ATTTTTCCT ACATTGAGAC AGTTACTGTG AGAATAGGAC ACAAACACCA GCTATTGCCT GCATCTGGGA AATTGCTGAA TCGCACAGCA GTCATGTCAT AATCAGAAAA TTAAGTCCAA ATAATTGTAA AATTGTAAA GTATAAAGTA TATAAGTAG ATACTAAATA CAGACACTTC AATATTTTGT TGAAGCTATT GACTGTACAA TTAACATTT TCAAAAGGTG TAATTTATTT AAAATTGTCT CATTTTGTTA AAATTTATGT GAACTTTTAA AGCTAAATAT TAACTTAAT ATGCTATGTA AATATATACA TATATACATT TAATGATGTA TTTTFTTAAA ACATTGGCTT GCTTTTGTTA AAGTGCAAGT GTTACATATG GCTTTGTACA TTAAGTTGA AAGGGGTTTT ACATTTTCCA TTAAGGAC TTTATCAAAA ATTGA	
LARS2	NM_015340.3	TGACAACATG GCGGCGCCCA TGGTCCGTGG CCCGGCAGTG CTCGCCTAAA GGTGGAGAAC GAGGAGTAGA GGAGCCGCAG GCCAGAGCCT GTGAGCAGAT CCAGACCTAC AGATAAAAAA	9

[0083]

	CATTATTTAA TCTATCTGGG ATTTACTCCG GCTTATGATT TGAGGGCCCT CTCACCTTCT GAAGAATGGC TTCTGTTTGG CAGAGATTGG GTTTTTATGC CTCTCTCTG AAAAGACAGC TAAATGGTGG GCCAGATGTC ATCAAGTGGG AAAGGAGAGT AATTCCCGGA TGTACCAGAA GCATCTACAG TGCCACGGGA AAGTGGACAA AAGAGTATAC ATTGCAGACA AGAAAGGATG TTGAGAAATG GTGGCATCAA CGAATAAAAG AACAGGCCTC CAAAATTTCA GAAGCTGATA AATCGAAGCC AAAATTTTAC GTGCTTTCCA TGTTCCTTA TCCTTCTGGT AAGCTGCACA TGGGCCATGT GCGTGTCTAC ACCATCAGCG ACACCATAGC ACGGTTCAG AAGATGAGAG GGATGCAGGT CATCAACCCC ATGGGATGGG ATGCTTTTGG ATTGCCTGCT GAAAATGCCG CAGTCGAGAG GAATCTACAT CCACAAAGTT GGACACAAAG TAATATTTAA CACATGAGGA AACAGCTTGA TCGTCTGGGC CTGTGTTTCA GCTGGGATAG GGAATAAAT ACGTGTTCG CAGATTACTA CAAGTGGACT CAGTATCTCT TTATTTAACT GTATGAGGCT GGGCTGGCCT ATCAAAAGGA GGCCCTGGTT AACTGGGACC CAGTGGATCA AACAGTGCCT GCCAATGAGC AGGTGGATGA ACATGGCTGT TCATGGCGTT CTGGAGCAAA GGTGAACAG AAGTACCTCA GACAATGGTT TATTAAGACA ACCGTTATG CAAAGGCCAT GCAGGACGCG TTGGCAGACC TTCCAGAATG GTATGGAATA AAAGGCATGC AAGCCCACTG GATTGGGGAC TGTGTGGCT GCCACCTGGA CTTACATTA AAGGTTTATG GGCAAGCCAC GGGCGAAAAG CTGACTGCCT ATACGGCCAC CCTGAAGCC ATTTATGGCA CCTCCACGT GGCATCTCG CCCAGCCACA GACTCCTACA TGGGCACAGC TCTCTGAAGG AAGCCTTGAG GATGGCCCTT GTCCCTGGCA AAGATTGCCT CACGCCTGTA ATGGCTGTGA ACATGCTTAC CCAGCAGGAG GTCCTGTG TATTTTGGC CAAAGCTGAC TTGAAGGGCT CTCTGGATT CAAAAATAGGA ATTCCAGTA CTAGCTCAGA GGACACCATC TTAGCCCAA CCCTGGGCCT GGCCTACTCT GAAGTCATTG AAATTTGCC AGATGGCACA GAGAGACTGA GCAGCTCTG TGAGTTCACA GGTATGACCC GGCAGGATGC TTTCTAGCC CTGACTCAGA AAGCCCGGGG GAAGAGAGTG GGTGGAGACG TGACAAGTGA TAAACTGAAA GACTGGCTGA TTTCACGGCA GCGTACTGG GGCACACCAA TCCCCATTGT CCACTGCCCC GTCTGTGGCC CCACACCTGT GCCCCTGGAG GACTTGCCCTG TGACCCTGCC CAACATCGCG TCTTCACTG GCAAGGGAGG CCCCCACTG GCCATGGCTT CAGAGTGGGT GAACTGCTCC TGCCCAAGGT GCAAGGGAGC AGCCAAGAGA GAGACAGACA CGATGGATAC CTTTGTGTAT TCTGCTTGGT ACTACTTCAG ATACACTGAC CCTCATAATC CACACAGCCC TTTTAACACA GCAGTGGCCG ATTACTGGAT GCCTGTGGAT TTGTACATTG GAGGGAAAGA ACATGCCGTC ATGCACCTGT TCTATGCAAG ATTCTTTAGT CATTTTGGC ATGATCAAAA AATGGTTAAA CATAGGGAGC CTTTTCATAA GCTGCTGGCC CAAGGCCTTA TCAAGGGGCA GACATTCGCG CTACCATCTG GACAGTATCT ACAGAGAGAG GAAGTGGATC	
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[0084]

	TCACAGGTTT CGTTCCTGTT CATGCAAAAA CGAAAAGAGAA GTTAGAGGTG ACGTGGGAGA AGATGAGTAA GTCCAAACAC AACGGGGTGG ACCCAGAGGA AGTTGTGGAG CAGTATGGGA TCGACACGAT TCGGCTCTAC ATCCTTTTTG CTGCCCTCC TGAGAAGGAT ATCTGTGGG ATGTGAAAAC TGATGCTCTC CCTGGGGTGC TGAGATGGCA ACAACGACTG TGGACCTTGA CAACTCGGTT TATTGAGGCC AGGGCTTCTG GGAAGTCTCC CCAGCCTCAG CTGCTGAGTA ACAAGGAGAA AGCTGAGGCC AGGAAGCTCT GGGAGTACAA GAACTCCGTC ATCTCTCAGG TGACCACCCA TTTCACAGAG GACTTCTCAC TGAATTCTGC AATTTCTCAG CTGATGGGAC TCAGCAATGC CCTCTCGCAA GCCTCTCAGA GCGTCATTCT CCACAGCCCC GAGTTTGAGG ATGCTTTGTG TGCCCTGATG GTAATGGCTG CTCCACTGGC CCCTCATGTA ACCTCAGAGA TCTGGGCAGG CCTGGCGCTG GTGCCGAGGA AGCTCTGTGC CCACTACACT TGGGATGCCA GTGTGCTGCT CCAGGCATGG CCTGCTGTGG ACCCGGAGTT CCTGCAGCAG CTTGAGGTTG TCCAGATGGC AGTTCTGATC AACATAAAG CTGTGGCAA AATTCTGTG CCCAACAAG TTGCCCGGA CCAGGACAAA GTCCACGAAT TTGTCTTCA AAGCGAGCTG GGTGTCAGGC TTTGCAAGG ACGAAGCATC AAGAAGTCTT TCCTTTCCCC GAGAACTGCC CTCATCAACT TCCTGGTGCA AGATTGACAG CCAGGAGGCT GCAGCTACCA CGAGGGCCTC TGAGGAACCT CTTCCAGGC CTGGGATGAG GGGGCGATGT CTGCTGGCCC AGGGGAAGGG AAAAGACAAA TGTCTTGACT GTTGACCTCG GTCCTGTGGC AGACTGCAGT CAACAGTGTG CCTCTGTAGT GTGGCCTGGT GCTGGGGTGA AGGTGAGCTG GGCAAAGGAG AAATATGAGC TACTGAGGAG GGGGTTGGAC ATCCTGCCCC TCACCCCCCA CCCACACTGC AGGTAGAGGA GGCCATCTGA TCCCATGGGA AGCCATCAGA GACACTGCTG GTGGGAGCAG GAAGGAGCAG TGCCCCTCGA GCAGCCAGGA AGCCTGCGGA TCTGGGAAAT GGCTCTGCCT TAGGCACTTC TCGGGAATTT GAGGCCAGCC TGAGGAACTG CAGGACTCAG GTGCAATGTG CCAGCCACTT GGAAGTGTCTA ACTGAGCCTC CAGATGGTAG TGAATGGTCT CTTTGCCTTC AGGCTGGATG AGGAAGTCAT TTAGGAAATG TTCAAATAAC CAATATGTGG AAATGGACAC AGGGATCTTC TGAAGTTGCT TTGAATCAAA AGGCAGGCAG TGCTGGTTCC TCTGCCTGTG TCCCCACCAC TCCCCAGCTC TGTCATGCAG GCCTGTCTCTC CCCAACCCCA GCTGGATGTG CCTCCCAGGC CTGCTGTGGT TCTGACACAC AGGATCCCAG GCAAGGCACC ACTTCCTCAC ATGAATGAGG AGCAGCAAGT CATAACCACT CCCTTGGGTA TACAATTTGC TGTGTAGTGA AGTGGAACCA GGCTCAGGCT GCTGGTCCCA ACCTCAGAGC CCCACCGCAG CCCAGTAGGG ATGCAGCACG CCCAGAGGG CTCATGTGGG CCCAGATGG CAATGCCACC ATTGTTGATG TGAATCCAGA GCCAGTTATT AGGAAGAGCA AGCTCACCAC AGAGGAGTGG AACTGAGGCC CCCCAGATGT TGCCTCCGGT GTCCAAGCCA CAGCGGTCTG GCTGTGGGA AGATGGCCAG GAATGGACTC ATACCATTGG	
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[0085]

		CACATTAGGC TAATCCTGGT TTTATGTGAA GTCAGCAATT AAGTGTTCCC ACTAGAACTG ACCTAAGCCA CTGATTAATA TTTAATGAGG GAAGGTAGGG GAGAATCTAG CCATTTTATA ATGCCAGAAA TCTATATATG TTATCTGATG CCATTTTCT GAAGTAGCCT CACATGTGGT CCCCTGCAG TTCAGCAGTT AACAGATGAC TTTTTAGTG TAATAAAATG TTTATCATCT ATG	
	NR_00 2819.2	GTAAAGGACT GGGGCCCCGC AACTGGCCTC TCCTGCCCTC TTAAGCGCAG CGCCATTTTA GCAACGCAGA AGCCCGGCGC CGGGAAGCCT CAGCTCGCCT GAAGGCAGGT CCCCTCTGAC GCCTCCGGGA GCCCAGGTTT CCCAGAGTCC TTGGGACGCA GCGACGAGTT GTGCTGCTAT CTTAGCTGTC CTTATAGGCT GGCCATTCCA GGTGGTGGTA TTTAGATAAA ACCACTCAAA CTCTGCAGTT TGGTCTGGG GTTTGGAGGA AAGCTTTTAT TTTCTTCCT GCTCCGGTTC AGAAGGTCTG AAGCTCATAC CTAACCAGGC ATAACACAGA ATCTGCAAAA CAAAAACCCC TAAAAAGCA GACCCAGAGC AGTGTAACA CTCTGGGTG TGCCCTGAC TGGCTGCCA AGGTCTCTGT GTCCTCGGAG ACAAAGCCAT TCGCTTAGTT GGTCTACTTT AAAAGGCCAC TTGAACTCGC TTTCCATGGC GATTTGCCTT GTGAGCACTT TCAGGAGAGC CTGGAAGCTG AAAACGGTA GAAAAATTC CGTGCGGGCC GTGGGGGGCT GCGGCAACT GGGGGGCGC AGATCAGAGT GGGCCACTGG CAGCCAACGG CCCCGGGGGC TCAGGCGGGG AGCAGCTCTG TGGTGTGGGA TTGAGGCGTT TTCCAAGAGT GGGTTTTCAC GTTCTAAGA TTCCCAAGC AGACAGCCCG TGCTGCTCCG ATTTCTCGAA CAAAAAGCA AAACGTGTGG CTGTCTTGGG AGCAAGTCGC AGGACTGCAA GCAGTTGGGG GAGAAAGTCC GCCATTTTGC CACTTCTCAA CCGTCCCTGC AAGGCTGGGG CTCAGTTGCG TAATGGAAAG TAAAGCCCTG AACTATCACA CTTAATCTT CTTCAAAAAG GTGGTAAACT ATACCTACTG TCCCTCAAGA GAACACAAGA AGTGCTTTAA GAGGTATTTT AAAAGTTCCG GGGGTTTTGT GAGGTGTTTG ATGACCCGTT TAAAAATATGA TTTCCATGTT TCTTTTGTCT AAAGTTTGCA GCTCAAATCT TTCCACACGC TAGTAATTTA AGTATTTCTG CATGTGTAGT TTGCATTCAA GTTCCATAAG CTGTTAAGAA AAATCTAGAA AAGTAAACT AGAACCTATT TTTAACCGAA GAACTACTTT TTGCCTCCCT CACAAAGGCG GCGGAAGGTG ATCGAATTCC GGTGATGCGA GTTGTTCTCC GTCTATAAAT ACGCCTCGCC CGAGCTGTGC GGTAGGCATT GAGGCAGCCA GCGCAGGGGC TTCTGCTGAG GGGGCAGGCG GAGCTTGAGG AAACCGCAGA TAAGTTTTTT TCTCTTGAA AGATAGAGAT TAATACAAC ACTTAAAAAA TATAGTCAAT AGGTACTAA GATATTGCTT AGCGTTAAGT TTTTAACGTA ATTTTAATAG CTTAAGATTT TAAGAGAAAA TATGAAGACT TAGAAGAGTA GCATGAGGAA GGAAAAGATA AAAGGTTTCT AAAACATGAC GGAGGTGAG ATGAAAGCTTC TTCATGGAGT AAAAAATGTA TTTAAAAGAA AATTGAGAGA AAGGACTACA GAGCCCCGAA TTAATACCAA TAGAAGGGCA	10

MALATI

[0086]

	ATGCTTTTAG ATTAAAATGA AGGTGACTTA AACAGCTTAA AGTTTAGTTT AAAAGTTGTA GGTGATTAAA ATAATTTGAA GGCGATCTTT TAAAAAGAGA TTAACCGAA GGTGATTAAA AGACCTTGAA ATCCATGACG CAGGGAGAAT TCGTCATTT AAAGCCTAGT TAACGCATTT ACTAAACGCA GACGAAATG GAAAGATTAA TTGGGAGTGG TAGGATGAAA CAATTTGGAG AAGATAGAAG TTGGAAGTGG AAAACTGGAA GACAGAAGTA CGGGAAGGCG AAGAAAAGAA TAGAGAAGAT AGGGAAATTA GAAGATAAAA ACATACTTTT AGAAGAAAAA AGATAAATTT AAACCTGAAA AGTAGGAAGC AGAAGAAAAA AGACAAGCTA GGAAACAAAA AGCTAAGGGC AAAATGTACA AACTTAGAAG AAAATTGGAA GATAGAAACA AGATAGAAAA TGAAAATATT GTCAAGAGTT TCAGATAGAA AATGAAAAAC AAGCTAAGAC AAGTATTGGA GAAGTATAGA AGATAGAAAA ATATAAAGCC AAAAATTGGA TAAATAGCA CTGAAAAAAT GAGGAAATTA TTGGTAACCA ATTTATTTTA AAAGCCCATC AATTTAATTT CTGTTGGTGC AGAAGTTAGA AGGTAAAGCT TGAGAAGATG AGGGTGTTTA CGTAGACCAG AACCAATTTA GAAGAATACT TGAAGCTAGA AGGGGAAGTT GGTAAAAAT CACATCAAAA AGCTACTAAA AGGACTGGTG TAATTTAAAA AAACTAAGG CAGAAGGCTT TTGGAAGAGT TAGAAGAATT TGGAAGGCC TAAATATAGT AGCTTAGTTT GAAAAATGTG AAGGACTTTC GTAACGGAAG TAATTCAAGA TCAAGAGTAA TTACCAACTT AATGTTTTTG CATTGGACTT TGAGTTAAGA TTATTTTTTA AATCCTGAGG ACTAGCATT ATTGACAGCT GACCCAGGTG CTACACAGAA GTGGATTGAG TGAATCTAGG AAGACAGCAG CAGACAGGAT TCCAGGAACC AGTGTTTGAT GAAGCTAGGA CTGAGGAGCA AGCGAGCAAG CAGCAGTTTC TGGTGAAGAT AGGAAAAGAG TCCAGGAGCC AGTGCGATTT GGTGAAGGAA GCTAGGAAGA AGGAAGGAGC GCTAACGATT TGGTGGTGAA GCTAGGAAAA AGGATTCCAG GAAGGAGCGA GTGCAATTTG GTGATGAAGG TAGCAGGCGG CTTGGCTTGG CAACCACACG GAGGAGGCGA GCAGGCGTTG TCGTAGAGG ATCCTAGACC AGCATGCCAG TGTGCCAAGG CCACAGGGAA AGCGAGTGGT TGGTAAAAAT CCGTGAGGTC GGCAATATGT TGTTTTCTG GAACTTACTT ATGGTAACCT TTTATTTATT TTCTAATATA ATGGGGGAGT TTCGTACTGA GGTGTAAGG GATTATATG GGGACGTAGG CCGATTTCCG GGTGTTGTAG GTTCTCTTT TTCAGGCTTA TACTCATGAA TCTTGCTGA AGCTTTIGAG GGCAGACTGC CAAGTCCTGG AGAAATAGTA GATGGCAAGT TTGTGGGTTT TTTTTTTT CACGAATTTG AGGAAAACCA AATGAATTTG ATAGCCAAAT TGAGACAATT TCAGCAAATC TGTAAGCAGT TTGTATGTTT AGTTGGGGTA ATGAAGTATT TCAGTTTTGT GAATAGATGA CTTGTTTTTA CTTCTCACC CTGAATTCGT TTTGTAAATG TAGAGTTTGG ATGTGTAAC GAGGCGGGGG GGAGTTTTCA GTATTTTTTT TTGTGGGGGT	
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[0087]

	GGGGGCAAAA TATGTTTTCA GTTCTTTTTT CCTTAGGTCT GTCTAGAATC CTAAAGGCCA ATGACTCAAG GTGTAACAGA AAACAAGAAA ATCCAATATC AGGATAATCA GACCACCACA GGTTTACAGT TTATAGAAAC TAGAGCAGTT CTCACGTTGA GGTCTGTGGA AGAGATGTCC ATTGGAGAAA TGGCTGGTAG TTACTCTTTT TTCCCCCAC CCCCTTAATC AGACTTTAAA AGTGCTTAAC CCCTTAACT TGTTATTTTT TACTTGAAGC ATTTTGGGAT GGTCTTAACA GGGAAGAGAG AGGGTGGGGG AGAAAATGTT TTTTCTAAG ATTTTCACA GATGCTATAG TACTATGAC AAACCTGGGT AGAGAAGGAG TGTACCGCTG TGCTGTTGGC ACGAACACCT TCAGGGACTG GAGCTGCTTT TATCCTTGGG AGAGTATTCC CAGTTGAAGC TGAAGAGTAC AGCACAGTGC AGCTTTGGTT CATATTCAGT CATCTCAGGA GAACTTCAGA AGAGCTTGAG TAGGCCAAAT GTTGAAGTTA AGTTTTCCAA TAATGTGACT TCTTAAAAGT TTTATTAAAG GGGAGGGGCA AATATTGGCA ATTAGTTGGC AGTGGCCTGT TACGGTTGGG ATTGGTGGGG TGGGTTTAGG TAATTGTTTA GTTTATGATT GCAGATAAAC TCATGCCAGA GAACTTAAAG TCTTAGAATG GAAAAAGTAA AGAAATATCA ACTTCCAAGT TGGCAAGTAA CTCCCAATGA TTAGTTTTT TTCCCCCAG TTTGAATTGG GAAGCTGGGG GAAGTTAAAT ATGAGCCACT GGGTGTACCA GTGCATTAAT TTGGGCAAGG AAAGTGTCT AATTTGATAC TGTATCTGTT TTCCTTCAAA GTATAGAGCT TTTGGGGAAG GAAAGTATTG AACTGGGGGT TGGTCTGGCC TACTGGGCTG ACATTAAC TAATTATGGG AAATGCAAAA GTTGTTTGGG TATGGTATG TGTGGTTCTC TTTTGGAAAT TTTTTCAGGT GATTTAATAA TAATTTAAAA CTAATATAGA AACTGCAGAG CAAAGGAAGT GGCTTAATGA TCCTGAAGGG ATTTCTTCTG ATGGTAGCTT TTGTATTATC AAGTAAGATT CTATTTTCAG TTGTGTGTAA GCAAGTTTTT TTTAGTGT GGAGAAAATAC TTTTCCATG TTTAACTGCA AAACAAGATG TTAAGGTATG CTTCAAAAAT TTTGTAAAT TTTATTTTA AATTTATCTG TTTGTAAAT GTAACGTATT AAGAATTGTG ATAGTTCAGC TTGAATGTCT CTTAGAGGGT GGGCTTTTGT TGATGAGGGA GGGGAACTT TTTTFTTTT TATAGACTTT TTTCAGATAA CATCTTCTGA GTCATAACCA GCCTGGCAGT ATGATGGCCT AGATGCAGAG AAAACAGCTC CTTGGTGAAT TGATAAGTAA AGGCAGAAAA GATTATATGT CATACTCCA TTGGGGAATA AGCATAACCC TGAGATTCTT ACTACTGATG AGAACATTAT CTGCATATGC CAAAAAATTT TAAGCAAATG AAAGCTACCA ATTTAAAGTT ACGGAATCTA CCATTTTAAA GTAAATTGCT TGTCAAGCTA TAACCACAAA AATAATGAAT TGATGAGAAA TACAATGAAG AGGCAATGTC CATCTCAAAA TACTGCTTTT ACAAAGCAG AATAAAGCG AAAAGAAATG AAAATGTTAC ACTACATTAA TCCTGGAATA AAAGAAGCCG AAATAAATGA GAGATGAGTT GGGATCAAGT GGATTGAGGA GGCTGTGCTG TGTGCCAATG TTTCTTTTGC CTCAGACAGG TATCTCTTCG TTATCAGAAG AGTTGCTTCA TTTCATCTGG	
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[0088]

		GAGCAGAAAA CAGCAGGCAG CTGTTAACAG ATAAGTTTAA CTTGCACTCG CAGTATTGCA TGTTAGGGAT AAGTGCTTAT TTTTAAGAGC TGTGGAGTTC TTAATATCA ACCATGGCAC TTTCTCCTGA CCCCTTCCCT AGGGGATTTC AGGATTGAGA AATTTTCCA TCGAGCCTTT TTAATAATTGT AGGACTTGT CCTGTGGGCT TCAGTGATGG GATAGTACAC TCACTCAGA GGCATTGCA TCTTTAAATA ATTTCTTAAA AGCCTCTAAA GTGATCAGTG CCTTGATGCC AACTAAGGAA ATTTGTTAG CATTGAATCT CTGAAGGCTC TATGAAAGGA ATAGCATGAT GTGCTGTTAG AATCAGATGT TACTGCTAAA ATTTACATGT TGTGATGTAA ATTGTGTAGA AAACCATTAA ATCATTCAAA ATAATAAACT ATTTTATTA GAGAATGTAT ACTTTAGAA AGCTGTCTCC TTATTTAAAT AAAATAGTGT TTGCTGTAG TTCAGTGTG GGGCAATCTT GGGGGGATT CTCTCTAAT CTTTCAGAAA CTTGTCTGC GAACACTCTT TAATGGACCA GATCAGGATT TGAGCGGAAG AACGAATGTA ACTTTAAGGC AGGAAAGACA AATTTTATTC TTCATAAAGT GATGAGCATA TAATAATTCC AGGCACATGG CAATAGAGGC CCTCTAAATA AGGAATAAAT AACCTCTTAG ACAGGTGGGA GATTATGATC AGAGTAAAG GTAATTACAC ATTTTATTC CAGAAAAGTCA GGGGTCTATA AATTGACAGT GATTAGAGTA ATACTTTTC ACATTCCAA AGTTGTCATG TTAACCTTAA ATGCTTACAA TCTTAGAGTG GTAGGCAATG TTTTACACTA TTGACCTTAT ATAGGGAAGG GAGGGGGTGC CTGTGGGGTT TTAAGAATT TTCCTTTGCA GAGGCATTTC ATCCTTCATG AAGCCATTCA GGATTTGAA TTGCATATGA GTGCTGGCT CTTCCTCTG TTCTAGTGAG TGTATGAGAC CTTGCAGTGA GTTATCAGC ATACTCAAAA TTTTTTCTT GGAATTTGGA GGGATGGGAG GAGGGGGTGG GGCTTACTTG TTGTAGCTTT TTTTTTTTT ACAGACTTCA CAGAGAATGC AGTTGTCTTG ACTTCAGGTC TGTCTGTTCT GTTGGCAAGT AAATGCAGTA CTGTTCTGAT CCCGCTGCTA TTAGAATGCA TTGTGAAACG ACTGGAGTAT GATTAAGAGT TGTGTTCCCC AATGCTTGGG GTAGTGATTG TTGAAGGAAA AAATCCAGCT GAGTGATAAA GGCTGAGTGT TGAGGAAATT TCTGCAGTTT TAAGCAGTCG TATTTGTGAT TGAAGCTGAG TACATTTTGC TGGTGTATTT TTAGGTAAAA TGCTTTTTGT TCATTCTTGG TGGTGGGAGG GGAAGTGAAGC CTTTAGTCTT TTCCAGATGC AACCTTAAAA TCAGTGACAA GAAACATTCC AAACAAGCAA CAGTCTTCAA GAAATTAAC TGGCAAGTGG AAATGTTTAA ACAGTTCAGT GATCTTTAGT GCATTGTTTA TGTGTGGGTT TCTCTCTCCC CTCCTTGGT CTTAATTCCT ACATGCAGGA AACTCAGCA GACACACGTA TGCGAAGGGC CAGAGAAGCC AGACCCAGTA AGAAAAAATA GCCTATTAC TTAAATAAAA CCAAACATT CATTITAAAT GTGGGGATTG GGAACCACTA GTTCTTTCAG ATGGTATTCT TCAGACTATA GAAGGAGCTT CCAGTTGAAT TCACCAGTGG ACAAAATGAG GAAAACAGGT GAACAAGCTT TTTCTGTATT TACATACAAA GTCAGATCAG TTATGGGACA ATAGTATTGA	
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[0089]

		ATAGATTTCA GCTTTATGCT GGAGTAACTG GCATGTGAGC AAACTGTGTT GGCGTGGGGG TGGAGGGGTG AGGTGGGCGC TAAGCCTTTT TTTAAGATTT TTCAGGTACC CCTACTAAA GGCACC GAAG GCTTAAAGTA GGACAACCAT GGAGCCTTCC TGTGGCAGGA GAGACAACAA AGCGCTATTA TCCTAAGGTC AAGAGAAGTG TCAGCCTCAC CTGATTTTTA TTAGTAATGA GGACTTGCCT CAACTCCCTC TTTCTGGAGT GAAGCATCCG AAGGAATGCT TGAAGTACCC CTGGGCTTCT CTTAACATTT AAGCAAGCTG TTTTATAGC AGCTCTTAAT AATAAAGCCC AAATCTCAAG CGGTGCTTGA AGGGGAGGGA AAGGGGGAAA GCGGGCAACC ACTTTTCCCT AGCTTTTCCA GAAGCCTGTT AAAAGCAAGG TCTCCCCACA AGCAACTTCT CTGCCACATC GCCACCCCGT GCCTTTTGAT CTAGCACAGA CCCTTCACCC CTCACCTCGA TGCAGCCAGT AGCTTGGATC CTGTGGGCA TGATCCATAA TCGGTTTCAA GGTAACGATG GTGTGAGGT CTTTGGTGGG TTGAACATG TTAGAAAAGG CCATTAATTT GCCTGCAAAAT TGTTAACAGA AGGGTATTAA AACCACAGCT AAGTAGCTCT ATTATAATAC TTATCCAGTG ACTAAACCA ACTTAAACCA GTAAGTGGAG AAATAACATG TTCAAGAACT GTAATGCTGG GTGGGAACAT GTAACCTGTA GACTGGAGAA GATAGGCATT TGAGTGGCTG AGAGGGCTTT TGGGTGGGAA TGCAAAAATT CTCTGCTAAG ACTTTTTCAG GTGAACATAA CAGACTTGGC CAAGCTAGCA TCTTAGCGGA AGCTGATCTC CAATGCTCTT CAGTAGGGTC ATGAAGGTTT TCTTTTCT GAGAAAACAA CACGTATTGT TTTCTCAGGT TTTGCTTTTT GGCCTTTTT TAGCTTAAAA AAAAAAAAAAG CAAAAGATGC TGGTGGTTGG CACTCCTGGT TTCCAGGACG GGGTTCAAAT CCCTGCGGCG TCTTTGCTTT GACTACTAAT CTGTCTTCAG GACTCTTCT GTATTCTCC TTTTCTCTGC AGGTGCTAGT TCTTGGAGTT TTGGGAGGT GGGAGGTAAC AGCACAATAT CTTTGAACCTA TATACATCCT TGATGTATAA TTTGTGAGGA GCTTGACTTG ATGTATATT CATATTTACA CGAGAACCTA ATATAACTGC CTGTCTTTT TCAGGTAATA GCCTGCAGCT GGTGTTTTGA GAAGCCCTAC TGCTGAAAAC TTAACAATTT TGTGTAATAA AAATGGAGAA GCTCTAAA	
MBNL1	NM_001314057.1	CTTGCCGGCT TCCTTGCAAA GCCCGGTGCA AGGGCCTCTT TCAAAATGAA CCCACTGGTG TGCCTAGCAG TCGGTAGAAG AAGCGGGAGG GCGTCCGGTC TGCACGCCCG CCGCGAGGTT ACAATGCTGA ACGCATGAGA TGGAAGATAC CAACGGGAGG CCGAGGGGAT CCACGGCGCC CGCGCGGGCT CCGGCTTCTT CCTGCTCTCG GCGCCGCTGG GCGACCGCCC ATGACCCGCT CTTGCGGGCT CTGTCCGGTT GACAGGCGAC CCTGTGGCCC GGGGAAGCGC GGGAGGGCGC CGGCGGAAAG TTGAAGAGCG TTTTCTCGC CGCCGCGTGC ATTAGGAGCT CGACGAGTCC GCCCTGGGCT TCCTGGTGGG GCTGGGCGGG CGGGGGAGGG GCCGCGCAGC AGCAGCGGAA GCCAGACCTC GGCGATAAGA GGCTGCACAG CGACATGCAA CAGTCTTTTC ACTGCAGCTG	11

[0090]

	AATGAGTTGT GCGCCCCACA ATGCTCCCAT GACAAGGAGC TGACAAGTTC CATTTTCCGT CGCGGGCATC TTGGAATCAT GACTCCCACA ATGCCTTGGG CACTTGGTCG ACAGTGGGGC CGCCTCTGAA AAAAAAATGT GAGAGCAGTC ACTCAGGAAA TGTTGTTTAA GGGGAACCTT CTGGATCCTT TTCATGGCAC CATGGCAAGA AGAAGCTGTA TCTTATCTAT GGAAGATAAA GCATGGAGTT GGCTAATGGA TGCTGATAGG ACCATCTAGT TGCAGGAAAA CAAGCTCAGG GCTCCCACTG ATTCTACATT ATGGGCCGTT GCTCCAGGGA GAACTGCAAA TATCTTCATC CACCCCCACA TTAAAAACG CAGTTGGAGA TAAATGGAGC CAATAACTTG ATTCAGCAGA AGAACATGGC CATGTTGGCC CAGCAAATGC AACTAGCCAA TGCCATGATG CCTGGTGCCC CATTACAACC CGTGCCAATG TTTTCAGTTG CACCAAGCTT AGCCACCAAT GCATCAGCAG CCGCCTTTAA TCCTATCTG GGACCTGTTT CTCCAAGCCT GGTCCCGGCA GAGATCTTGC CGACTGCACC AATGTTGGTT ACAGGGAATC CGGGTGTCCC TGTACCTGCA GCTGCTGCAG CTGCTGCACA GAAATTAATG CGAACAGACA GACTTGAGGT ATGTCGAGAG TACCAACGTG GCAATTGCAA CCGAGGAGAA AATGATTGTC GGTTTGCTCA TCCTGCTGAC AGCACAATGA TTGACACCAA TGACAACACA GTCAGTGTGT GTATGGATTA CATCAAAGGG AGATGCTCTC GGGAAAAGTG CAAATACTTT CATCCCCCTG CACATTTGCA AGCCAAGATC AAGGCTGCCC AATACCAGGT CAACCAGGCT GCAGTGCAC AGGCTGCAGC CACCGCAGCT GCCATGACTC AGTCGGCTGT CAAATCACTG AAGCGACCCC TCGAGGCAAC CTTTGACCTG GGAATTCTC AAGCTGTACT TCCCCATTA CCAAAGAGGC CTGCTCTTGA AAAAACCAAC GGTGCCACCG CAGTCTTTAA CACTGGTATT TTCCAATACC AACAGGCTCT AGCCAACATG CAGTTACAAC AGCATACAGC ATTTCTCCCA CCAGGCTCAA TATTGTGCAT GACACCCGCT ACAAGTGTG TTCCCATGGT GCACGGTGCT ACGCCAGCCA CTGTGTCCGC AGCAACAACA TCTGCCACAA GTGTTCCCTT CGCTGCAACA GCCACAGCCA ACCAGATACC CATAATATCT GCCGAACATC TGACTAGCCA CAAGTATGTT ACCCAGATGT AGAATTTTCA TCACTAAACA ATCATGCTAA AGAGGAAAGG ACAGTGTGCT TGGTTAGAGT AAAGGACGAG GTCATTAGCC ATATTGTATA TATCGTCAAG CAACACACAC AAAAGTTCTT CAGCCACAAG ACATCCACAT ATTGCATGTT AACCAGAAGA AAAGACAACA TTTTCCGGAA ATCCACTGCA CACTGTTGCC TATACACTTT GTACATTTAA TTGATATTTG TGCTGAGGTG ATATTCTGT CTAAAAGAAC AACATTGTCT TTCTTTTCTA GCACAGAGTT ATGCATTCAA AGATGCATAC CTAGTTAGTT TCCTATATAT TCATGCCATC TTGAAAAGAC AGACTATGGT GTAACCATGA TTCTATTATG TATTGGTACG TCTGTAGACC AAGATATAAT TTTTTAAAAA TAAGTTTATT TCTTTCAAGG TTTACAAATA ACAAAGGTGC ACCTTGTATT TAAAATTGCC ATTATAGATG AGAGCGTGCA TGCACAGTCA TTTTGTGTTA AGAGTAATAT TTTTAATGTA ATAGATTGTA AGACGTGGTG AGGGAGGGAT	
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[0091]

	CTGACAGAGA TGAATGTGCC AAGCAAAACC ACAACTGTGT ATATTTTAAA GCACATCATG GCTTTAAGTA CCATGTTGTT AAGGATTCTC ATGAAGTGCC ATAGACTGTA CATCAAATTA GAGTATTATT TCTTCAGTGT TATTGTTTTC AGAGCCACAT TTTGTTGCAT ATTTGCTAGT ACTAATCAGT CAAAGGGCAC CATTCTTTTT TTTTTTTTTT GAAACCAAAG CTGTCTCAGA AATGGCCAAT TTAACCTTAC AGTAACAATA GACAGCACAA CACAACTCT CTCAATACAG ATAACTCAC ACATACTGGA GATATATATA TAATAGATAT ATATAAAATT ATTTAATGC ATTGTAGTGT AATATTTATG CATACTATAC TGTATAACAT GTTATTCAAA AGGGATTGCC ATTTCTGAGA CACAGTAACA AAAAAATGAG GAAATTATTT TGCTTCTATT TATAGCCTCT GTCAAAAGTC AAAAGACTAT AAATGCTTTG CAAAAATGGT TTCACGTTTG CTTAAATGCT TCATCACAGT CACATTCAAA ATAGTGACTC TAAACAAAAG AGAAAGCAGC ACTGTCATCA GATGCATGAT AAACCAAAAT ATGAAAATGG GAAATGTTTA ATTAACCTAG TAATTGGGTG GGTTAAGTAC ATGGGTGAAT TTTATATGTG ATTTTGTGTT TGTTTGTGTT TGTTTCAGATT AACTGCTTAT AGCCTTAGAA AGCCTTTTAC AAAATTAAAA AAAAAATAGA TGTGCATTCA GTTTTAAAGA ATGGAATCAT CCAAAGGAAT TCCTTTTTTT GAGGTTTGGA TGTTGCAGCT AGTAAAGGAT ATTTTGTCTC TGTTTCAGCAG TCTAAAAAT TGCTGAAGTA GGGGCCAGGT CACTGGTAGT TATAGTATGG AATGGGAGAA GTGAAAGTTC AGTTATAGAA CTTTCCATAC TTCCAAGTTT ACTGCAAGTT TTTATGCTTG AGAGAGATGC TTTCTAATAT AAGACTGATG TGTTGATTTT ACTGATTGTA CTGTACATCT ATTAAGCCT TAGATTATTA CATTACGGGT TGGAACCCAT ACCAATGTAA TTTCAATCGT GTTAAGAAAG TAATGGTGAC TTCACATGTT ATTGTAGTTA GTTACATTAT AGAATATTAC TTATTTTCT TGTTAAATG TAGTTTTCA TTTCTACAT TTATTAGATT TTCATTTTCT ATTAACAATT GAATACCAT TCAGTTTATA GACTTGTTTT ATTAGATTTT ACCAATGAAT TTTTCAAAAT ACAAAAAAAA GTAGTTTTTC CTTCATAACA TACTCAGTTT TGAATTACAT GTAGTGTCAC ATGAATATTG GTATTGTTAA CTAATGATT TATATTTTAC TGATTTAATA TTACAGTGTA AGAATGTCAG TCATTGTTAG TTCCTGTCTA GTTTTCATTA AAAGAACAAA GATCTTTTAT ATGGATATCT TATAAATATA TAATCATTGC TAAGTAAGAA GTAAAGTTGT TGCTATCGCA ACAATCCTGG CAGACAATTG AGTAATATTT TGATGATTTA TTTTGTGTTG AATTAGTTAT TATAAGAAGA TCTAGATCCT AGATATTAGA ATAAAAATTA TTTTCTACTG TATCCATTTT AAATGTTAAA ATATTGTTTA ATATTTTTGA AATCCCTGAG TATCAGGCCT TGTTATAAAT AAGCTGCATA ATCAATAAAT AGAACAAGGG ACTTTTTGTT GATAATCCAA ATACTCAAAG TTTACGTAAT GAAAATTATA GCGTGTGTGC AAACCTTTGA GGGTTGATTA TGCTGCAATT TAGCATGTTG GAACGTCTAG GGAGAAGGTT GACTTTTTGC ACTTCTGTAT ATAGTCAAAA GAGAGAAACC TGTATAATAG	
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[0092]

		TAAGATCTTA TTTTGAATAA AAACGTCTAT AATTACAAGG AGTTTTGTGA AGGCTAATAC AATGACAGAC TGAGCAAAAT TGCTTGCAAA AGTGGCACAG AGTTAGCACT CCATACCCCT TCAAACATGT TGCTTTGCTT TCTTGTGGAC AGCTTGTAGT TTGCCAGGAT TTTTTCAGCT GGAAAGATAC GCCATCCTTT CAAACCTCA TGAAGTACAA AAATAGCAGG TACTTCTACC ATTAAGGTGA AATCATGGAT CAGATATTCC TTACATTTTT CAAACTACT GCATGTTTAA AACTTCAACA AAAAAAGAGA GAAAGAACTA TACTAAGAAC ATATATTATT CAGATCAGTT TCTGCCAATT TCAGTGGTTT ATTGTTTACA AAAAAATCTT CAAAACAAGT ATTGACTTTC AAAAAATTTA AATCATAAAC AGGCAAAACCA AACAGCACAC TGATAGCTATA GTTGTATGT GATTGTTTTT TAATTGCTGT AGGATCCTGT TCTTTCAGCA GGTGAAAAAT AAAACGCAGT TCAAAATTCA TGGTTTTAAT TTTCAACTCA GAAGCACTCA AAAATGCAAA ATGTGATAAT GGGCACTTGT TTAAGAAGAT TAGTGATATCC AGCCTTCACT CCAGCTGGTT AAAAATGTTG CACTTATCAG CAACCTTACC ACTTTCATCT GCTGAAAGGA CAAATGTGCT TGGTTTTACT ATTATGTAAT CACAACCTAC TTCTGCTTG TAGTTGCTTA AAATTATGTA TTTTGTCTTG GGCTGCAATT TGTTTTATGC TTATTTTATT ATTACTGCAG TAGTTGACTT TGCTGTATGG AAAAATAAAG TGAAATTGCC CTAATAAAAC TTCCTTTCT TAAGTAAAAA AAAAAA AAAAAA	
MCL1	NM_001197320.1	GCGCAACCCT CCGGAAGCTG CCGCCCTTT CCCCTTTTAT GGGAATACTT TTTTAAAAA AAAAGAGTTC GCTGGCGCCA CCCCGTAGGA CTGGCCGCC TAAACCGTG ATAAAGGAGC TGCTCGCCAC TTCTCACTTC CGCTTCCTTC CAGTAAGGAG TCGGGGTCTT CCCAGTTTT CTCAGCCAGG CGGCGGCGGC GACTGGCAAT GTTTGGCCTC AAAAGAAACG CGGTAATCGG ACTCAACCTC TACTGTGGGG GGGCCGGCTT GGGGGCCGGC AGCGGCGGGC CCACCCGCC GGGAGGGCGA CTTTGGCCA CCGGCGCCAA GGACACAAAG CCAATGGGCA GGTCTGGGGC CACCAGCAGG AAGGCGCTGG AGACCTTACG ACGGGTTGGG GATGGCGTGC AGCGCAACCA CGAGACGGCC TTCCAAGGCA TGCTTCGGAA ACTGGACATC AAAACGAAG ACGATGTGAA ATCGTTGTCT CGAGTGATGA TCCATGTTTT CAGCGACGGC GTAACAAACT GGGGCAGGAT TGTGACTCTC ATTCTTTTG GTGCCTTTGT GGCTAAACAC TTGAAGACCA TAAACCAAGA AAGCTGCATC GAACCATAG CAGAAAGTAT CACAGACGTT CTCGTAAGGA CAAAACGGGA CTGGCTAGTT AAACAAAGAG GCTGGGATGG GTTTGTGGAG TTCTTCCATG TAGAGGACCT AGAAGGTGGC ATCAGGAATG TGCTGCTGGC TTTTGCAGGT GTTGCTGGAG TAGGAGCTGG TTTGGCATAT CTAATAAGAT AGCCTTACTG TAAGTGCAAT AGTTGACTTT TAACCAACCA CCACCACCAC CAAAACCACT TTATGCAGTT GGACTCCAAG CTGTAACCTC CTAGAGTTGC ACCCTAGCAA CCTAGCCAGA AAAGCAAGTG GCAAGAGGAT TATGGCTAAC AAGAATAAAT	12

[0093]

	ACATGGGAAG AGTGCTCCCC ATTGATTGAA GAGTCACTGT CTGAAAAGAAG CAAAGTTCAG TTTCAGCAAC AAACAAACTT TGTTTGGGAA GCTATGGAGG AGGACTTTTA GATTTAGTGA AGATGGTAGG GTGGAAAGAC TTAATTTCTT TGTGAGAAC AGGAAAAGTGG CCAGTAGCCA GGCAAGTCAT AGAATTGATT ACCCGCCGAA TTCATTAATT TACTGTAGTG TTAAGAGAAG CACTAAGAAT GCCAGTGACC TGTGTAAAAG TTACAAGTAA TAGAACTATG ACTGTAAGCC TCAGTACTGT ACAAGGGAAG CTTTTCTCT CTCTAATTAG CTTTCCAGT ATACTTCTTA GAAAGTCCAA GTGTTTCAGGA CTTTATACC TGTTATACTT TGGCTTGGTT TCCATGATTG TTAATTTATT AGCCTAGTTT ATCACCAATA ATACTTGACG GAAGGCTCAG TAATTAGTTA TGAATATGGA TATCCTCAAT TCTTAAGACA GCTTGTAAT GTATTTGTAA AAATTGTATA TATTTTACA GAAAGTCTAT TTCTTTGAAA CGAAGGAAGT ATCGAATTTA CATTAGTTTT TTTCATACCC TTTTGAACCT TGCAACTTCC GTAATTAGGA ACCTGTTTCT TACAGCTTTT CTATGCTAAA CTTTGTCTG TTCAGTTCTA GAGTGTATAC AGAACGAATT GATGTGTAAC TGTATGCAGA CTGGTTGTAG TGGAACAAAT CTGATAACTA TGCAGGTTTA AATTTTCTTA TCTGATTTTG GTAAGTATTC CTTAGATAGG TTTTCTTTG AAAACCTGGG ATTGAGAGGT TGATGAATGG AAATTTCTTC ACTTCATTAT ATGCAAGTTT TCAATAATTA GGCTAAAGTG GAGTTTAAAG GTTACTGATG ACTTACAAAT AATGGGCTCT GATTGGGCAA TACTCATTTG AGTTCCCTCC ATTTGACCTA ATTAACTGG TGAATTTAA AGTGAAATCA TGGGCTCATC TTTAAAGCTT TACTAAAAAG ATTTTCAGCT GAATGGAAC CATTAGCTGT GTGCATATAA AAAGATCACA TCAGGTGGAT GGAGAGACAT TTGATCCCTT GTTTGCTTAA TAAATTATAA AATGATGGCT TGGAAAAGCA GGCTAGTCTA ACCATGGTGC TATTATTAGG CTTGCTTGT ACACACACAG GTCTAAGCCT AGTATGTCAA TAAAGCAAAT ACTTACTGTT TTGTTTCTAT TAATGATTCC CAAACCTTGT TGCAAGTTTT TGCAATGGCA TCTTTGGATT TCAGTCTTGA TGTTTGTCT ATCAGACTTA ACCTTTTATT TCCTGTCCTT CCTTGAAATT GCTGATTGTT CTGCTCCCTC TACAGATATT TATATCAATT CCTACAGCTT TCCCCTGCCA TCCCTGAACT CTTTCTAGCC CTTTATAGATT TTGGCACTGT GAAACCCCTG CTGGAAACCT GAGTGACCCT CCCTCCCCAC CAAGAGTCCA CAGACCTTTC ATCTTTCACG AACTTGATCC TGTTAGCAGG TGGTAATACC ATGGGTGCTG TGACACTAAC AGTCATTGAG AGGTGGGAGG AAGTCCCTTT TCCTTGGACT GGTATCTTTT CAACTATTGT TTTATCCTGT CTTGGGGGC AATGTGTCAA AAGTCCCTC AGGAATTTTC AGAGGAAAAG ACATTTTATG AGGCTTCTC TAAAGTTTCC TTGTATAGG AGTATGCTCA CTTAAATTTA CAGAAAGAGG TGAGCTGTGT TAAACCTCAG AGTTTAAAAG CTAAGTATAA ACTGAAGAAA GTGTCTATAT TGGAAGTAGG GTCATTTGAA AGCTTCAGTC TCGGAACATG ACCTTTAGTC TGTGGACTCC ATTTAAAAAT AGGTATGAAT	
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[0094]

		AAGATGACTA AGAATGTAAT GGGGAAGAAC TGCCCTGCCT GCCCCATCTCA GAGCCATAAG GTCATCTTTG CTAGAGCTAT TTTTACCTAT GTATTATCG TTCTTGATCA TAAGCCGCTT ATTTATATCA TGTATCTCTA AGGACCTAAA AGCACTTTAT GTAGTTTTTA ATTAATCTTA AGATCTGGTT ACGGTAACCTA AAAAAGCCTG TCTGCCAAAT CCAGTGGAAA CAAGTGCATA GATGTGAATT GGTTTTTAGG GGCCCCACTT CCCAATTCAT TAGGTATGAC TGTGGAAATA CAGACAAGGA TCTTAGTTGA TATTTTGGGC TTGGGGCAGT GAGGGCTTAG GACACCCCAA GTGGTTTGGG AAAGGAGGAG GGGAGTGGTG GGTTTATAGG GGGAGGAGGA GGCAGGTGGT CTAAGTGCTG ACTGGCTACG TAGTTCGGGC AAATCCTCCA AAAGGGAAAAG GGAGGATTTG CTTAGAAGGA TGGCGCTCCC AGTGACTION TTTTGACTTC TGTTTGCTTT ACGCTTCTCT CAGGGAAAAA CATGCAGTCC TCTAGTGTTT CATGTACATT CTGTGGGGGG TGAACACCTT GGTTCTGGTT AAACAGCTGT ACTTTTGATA GCTGTGCCAG GAAGGGTTAG GACCAACTAC AAATTAATGT TGGTTGTCAA ATGTAGTGTG TTCCCTAAC TTTCTGTTTT TCCTGAGAAA AAAAAATAAA TCTTTTATTC AAATACAGGG AAAAAAAAAA AAAAAATA	
NFKBIZ	NM_0 010054 74.2	CTCCTCTTGC CACGAGGTCA GACGGCGAGT TCTTAGAGAA AAAGGCTGCT TAGCTGCTGC TTATCATGTA ACCTCAAAAAG GAAACTGATC GTCTTTCTCA TGCTGTCACG TACTTGGGTT ATTATCGCTG ATTACAGCTG GAAACAATTG ATTTGCTCTT ACGTATTTGT GTGACTTGAC TCTTCAAACA CAAAGGTAA CAGGAAGATC TCGAGGGCCC TGGCTGAACT TCACCTTTTG GCTTCTTGG CCTGATGCTG AACTCTCGAG GTTGAGCCCC ATATGGGGGT TGGCAGGCAG CAGAGAGGCC CCTTCAAGG TGTTCCGGTA AAGAACTCAG TGAAGGAACT CCTGTTGCAC ATCCGAAAGTC ATAAACAGAA GGCTTCTGGC CAAGCTGTGG ATGATTTTAA GACACAAGGT GTGAACATAG AACAGTTCAG AGAATTGAAG AACACAGTAT CATACTAGTG GAAAAGGAAA GGGCCCAGATT CGTTGTCTGA TGGACCTGCT TGCAAAAAGG CAGCTCTGTT GCATTCCCAA TTTTGTGACAC CACCTCAAAC ACCAACGCCC GGGGAGAGCA TGGAGAGATG TCATCTCAAT GAACCCAAAC AGGAGAGCAG TGCTGATCTG CTTCAGAACA TTATCAACAT TAAGAATGAA TGCAGCCCCG TTTCCCTGAA CACAGTTCAA GTTAGCTGGC TGAACCCCGT GGTGGTCCCT CAGAGCTCCC CCGCAGAGCA GTGTCAGGAC TTCCATGGAG GGCAGGTCTT TTCTCCACCT CAGAAATGCC AACCATTCCA AGTCAGGGGC TCCCAACAAA TGATAGACCA GGCTTCCCTG TACCAGTATT CTCCACAGAA CCAGCATGTA GAGCAGCAGC CACACTACAC CCACAAACCA ACTCTGGAAT ACAGTCCTTT TCCCATACCT CCCCAGTCCC CCGCTTATGA ACCAAACCTC TTTGATGGTC CAGAATCACA GTTTTGCCCA AACCAAGCT TAGTTTCCCT TCTTGGTGAT CAAAGGGAAT CTGAGAATAT TGCTAATCCC ATGCAGACTT CCTCCAGTGT TCAGCAGCAA	13

[0095]

		AATGATGCTC ACTTGACAG CTTCAGCATG ATGCCCAGCA GCGCCTGTGA GGCCATGGTG GGGCACGAGA TGGCCTCTGA CTCTTCAAAC ACTTCACTGC CATTCTCAA CATGGGAAAT CCAATGAACA CCACACAGTT AGGGAAATCA CTTTTTCAGT GGCAGGTGGA GCAGGAAGAA AGCAAATTGG CAAATATTTC CCAAGACCAG TTTCTTTCAA AGGATGCAGA TGGTGACACG TTCCTTCATA TTGCTGTGTC CCAAGGGAGA AGGGCACTTT CCTATGTTCT TGCAAGAAAG ATGAATGCAC TTCACATGCT GGATATTAAG GAGCACAATG GACAGAGTGC CTTTCAGGTG GCAGTGGCTG CCAATCAGCA TCTCATTTGT CAGGATCTGG TGAACATCGG GGCACAGGTG AACACCACAG ACTGCTGGGG AAGAACACCT CTGCATGTGT GTGCTGAGAA GGGCCACTCC CAGGTGCTTC AGGCGATTCA GAAGGGAGCA GTGGGAAGTA ATCAGTTTGT GGATCTTGAG GCAACTAACT ATGATGGCCT GACTCCCTT CACTGTGCAG TCATAGCCCA CAATGCTGTG GTCCATGAAC TCCAGAGAAA TCAACAGCCT CATTACCTG AAGTTCAGGA GCTTTTACTG AAGAATAAGA GTCTGGTTGA TACCATTAAAG TGCCTAATTC AAATGGGAGC AGCGGTGGAA GCGAAGGATC GCAAAAGTGG CCGCACAGCC CTGCATTTGG CAGCTGAAGA AGCAAATCTG GAACCTATTC GCCTCTTTT GGAGCTGCCC AGTTGCCTGT CTTTGTGAA TGCAAAGGCT TACAATGGCA AACTGCCCCT CCATGTTGCT GCCAGCTTGC AGTATCGGTT GACACAATTA GATGCTGTCC GCCTGTTGAT GAGGAAGGGA GCAGACCCAA GTACTCGGAA CTGGAGAAC GAACAGCCAG TGCATTGGT TCCCGATGGC CTTGTGGGAG AACAGATCCG ACGTATCTG AAGGGAAAGT CCAATCAGCA GAGAGCTCCA CCGTATTAGC TCCATTAGCT TGGAGCCTGG CTAGCAACAC TCACTGTCAG TTAGGCAGTC CTGATGTATC TGTACATAGA CCATTTGCCT TATATTGGCA AATGTAAGTT GTTTCTATGA AACAAACATA TTTAGTTCAC TATTATATAG TGGGTTATAT TAAAAGAAAA GAAGAAAAAT ATCTAATTTT TCTTGGCAGA TTTCATATT TCATACCCAG GTATCTGGGA TCTAGACATC TGAAATTTGAT CTCATGGTA ACATTGCCTT CAATTAACAG TAGCTTTTGA GTAGGAAAGG ACTTTGATTT GTGGCACAAA ACATTATTAA TATAGCTATT GACAGTTTCA AAGCAGGTAA ATTGTAAATG TTTCTTAAAG AAAAAGCATG TGAAAGGAAA AAGGTAAATA CAGCATTGAG GCTTCATTTG GCCTTAGTCC CTGGGAGTTA CTGGCGTTGG ACAGGCTTCA GTCATTGGAC TAGATGAAAG GTGTCCATGG TTAGAATTTG ATCTTTGCAA ACTGTATATA ATTGTTATTT TTGTCCTTAA AAATATTGTA CATACTTGGT TGTTAACATG GTCATATTTG AAATGTATAA GTCCATAAAA TAGAAAAGAA CAAGTGAATT GTTGCTATTT AAAAAAATTT TACAATTCCT ACTAAGGAGT TTTTATTGTG TAATCACTAA GTCTTTGTAG ATAAAGCAGA TGGGGAGTTA CGGAGTTGTT CCTTTACTGG CTGAAAGATA TATTCGAATT GTAAAGATGC TTTTCTCAT GCATTGAAAT TATACATTAT TTGTAGGGAA TTGCATGCTT TTTTTTTTTT TTCTCCCGAG ACAGGGTCTT GCTCTGGCGC CCAGGCTGGA	
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[0096]

		GTACAGTGGC ATGATCTTGG CTCACTTCAG CCTTGACTTG GGCTCAAGTG ATCCTCCTAC CTGAGCCTTC TGAGTAACTG GAACTACAGG TGTGCACTCC TCGCCTGGCT AATTTTTTAT TTTTTGTAACA GGCAGGATCT TGCCACCTTG CCCAGGCTGG TCTTGAACTC CTGAGCTCAT GCCATCTGCC TGCCTTAGTC TCCCAAAATG CTGGGATTAC AGGAGTGAGC CACCATGCCC GGCTGGCAGT TGCATGGAAG AGAACACCTC TTTATGGCTT ACCTCTAGA ATTTCTAATT TATGTGTTCT GTTGAAATTT TTGTTTTTTT ACCTTTATTG AAACAACAAA AAGTCAGTAT TGAAACATAT CTCCTGTTT TCTGTTGTCA AATGATGATA ATGTGCCATG ATGTTTTATA TATATCATTC AGAAAAAGTT TTATTTTTTA ATAACATTCT ATTAACATTA TTTTGCTTGC CGCTGGCATG CCTGAGGAAT GTATTGGCT TTGATTACAC ACTAAGTTTT TGTAATAAAT TTGACTCATT AAAAACCTTT TTTTTTTAAA AAAAAAAAAA AAGAAAAATCT CATTAGTGAA CTATCTTTG CAGCTGAGTA CTAAATTTCT TTTAAAAAG ATACCCTTTG GATTGATCAC ATTGTTTGAC CCAGTATGTC TTGTAGACAC GTTAGTTATA ATCACCTTGT ATCTCTAAAT ATGGTGTGAT ATGAACCAGT CCATTACAT TGGAAAAACT GATGGTTTTA AATAAACTAA TTCACTAATA TAAAAAAA A	
NR4A1	NM_001202233.1	TTCTGGTGT AAGCTTTGGT ATGGATGGTG GCCGCTCCC TACAGACTGG GAGCTGTAG AGGGCAGGGA TCCTAGCTGA CACATCTATG TCCTCGCCTT GGTGGAGGC CTCCACCATG GACAGAGGCC AGGCCCTGCC CCTCCAGGC AGCCTGGCTC CTTCTGCTGG GCCCTGAAGG CAGACGGGAT AATGTGGTTG GCCAAGGCCT GTTGGTCCAT CCAGAGTGAG ATGCCCTGTA TCCAAGCCCA ATATGGGACA CCAGCACCGA GTCCGGGACC CCGTGACCAC CTGGCAAGCG ACCCCCTGAC CCCTGAGTTC ATCAAGCCCA CCATGGACCT GGCCAGCCCC GAGGCAGCCC CCGCTGCCCC CACTGCCCTG CCCAGCTTCA GCACCTTCAT GGACGGCTAC ACAGGAGAGT TTGACACCTT CCTCTACCAG CTGCCAGGAA CAGTCCAGCC ATGCTCCTCA GCCTCCTCCT CGGCTCCTC CACATCCTCG TCCTCAGCCA CCTCCCCTGC CTCTGCCTCC TTCAAGTTTC AGGACTTCCA GGTGTACGGC TGCTACCCCG GCCCCCTGAG CGGCCAGTG GATGAGGCC TGTCCTCAG TGGCTCTGAC TACTATGGCA GCCCCTGCTC GGCCCCGTCG CCTCCACGC CCAGCTTCCA GCCGCCAG CTCTCTCCT GGGATGGCTC CTTCGGCCAC TTCTCGCCA GCCAGACTTA CGAAGGCCCTG CGGGCATGGA CAGAGCAGCT GCCCCAAGCC TCTGGGCCCC CACAGCCTCC AGCCTTCTTT TCCTTCAGTC CTCCACCGG CCCCAGCCCC AGCCTGGCCC AGAGCCCCCT GAAGTTGTTC CCCTCACAGG CCACCCACCA GCTGGGGGAG GGAGAGAGCT ATTCCATGCC TACGGCCTTC CCAGGTTTGG CACCCACTTC TCCACACCTT GAGGGCTCGG GGATACTGGA TACACCCGTG ACCTCAACCA AGGCCCGGAG CGGGGCCCCA GGTGGAAGTG AAGGCCGCTG TGCTGTGTGT GGGGACAACG CTTATGCCA GCATTATGGT GTCCGCACAT	14

[0097]

		GTGAGGGCTG CAAGGGCTTC TTCAAGCGCA CAGTGCAGAA AAACGCCAAG TACATCTGCC TGGCTAACAA GGACTGCCCT GTGGACAAGA GGCGGCGAAA CCGCTGCCAG TTCTGCCGCT TCCAGAAAGTG CCTGGCGGTG GGCATGGTGA AGGAAGTTGT CCGAACAGAC AGCCTGAAGG GGCGGCGGGG CCGGCTACCT TCAAAACCCA AGCAGCCCCC AGATGCCTCC CCTGCCAATC TCCTCACTTC CCTGGTCCGT GCACACCTGG ACTCAGGGCC CAGCACTGCC AAAGTGGACT ACTCCAAGTT CCAGGAGCTG GTGCTGCCCC ACTTTGGGAA GGAAGATGCT GGGGATGTAC AGCAGTTCTA CGACCTGCTC TCCGGTTCTC TGGAGGTCAT CCGCAAGTGG GCGGAGAAGA TCCCTGGCTT TGCTGAGCTG TCACCGGCTG ACCAGGACCT GTTGCTGGAG TCGGCCTTCC TGGAGCTCTT CATCCTCCGC CTGGCGTACA GGTCTAAGCC AGGCGAGGGC AAGCTCATCT TCTGCTCAGG CCTGGTGCTA CACCGGCTGC AGTGTGCCCG TGGCTTCGGG GACTGGATTG ACAGTATCCT GGCCTTCTCA AGGTCCCTGC ACAGCTTGCT TGTCGATGTC CCTGCCTTCG CCTGCCTCTC TGCCCTTGTC CTCATCACCG ACCGGCATGG GCTGCAGGAG CCGCGGCGGG TGGAGGAGCT GCAGAACCGC ATCGCCAGCT GCCTGAAGGA GCACGTGGCA GCTGTGGCGG GCGAGCCCCA GCCAGCCAGC TGCCCTGTAC GTCTGTGGG CAAAGTGCCG GAGCTGCGGA CCCTGTGCAC CCAGGGCCTG CAGCGCATCT TCTACCTCAA GCTGGAGGAC TTGGTGCCCC CTCCACCCAT CATTGACAAG ATCTCATGG ACACGCTGCC CTCTGACCC CTGCCTGGGA ACACGTGTGC ACATGCGCAC TCTCATATGC CACCCCATGT GCCTTTAGTC CACGGACCCC CAGAGCACCC CCAAGCCTGG GCTTGAGCTG CAGAAAGACT CCACCTTCTC ACCTGCTCCA GGAGGTTTGC AGGGAGCTCA AGCCCTTGGG GAGGGGGATG CCTTCATGGG GGTGACCCCA CGATTGTCT TATCCCCCCC AGCCTGGCCC CGGCCTTTAT GTTTTTTGTA AGATAAACCG TTTTTAACAC ATAGCGCCGT GCTGTAAATA AGCCAGTGC TGCTGTAAAT ACAGGAAGAA AGAGCTTGAG GTGGGAGCGG GGCTGGGAGG AAGGGATGGG CCCCGCCTTC CTGGGCAGCC TTTCCAGCCT CCTGCTGGCT CTCTCTCCT ACCCTCCTTC CACATGTACA TAAAGTGA CTCTAGGAAG AAGACAAATG ACAGATTCTG ACATTTATAT TTGTGTATTT TCCTGGATTT ATAGTATGTG ACTTTTCTGA TTAATATATT TAATATATTG AATAAAAAAT AGACATGTAG TTGGAAGTGA AAAAAAAAAA AAA	
PDE4B	NM_001037339.2	ATCACATACC CTAAAGAACC CTGGGATGAC TAAGGCAGAG AGAGTCTGAG AAAACTCTTT GGTGCTTCTG CCTTTAGTTT TAGGACACAT TTATGCAGAT GAGCTTATAA GAGACCGTTC CCTCCGCCTT CTTCCTCAGA GGAAGTTTCT TGGTAGATCA CCGACACCTC ATCCAGGCGG GGGGTTGGGG GGAAACTTGG CACCAGCCAT CCCAGGCAGA GCACCACTGT GATTGTCT	15

[0098]

	CCTGGTGGAG AGAGCTGGAA GGAAGGAGCC AGCGTGCAAA TAATGAAGGA GCACGGGGGC ACCTTCAGTA GCACCGGAAT CAGCGGTGGT AGCGGTGACT CTGCTATGGA CAGCCTGCAG CCGCTCCAGC TAACTACAT GCCTGTGTGT TTGTTTGAG AAGAATCTTA TCAAAAATTA GCAATGGAAA CGCTGGAGGA ATTAGACTGG TGTTTAGACC AGCTAGAGAC CATAAGACC TACCGGTCTG TCAGTGAGAT GGCTTCTAAC AAGTTCAAAA GAATGCTGAA CCGGGAGCTG ACACACCTCT CAGAGATGAG CCGATCAGGG AACCAGGTGT CTGAATACAT TTCAAATACT TTCTTAGACA AGCAGAATGA TGTGGAGATC CCATCTCCTA CCCAGAAAGA CAGGGAGAAA AAGAAAAAGC AGCAGCTCAT GACCCAGATA AGTGGAGTGA AGAAATTAAT GCATAGTTCA AGCCTAAACA ATACAAGCAT CTCACGCTTT GGAGTCAACA CTGAAATGA AGATCACCTG GCCAAGGAGC TGGAAGACCT GAACAAAATGG GGTCTTAACA TCTTTAATGT GGCTGGATAT TCTCACAATA GACCCCTAAC ATGCATCATG TATGCTATAT TCCAGGAAAG AGACCTCCTA AAGACATTCA GAATCTCATC TGACACATTT ATAACCTACA TGATGACTTT AGAAGACCAT TACCATTCTG ACGTGGCATA TCACAACAGC CTGCACGCTG CTGATGTAGC CCAGTCGACC CATGTTCTCC TTTTACACC AGCATTAGAC GCTGTCTTCA CAGATTGGA GATCCTGGCT GCCATTTTTG CAGCTGCCAT CCATGACGTT GATCATCCTG GAGTCTCCAA TCAGTTTCTC ATCAACACAA ATTCAGAACT TGCTTTGATG TATAATGATG AATCTGTGTT GGAAAAATCAT CACCTTGCTG TGGGTTTCAA ACTGCTGCAA GAAGAACACT GTGACATCTT CATGAATCTC ACCAAGAAGC AGCGTCAGAC ACTCAGGAAG ATGGTTATTG ACATGGTGTT AGCAACTGAT ATGTCTAAAC ATATGAGCCT GCTGGCAGAC CTGAAGACAA TGGTAGAAAC GAAGAAAGTT ACAAGTTCAG GCGTTCTTCT CCTAGACAAC TATACCGATC GCATTACAGGT CCTTCGCAAC ATGGTACACT GTGCAGACCT GAGCAACCCC ACCAAGTCCT TGGAATTGTA TCGGCAATGG ACAGACCGCA TCATGGAGGA ATTTTCCAG CAGGGAGACA AAGAGCGGGA GAGGGGAATG GAAATTAGCC CAATGTGTGA TAAACACACA GCTTCTGTGG AAAAATCCCA GGTGGGTTTC ATCGACTACA TTGTCCATCC ATTGTGGGAG ACATGGGCAG ATTTGGTACA GCCTGATGCT CAGGACATTC TCGATACCTT AGAAGATAAC AGGAACTGGT ATCAGAGCAT GATACCTCAA AGTCCCTCAC CACCACTGGA CGAGCAGAAC AGGGACTGCC AGGGTCTGAT GGAGAAGTTT CAGTTTGAAC TGAATCTCGA TGAGGAAGAT TCTGAAGGAC CTGAGAAGGA GGGAGAGGGA CACAGCTATT TCAGCAGCAC AAAGACGCTT TGTGTGATTG ATCCAGAAAA CAGAGATTCC CTGGGAGAGA CTGACATAGA CATTGCAACA GAAGACAAGT CCCCGTGGA TACATAATCC CCCTCTCCCT GTGGAGATGA ACATTCTATC CTTGATGAGC ATGCCAGCTA TGTGGTAGGG CCAGCCCACC ATGGGGGCCA AGACCTGCAC AGGACAAGGG CCACCTGGCC TTTCAGTTAC TTGAGTTTGG AGTCAGAAAG CAAGACCAGG AAGCAAATAG CAGCTCAGGA AATCCCACGG	
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[0099]

		TTGACTTGCC TTGATGGCAA GCTTGGTGGG GAGGGCTGAA GCTGTGCTG GGGGCCGATT CTGATCAAGA CACATGGCTT GAAAAATGGAA GACACAAAAC TGAGAGATCA TTCTGCACTA AGTTTCGGGA ACTTATCCCC GACAGTGACT GAACTCACTG ACTAATAACT TCATTTATGA ATCTTCTCAC TTGTCCCTTT GTCTGCCAAC CTGTGTGCCT TTTTGTAAA ACATTTTCAT GTCTTTAAAA TGCTGTGTA ATACCTGGAG TTTAGTATCA ACTTCTACAC AGATAAGCTT TCAAAGTTGA CAACTTTTT TGACTCTTTC TGGAAAAGGG AAAGAAAATA GTCTTCCTTC TTTCTGGGC AATATCCTTC ACTTTACTAC AGTTACTTTT GCAAAACAGAC AGAAAAGGATA CACTTCTAAC CACATTTTAC TTCCTTCCCC TGTGTCCAG TCCAACCTCA CAGTCACTCT TAAAACCTCT CTCTGTTTGC CTGCCTCCAA CAGTACTTTT AACTTTTTGC TGTAACAGA ATAAAATTGA ACAAATTAGG GGGTAGAAAG GAGCAGTGGT GTCGTTTACC GTGAGAGTCT GCATAGAACT CAGCAGTGTG CCCTGCTGTG TCTTGGACCC TGCCCCCAC AGGAGTTGTA CAGTCCCTGG CCCTGTTCCC TACCTCCTCT CTTCACCCCG TTAGGCTGTT TTCAATGTAA TGCTGCCGTC CTCTCTTGC ACTGCCTTCT GCGCTAACAC CTCCATTCTT GTTTATAACC GTGTATTTAT TACTTAATGT ATATAATGTA ATGTTTTGTA AGTTATTAAT TTATATATCT AACATTGCCT GCCAATGGTG GTGTTAAATT TGTGTAGAAA ACTCTGCCTA AGAGTTACGA CTTTTTCTTG TAATGTTTTG TATTGTGTAT TATATAACCC AAACGTCACT TAGTAGAGAC ATATGGCCCC CTGGCAGAG AGGACAGGGG TGGGCTTTTG TTCAAAAGGG CTGCCCTTTC CCTGCCTGAG TTGCTACTTC TGCACAACCC CTTTATGAAC CAGTTTTGGA ACAAATATTC TCACATTAGA TACTAAATGG TTTATACTGA GCTTTTACTT TIGTATAGCT TGATAGGGGC AGGGGGCAAT GGGATGTAGT TTTTACCCAG GTTCTATCCA AATCTATGTG GGCATGAGTT GGGTTATAAC TGGATCCTAC TATCATTTGT GCTTTGGTTC AAAAGGAAAC ACTACATTTG CTCACAGATG ATTCTTCTGA ATGCTCCCGA ACTACTGACT TTGAAGAGGT AGCCTCCTGC CTGCCATTAA GCAGGAATGT CATGTTCCAG TTCATTACAA AAGAAAACAA TAAAACAATG TGAATTTTAA TAATAAAATG TGAACGTATG TAGCAAAATTA CGCAAATGTG AAGCCTCTTC TGATAACACT TGTTAGGCCT CTTACTGATG TCAGTTTCAG TTTGTAAAAT ATGTTTCATG CTTTCAGTTC AGCATTGTGA CTCAGTAATT ACAGAAAATG GCACAAATGT GCATGACCAA TGTATGTCTA TGAACACTGC ATTGTTTCAG GTGGACATTT TATCATTTTC AAATGTTTCT CACAATGTAT GTTATAGTAT TATTATTATA TATTGTGTTT AAATGCATTC TAAAGAGACT TTTATATGAG GTGAATAAAG AAAAGCATGA TTAGATTAAA AAAA	
PLAS2	NM_013240 46.1	CGGAGGCGGA GCTCCCGCGC CGTTCACGTG ACGGGCCCGG CTGTAGCGGC GGCGGCCGCG GCGTCTTAAG CGGCGCCAG TGCAGGATGG TGCTGGAGGC GGCGGCGGCC GTGGTGCGCG	16

[0100]

		CAGCGTCGTT GCGGGCAGCG GGAGTGGGTG CGGCGGCAGC GGCGGCGGCG CCCGCGGGTG GTATAAAATG GCGGATTTTCG AAGAGTTGAG GGATCTCCAG TACAATGTTG AATAGAAGCT GTGATGGGGG CATCCTGATC TTGTTCTGA TTTTAAAGGG AATGCTTTCA AAGTTTCACA AGTGGCTGTA CCATTTTACA TCCCTACCAG CAATGTATGG AGTGATCCAG TTTCTCAGCA TCCTCGCCAG CATTTGGTGT TATCAGTGT TTTCAATTTA GCCATTCTGA ATATGGTTTC TAGTTTTAGG GTTCTGAAC TACAAGTATT ACTAGGCTTT GCTGGACGGA ATAAAAGTGG ACGCAAGCAT GACCTCCTGA TGAGGGCGCT GCATTTATTG AAGAGCGGCT GCAGCCCTGC GGTTCAGATT AAAATCCGAG AATTGTATAG ACGCCGATAT CCACGAACTC TTGAAGGACT TTCTGATTTA TCCACAATCA AATCATCGGT TTTCAGTTTG GATGGTGGCT CATCACCTGT AGAACCTGAC TTGGCCGTGG CTGGAATCCA CTCGTTGCCT TCCACTTCAG TTACACCTCA CTCACCATCC TCTCCTGTTG GTTCTGTGCT GCTCAAGAT ACTAAGCCCA CATTTGAGAT GCAGCAGCCA TCTCCCCCA TTCTCCTGT CCATCCTGAT GTGCAGTTAA AAAATCTGCC CTTTTATGAT GTCTTGATG TTCTCATCAA GCCCAGAGT TTAGTTCAA GCAGTATCA GCGATTTCAA GAGAAGTTTT TTATTTTTGC TTGACACCT CAACAAGTTA GAGAGATATG CATATCCAGG GATTTTTTGC CAGGTGGTAG GAGAGATTAT ACAGTCCAAG TTCAGTTGAG ACTTTCCTG GCAGAGACAA GTTGCCCTCA AGAAGATAAC TATCCAAATA GTCTATGTAT AAAAGTAAAT GGGAAAGCTAT TTCTTTGCC TGGCTATGCA CCACCGCCTA AAAATGGGAT TGAACAGAAG CGCCCTGGAC GCCCCTTGAA TATTACATCT TTAGTTAGGT TATCTTCAGC TGTGCCAAAC CAAATTTCCA TTTCTTGGGC ATCAGAAATT GGGAAGAATT ACTCTATGTC TGTATATCTT GTACGGCAGC TTACATCAGC CATGTTATTA CAGAGATTAA AAATGAAAGG TATTAGAAAC CCTGATCATT CCAGAGCACT AATTAAAGAA AAACTTACTG CAGATCCTGA TAGTGAAATT GCTACAATA GCCTTCGGGT ATCCTTGATG TGCCCTTAG GAAAAATGAG GCTGACAATC CCATGCCGTG CAGTGACTTG TACACATCTG CAGTGTTTTG ATGCTGCCCT CTATCTACAA ATGAATGAGA AAAAGCCAC CTGGATTGT CCGTGTGTG ACAAAAAAGC TGCCTATGAA AGTCTAATAT TAGATGGGCT TTTATGGAA ATTCTCAATG ACTGTTCTGA TGTAGATGAG ATCAAATTCC AAGAAGATGG TTCTTGGTGT CCAATGAGAC CGAAGAAAGA AGCTATGAAA GTATCCAGCC AACCCTGTAC AAAAATAGAA AGTTCAAGCG TCCTCAGTAA GCCTTGTTCA GTGACTGTAG CCAGTGAGGC AAGCAAGAAG AAAGTAGATG TTATTGATCT TACAATAGAA AGCTCTTCTG ACGAAGAGGA AGACCCTCCT GCCAAAAGGA AATGCATCTT TATGTCAGAA ACACAAAGCA GCCCAACCAA AGGGGTTCTC ATGTATCAGC CATCTTCTGT AAGGGTGCCC AGTGTGACTT CGGTGATCC TGCTGCTATT CCGCTTCAT TAACAGACTA CTCAGTACCA TTCCACCATA CGCCAATATC AAGCATGTCA TCAGATTTGC CAGGTTTGA	
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[0101]

	TTTTCTTTCC CTTATTCCAG TTGATCCCCA GTCTCACCTC ACCCTTAACA GCAAGCAGTA CGTCTGTCAC CACCACCAGC TCCCATGAAA GCAGTACTCA TGTTAGTTCA TCCAGCAGCA GGAGTGAGAC AGGGGTCATA ACCAGCAGTG GAAAGTAACAT TCCTGACATC ATCTCATTGG ACTAAAGGAG GACTCACTTG ATTCTGGGAA TCATTTCATCA GAACTGCTTT TTCTTGGATC TCTAGTCTGT GGAAACGTTT TTTTTTTTTT TTTTAAATA ATTTGGTATT TATTGAAAGT CAGATGGATT CTTTGTCTT CTGAGGGGTG AACACAGAAG ACTGCAACAA GAACCAAATG ACATGCAAGG ATTTTCTTA ATTATGCTGT ACTCTCAGCA TCAGATACAT TCAACCATAA CTGTATCTTC CTGAGAGATG GATTTCACTT TCATACGTTA ATGGATGGAG TCTACAAATC AGTGAACAAA GTTTTGTGA AAATAAAGAG CAATAAAATT ATGTAATAT TCAAGTAACC TTTTTCTAA TTAACAAAAA AATTGTAATC ACTGATTCTA GAATGACAGC AACTTCTGTT TAACCTTACG TGAAGGAAAA AAAATATATG GAAAGAACTT AATGTTTGCT GAATGAGTCC TTTCATGGA GATTTGCTCT GTTTCATTGA AGTAATGAAG TTTCACTACG TGGCCAAAGC TTGGATTCCA CTTTTCGTCC TGCATTTCCT CTTTCTTCG TGATTGCATC AAAGAAAAAT GGCAATTCGT TTAATTGGTT TTTTCTCTGC TTATCATTTA CACTTTGACG TTGTTTGCTA ATGAGTGCTG TGTGAAGTTC TGGGATTTGG CTACTCTTCA TTGGTGATTA TGTTTAAAG CACTATGCAG ATTCTGCCCT GACATAAAGT GTGTTATTAT GTTTTATGTA ATTGTACATT TTTCATTCTA GAGTTTTCTA TAAATTTGAG GCTTGCCTTC TCAAAAAAGA AACTATGCAG CCATTGAATG AAATGTCTTT GGGTACGGT GTGACTGGAA TGTTTGTTAG AAATTTGTTT ACACTATCAA ATATTGATAT CTTGGAGCCA GCAGAAGAGC AGATTTTGGG AGGTGGTAAT AACAAAAATT AATTTCTTCC CAACAACCTA ATTTCTCAT TTATTTTACA GAATAGTAGT GAAATATTTG ATGAAACTTT GTATTTTGGT AGCACTACAT AGAAAATGTG TTTTAGATTT ATGATGATCA TATTTCTCAC CAATGTAAAT TCAGTCTCAG CAGTGATTTT CAAACTTAGG GAAAGGGACA GCATTAGATT TTTTTTTTTT TTCATTTTTT TAAATGATA TCTTACCTGA AACTACAAAC GACAAAAGAG AATTAGAAAT GTTTGAATTA AAGTGAAGAA GGGTTGGGGG AGATGGGCTT GAACCCACTT CCTGTCTCAA TCCATGCTAC CCCAAACT CCAGGGAACC TCTGAGGTTT TATTGGGTGC ACTTTGAAAA TTCTCTTCT ATAGTGTGTT TGTTTGATT TAAATCACAG AGAAAACGTT GTTTTACTCT TAGAGAAACA TTTTCATCCA GTTTTTTAGT TTGCTTCATT TGACTTCCTA AATCATTTTT GAGTTCACAA GGATTTGGTA CTTTCTGTT TAGCTTTCTC TCTTAAGCT TTATCTACCT TAAAAACAA GTCTTTTTT TAATGGCCAG TCCAACCAAT TGATTCTCA AACTGAAGTG CCCAGGTGTG GACTCATCAA TTCCCGTTAG AATAGGGACA TCCTACTTAA GAGTTGGTGC AGCTCCAAGG AGCTGACTTG TCCTTGCTTG GGGTTTTTTT TTTTTTCTT TCACCTTCTC AAGTTTCCAT GGCCTTTGTG TGTTCTTTTT	
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[0102]

	ATGTTGATTT AAATTCATAT GGTTTTCCAC AAATCCCTTC TTTGGCTACA TTGTCTCCTT ATTCAATGGA TTATCCCTTT GTGGGGGCTG CTTATTTTAA AGATGTTGGG GGGGAAACAA ACCCAAATCT ACGAGCAGTA GTTGCACATA GTTGCCAGTT TTACCTTCTT AGTCATTAGA TTCCAAACC ATGTTGCAGT TTTTGGTCC AGATATAGTA TTTCTTTCTA ATAAAGTTTT ATGTTGCTGC TCTAAATACA GATGCAATAT TTATTGACTC TGTAATCAGA TAGAAAAAAC TTAAGTTGGT TTGTGTGGTA TGACTTATAA AGAAATGATG TATATTGTTT ATTTTGTTAC CCTTTAGATT GTCAGAGACT CCCCCAATTT AATCAACAAA GTTTTATAAA GTAAATGAAA ATATTAATAG AAATTAGTTT ATTTACTTGG TTCTTATAAC TGATATCTCT GTGCTTTTAT AATTGTGATT TGTTTTTTTG TTTTTTTTTC TATTTCTGT GAACAGTTTT AATGTTCCGT TTTGGTGTIT TACACTGAAA TTACATATAA ATTTTAAATT TATTTCATAC AGGCAACTTG CATTTTAAAA AATACACTTT GAAGTTTATC ATCTTGAAAT TGGGGCTTAC GTTGTATTATC TGCTTGAGC ATTAGTACTT TATGACTTTG GCCTTATGGC AACATCATGA TTATTAATCC GTCAGCCTTT AATGTGGTCA CTGTTTCTTA TCCAGACCCT GACTTTCTAG TAGTTTATTT TGCTAGCCCA GATTTCGTCT TAACCAAATA TAAGGGAGTT TCAGAGGGGT GATCTTAGCT GTCACCTAGA TTCTGTCAGC CAACCAGTGA TTGTCTGGAA TATCTTAGGA AATGAACGT AATTGTCAGC CTCCTAAAAT CAATTTTTTT TTTTTTTTTT TTGAGGCTGA GTCTTGCTCT TGTTCGCCGG GATGGAGTGC AATGGTGCGA TCTTGGCTCA CCGCAACCTC CACCTACAGG GTTCAAGCGA TTCTCCTGCC TCAGCCTCCC GAGTAGCTGG GATTACAGGC ATGTATCACC ACGCCAGCT AATTTTGTAT TTTTAGTAGA TACGGGGTTT CTCCATTTTG GTCAGGCTGG TCTCGAACTC CCGACCTCAG GTGATCCGCC TGCCTTGGCC TCCCAAAGTG CTGGGATTTA CAGGCGTGAG CCACCGGCC TGGCCAAAAT AAAATGTTTT TATCTTTCTT CACTTAGAAC TATGAAGGCC TTTTCTGT CTGGTAACCC CCCACAGTGT AATTGGTGCT GAAAATAGTT TCGTGCCTGA GGTCTGTTGT CACTCACTCA CTTTCTGACA ATTAGGTGAG CCAGTTGAGG ATTTTCTGGC CTGAAGTTAT AAAAAGTTGG CATCTGTCCT AAGGTAATTG TAAAGGCAAA ATGAAAGCAT TGAGGTGAAT TTAGGTTATA TGGCATTAT CTGGTAATGT GTTTCAGAAA AGCTAGAATG AAAATGTGAT GTAAGGGATA GCAAGTGTAG GTTGATTTCAT AATTCTTGGT ATAAAACCAA GTTTTCCTTA GTCTTGAGGA ATTTGAAGAA AGGTAAAATG TTGGATTTTA AGCAAAGTAG GATTGACCAG AGACTGTTCT GACTTTGACA TTCAGACCTT TCAGATGTTT TTCTTCAGA CCAGTCCAAG AACTCAGCA TTTCAGCCA AGTTGTCTTT TTTTCTGCC AATAAAGTAT TCATTAGTTG ACGTTTGTIT GTATTTTAAAG TAAAGTCAAT TTTTTTAAA GCATTAATTT AATTCACGGG TATGCCTTTC ATTTCTCTGG CCTTCAGTTG GTTTAAAAAA AAAAAAAAAA AAAAAAGCAC TTAGCCGGAC CATCTTTCTT TTAGTAAACA TTTTATTTT	
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[0103]

	CTTAATTTTT CCTGAAAGAT TTCTTCATT TTCATGGAAT GTCATAATGA CACTACCATT ATTTCTAGC TCTTGCATA ATAGAAAAAT GTAGAGCAGT GCACCATTTA AACACGTCTG ACATTGGATT TAGTGGTCCT AGGTTTCATGT GATTTGGGAG CCTTAAGTTG TTATTTAGAT TGATTCAGCC TGATTCACCA TCTTTTTTAC TACAGTTCTA CATGAATGTG GTGAAACAGG TAGAAGAAAA TTAAGCATT CTCTGCTTTT GGAGTCTAAT GTTCTGCCT AGTGACTGGT TTGTAACACC CCCCTCACCC CTACTTTGTT AGGAACCTGC AATTCTAAA AGAAATAAAT AAAGCTGTAC CCAATGTCCA TTCTTTAATG CTTCCTGGT TGAATAATGT TTGTTTTTTC TGTATTATGC AGTAGTACAT GCTTATTGTG GAAAATTTAG ACAATACAGA AAAGTATAAC AATTAATTGC CTATGATTCT GTCACCAGAA AAAATCACTT GATATTTTTG CATCTTCCTT GCCATTGTCT TTGCTACTTC TGCATATTTT TACTTAGTTT CATCATCTC AGTGTAATTT ATATCTTGGG GTTTTTCCCC GCAACCTACA GGCATTATTC CATGTCATTA AAAGTGTGTC AACTATTATT AATTTTATGG TACTCCATTG TTATGGATGT GCCATGTTT ATATAACCTT TACTTATTTT GAACAGTTTA GATTATATCT CATAATGCCA CAATGAATGT CTTTGTGTAT AAATTATTTT CTAGGATAA AATACTGGAG GTGGAATTTT TAGTCAAGGG TATATGAACA CTTTTGTAGT TCTTGATTCA TACCCTTTT CCACATGGGT ATGTTAATTT ATACTGCAGC TAGATGGTAT GGGGAAGGGTG GTCTAGCCAT ATTTTCCAAG AACATGCAAC GTTTTATCTT TATGCAGGCA TCTGCACTAA GACCTCTGTC CTTTCTGACT CTATGGAACG GGGTTAAGTG ATATGGAGAT CATTGGCAGA GATTTTCCCA AGCTTTCTTA GTTTTAAATA TATCTGACAT GGGCCGGGTA TGGAGGCTCA CGCCTGTAAT CCCAGCACTT TGGGAGGCCA AGGCGGGCAG ATAATCTGAA GTCAGGAGTT GGAGACCAGC CTGGCTAACA TGGAACATGG TGAAACCCCA TCTCTAGCAA AAACATAAAT TAGGTGGGTG TGATGGCAGG CGCCTGTAGT CCCAGCTACT TGGGAGACCG AGGCAGGAGA ATCGCTTGAA CCCAGGAGGC GGAGGATTTG CAGTGATCCG AGATTGTGCC ACTGCACTCC AGCCTGGGTA ACAAAGCAAG ACTCTCTAAA AAAAAAAAAA AAAAAAAAAA AAAATATATA TATATATATA TATATATATA TAAATCTGA CATGTTTCAG AAACACCTAC GTATGGCTAT CCAAGCTTTT CCCATGATTT TACTGGCACT GTAAAGTTGC ACAAATATTC TTTGTCAGAC TACGTTTTCC ATCTTTAGTT CAAAAGTTTT GTCACTTTTT AAAAAAAGCC TCTGTACCT AAGGCCTGCC CTTAAGAGGT CAGCTCTCTT TTCTCTTTC CTGTAGGCCC CATTATGGCC TTTCTGAGCT CCCCAAAGCC AGTAGAATCT ACTGAGCCAA AGGCATTCCA TCCCCAACT GAAAAGTGGT AAGGCTAAAA GCTATAAAAA CAGGCAACAA TTGCCTGTTT TCACCTTATA TTCCCTTATG TTTCCAATAA GGGTAGCTGC AGGGAAAGAA AAAAACAGAT TGCTACCTTC AGATGTTTGA GGTACAACAT TTTCTTGATT GGCCTAGCAC AATCATTTCC CAACTGCTT CCTATTTCTG AATGGCTTTT TAAAAAGCT TTATTTTGTG	
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[0104]

	TTCTCAAAGC TTAATTATTT TAAGTGACGA AGAGTGTAC CGTGTGTAG AATAGCATAT GCCTTTATT TTGGCTTCA TCAAAGTGT TAATAAATGT TTAGAGTGT TTGTAAGTAC ACGTGGAATA GAGTGTACA GAAGTTTTGG TTCCAGACAT CAGGCAGCTT ATAATCAAGG TTCCAAAAAT CAAGAATTCT TAAGCTGGGC ATGGTGGCTC ATGCCTGTAA TCCCAGCACT TTGGGAAGCC AAGGCAGGCA AATCACTTGA GGCCAGGAGT TTGAGACCAG CTGGCCAAC TTGGTAAAAAC CCCATCTCTA CTAAAAATAC AAAAAATTAG GGCATGATGG CTCATGTCTG TAATCCCAGC TACTTGGGAG GCTGAGGGAT GAGAATTGCT TGAACCTGAG AGGCGGAGGT TGCAGTGAAT CAGGATCATG ACCCTGTACT CCAGCCTGGG TGACAGAGTG AGACCAAAAA AAAAAATAA AAAAAATAA AAAAGTAACA GGCATTGTGC AAAGAAATTT CCAAGAATGT CTCATTCTTG CAATGGCTTC TCAGAGGAAA GTGGTGTAT TCCCCATTTT ACAAATGAAA CAGGTTTAGG TAAGTTTCCC AAGGTCACAG TGAATGAGTA GTGGACTTGG GAGTCTGACC TAGACTTACC CAAAAGCTC TCTGCGTAAA CTGAAGTGAC GTTAATTAGC TGTGCTATCT AGGAGACTGA TATGGGAATC TAGACTTAAA ATTATGAGAA CTGGTTTCAG ATGATGGCCA GAGTAATAAG GAAGGAGTGG ATGCTGAAGC CATTTCAAAG GAAGACTCAA GATTCACTGA CTGAATATAG GAGTAAGGGT TGAGTGCATT TTTCATCCAT TTTTCAAGCC TGGGTAACCT GGATGTAAAT GGCATATCT ACAGAGACAG GAGGCAGTTT AGAGTGAAGA CGAATCATGT ATGGGAGACA GTGATGAATG TTAAGCATGG GATTTCAGAA ATGAAGCATC CATGAGGCTC ATTCCTGGTT TTTCTGCAGT CTTTTAAATA AAAGTACAAA CCTCCCTTGT CATCCATTTT TGCCTTCACT TATCTCCATT CTGTATTATG TTCTAGTCAC GCCCCAGTCA CTGATCCCTT CCTAGGCCAT ACTTGGCTAC ATCTTAGCCT TTTCTTTTGA TTTTCTCTT CACTGCCTTG CCCATTACAA ATTTGGCTGC CACCTGAGGC CCTGCCATAC CCTACAGCTC ACACCAGCGT GGGCTGTGTT CACATTCTAC ATATCTCAAG ATACAGTGGT TGCTGTCCTT CCCCCTACT GCATCGTTAC ACGTCTCTAA AAAATCTCTG CCTCTGAAGC TCATGCCAAG AGGTATATACT ATCAGCTACC TCTAGTCTTA TAACTGCCTG ATCATTCCCT TTGATTTGCT GGAAGCTTTG ACTCACAGTG TTCCTTGCTT TCCTTGATTC TGGTCATTAT TATTAATATC TTGAACATTC TATAGATGAT TTATCCAAGT TGGTCTGTGA GGTATTGGTT ACTTTACCTC CAGCATTTTC GTCTACTGAA CCACGCTTTC TGTTTTCCTC TTTGCTACTT GTCCAGACTG TTCTTTCATT ATTGCAGCCT TGAAGAAATC CTCAGTAACC TATCCATCCT CCGACATGAC GTAGCATAGT TCCTTTGCCC ATTCTCATCA GTTATAACAA ATGTTATTGC CCTCTTTTCA GGCCACTTCC TTCTCAGAAG ATGACTTTGC TGCTTAATTC AAACAGAAGG GACAGTCCGA AAGCATGATT TCTTCCCCAC CTATGACCAC CTCCATCCTT TTTGTTTCC AGTTTCAGAG AATGAGGTAG GCCTTTAAGG CCAACTGACT CTGGTCTCCT CTGTCTATCT TCAGGACCTT CCTCTGTCAG	
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[0105]

		ACTTCCCCTC TCTTATCTCC ATGTCTCTCA CCTCTCTACT GCTGCTTTTC TTGGCTTACA AATGGTCTCA GTCATCCAGT ATTTGAGATT ATATTAGGTG CCAGGCATTG TATCAGGCAC TTGGAACACA AGGCAGGATC CTGCCCCCAC CAAAGTTGTG CTCCAATAGC GTCAACAGAG GTGTGAAATA GGGAGATTAC AATGTTAATG GTAAAAGACA AAGTATAGGG TGCTACAAGA GCATGTAAAT GAGGCACCTC AATGATTTAA TAGAAGTAAT GTGGAGAAAT GTGAGGATTG ATGAAAAGCT TGTCCAAAAA GGGCCAGAAA TGTTTAGAAT TGCTGGAAGT TTGCTAAGGA ATATTGAGAA ATATGCATAG ATAGATCGTG AAGGGCCTTG TAAAACAGTG ATGAGACATT GAAGAGTTTT CATGATCATT AGTAGTAATG AGAATTTGTT GAGTTTGGCA TGATTATCTC CATATTACAA ATGTGGAAC AGATTCTGAC AGGATAAGCG ACTTACTTGC CCAGGGTCAT GCAGCTTGTA ATTGAGGAGT CAGGTTTCAA ATCCAGTTTT AACTACTTTC TCAGAGGCCT TTCTTGATCA TTCTATCTAA AAAGCAAGTG TTCCCTAACT ATTATCCCAG TACCTGGTT TATATACTCT TAATACATAA AATAATCCCT GCATAITGTG TGTTTCCCT ACTAGATTGT AAGTCCCATG AGGCAGAGG TGATAACTTT TTTCACTTGC ATCCCAGAGC CTAACATGAT ATGGGCTACA TAGAAGGTGC CCAGTAAATA TTGGTGGATG AAGAAATGGT GGATAACCAT TTGCATTTGA CTTATGCTGA CTGGAAATTC AATACCTTTG GAATATATAA TACCTCAGCA GTAAGCATTC ACCAAGAGAG GAAAACAGAA GGAGGTGCAT GTTTAGGGTA GGTGGTACGG GAGATGGATG CTGAGGTGTT GAAAGGCAGC ATACTCACCT TCTGAATCC AAAACTTACA GGGGCAAGGG CCATTAAATGA GGGGTGGGTA GAGCAGTGCA CAGTGGGGAT AATATGGGAG TAGGTGTATT AAACCTGGAA GTGTAAGCAA CTCCTTGTAG ACCCACCTTA CTGTGTATAA AAGGCTGGAG AAATTCTTCA TATGATCTAC TCTAGGTAT GTACTGAGGA CCACCTTATC TGGGTCAGGT AACTACACA GAGTGCTACA ATATAATTGT AAACATAATT TATCCTCACT GTGATGGCTA GCCACCTGAC CCAAATCATT ATTAGACTCA ATACTTTGGA ACTGGAACAA AAATCAGTTG ACCTGATGTC TGAAAGACAT GCCCACCTGC TATTTGACAA GCTATAGACA TATCCTACCA ATTGATGGGT AGTAGCACTG AACTATGAA AGTGGATGAA CTCATCCAGA GGAGTTGATG AGTGAGAAAA GAAGACTGGA AAAGGAACAC AAGGAAATCA AGAAGCAGCA GCTGAGACTG AAGGAAAATA ACGTGGTATT ACAGAGGCCA AAAAAATAGAG TATTTCAAGA AGCAAGTGGT TAGTGGAGTT AAAAGCTGCT GATACAACCT AAAAAAGTAA GTATCCATTT TTTAAAAAAC TTTCAATTTAA AATACCACCA TATTTTATTG AATCTAAGTA CCTGATTGTA AGACATTAAG GAAAAATTAA ACCTGCTAAT TAAA	
PRKAA1	NM_006251.5	AGCGCCATGC GCAGACTCAG TTCCTGGAGA AAGATGGCGA CAGCCGAGAA GCAGAAACAC GACGGGCGGG TGAAGATCGG CCACTACATT CTGGGTGACA CGCTGGGGGT CGGCACCTTC	17

[0106]

	GGCAAAGTGA AGGTTGGCAA ACATGAATTG ACTGGGCATA AAGTAGCTGT GAAGATACTC AATCGACAGA AGATTGGGAG CCTTGATGTG GTAGGAAAAA TCCGCAGAGA AATTCAGAAC CTCAAGCTTT TCAGGCATCC TCATATAATT AAACGTACC AGGTCATCAG TACACCATCT GATATTTTCA TGGTGATGGA ATATGTCTCA GGAGGAGAGC TATTTGATTA TATCTGTAAG AATGGAAGGC TGGATGAAAA AGAAAGTCGG CGTCTGTCC AACAGATCCT TTCTGGTGTG GATTATTGTC ACAGGCATAT GGTGGTCCAT AGAGATTTGA AACCTGAAAA TGTCTGCTT GATGCACACA TGAATGCAAA GATAGCTGAT TTTGGTCTTT CAAACATGAT GTGAGATGGT GAATTTTAA GAACAAGTTG TGGCTCACCC AACTATGCTG CACCAGAAGT AATTTCAGGA AGATTGTATG CAGGCCCAGA GGTAGATATA TGGAGCAGTG GGGTATTCT CTATGCTTTA TTATGTGGAA CCCTTCCATT TGATGATGAC CATGTGCCAA CTCTTTTTAA GAAGATATGT GATGGGATCT TCTATACCCC TCAATATTTA AATCCTTCTG TGATTAGCCT TTGAAACAT ATGCTGCAGG TGGATCCCAT GAAGAGGGCC ACAATCAAAG ATATCAGGGA ACATGAATGG TTTAAACAGG ACCTTCCAAA ATATCTCTTT CCTGAGGATC CATCATATAG TTCAACCATG ATTGATGATG AAGCCTTAAA AGAAGTATGT GAAAAGTTTG AGTGCTCAGA AGAGGAAGTT CTCAGCTGTC TTTACAACAG AAATCACCAG GATCCTTTGG CAGTTGCCTA CCATCTCATA ATAGATAACA GGAGAATAAT GAATGAAGCC AAAGATTTCT ATTTGGCGAC AAGCCACCT GATTCTTTTC TTGATGATCA TCACCTGACT CGGCCCCATC CTGAAAGAGT ACCATTCTTG GTTGCTGAAA CACCAAGGGC ACGCCATACC CTTGATGAAT TAAATCCACA GAAATCCAAA CACCAAGGTG TAAGGAAAGC AAAATGGCAT TTAGGAATTA GAAGTCAAAG TCGACCAAAT GATATTATGG CAGAAGTATG TAGAGCAATC AAACAATTGG ATTATGAATG GAAGGTGTGA AACCCATATT ATTTGCGTGT ACGAAGGAAG AATCCTGTGA CAAGCACTTA CTCAAAAATG AGTCTACAGT TATACCAAGT GGATAGTAGA ACTTATCTAC TGGATTTCG TAGTATTGAT GATGAAATTA CAGAAGCCAA ATCAGGGACT GCTACTCCAC AGAGATCGGG ATCAGTTAGC AACTATCGAT CTTGCCAAAG GAGTGATTCA GATGCTGAGG CTCAAGGAAA ATCCTCAGAA GTTTCTCTTA CCTCATCTGT GACCTCACTT GACTCTTCTC CTGTTGACCT AACTCCAAGA CCTGGAAGTC ACACAATAGA ATTTTTTGAG ATGTGTGCAA ATCTAATTAA AATTCTTGCA CAATAAACAG AAAACTTTGC TTATTTCTTT TGCAGCAATA AGCATGCATA ATAAGTCACA GCCAAATGCT TCCATTTGTA ATCAAGTTAT ACATAATTAT AACCGAGGGC TGGCGTTTTG GAATGCAATT TGCACAGGGA TTGGAACATG ATTTATAGTT AAAAGCCTAA TATGCAGAAA TGAATTAAGA TCATTTTGTT GTTCAATTGTG CAGTATGTAT ATAGCATAAT ATACACAGTG AATTATAGGT CTCAGGCTTA CTTGATTTTT GGCTATTTTA TATTTAGTGT ACACAGGGCT TTGAAATATT AATTTACATA AAGGCCTTCA TATATTATTA CGTGTTATAT ATTACGTGTT	
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[0107]

	ATAAATTTAT TCAATAAATA TTTGCCTAGA ATTCCCAAGA CCTTTATAGG TGATTTTGTT TTCTGGGCTC CTAACTTCA TAAATAGCTA GTATCTTCCA GCAGTAGTAA CAGTCTGGAT AACTTCTTCC ATATCCCTCC CTCTTTGTTT TTTTGAGACA GTGTCACTTT GTCACCCAGG CTGGAGTGCA ATGGTGTGGT CTCGGCTCAC TGCAACCTCC ACCTCCCGGG TTCAAGTGAT TCTCCCGCCT CAGCTTCCTG AGTAGCTGGA ACTACAGGCG TGTGCCACCA CACCCGGCTA ATTTTTCGTA TTTTATGT AGACGGGGTT TCACTATGTT GCCCAGGCTG GTCTCGAACT CCTGACCGCG TGATCCACCA CCTCAGCTTC CCAAAGTGGT GGGATTACAG GCGTGAGCCA CCGCACCCGG CCTCCATATC CCCCTTTTAA AATTCTGTAG TGTATGGTAA GTCATATCAG ATATCAGACC TAATTTAAAT TTCATTTTAG CTTTACAAGT CCAAAAACAC AGAATTTATA TATTCAGATA CTCTAGCACT AATTTTAGTC TTAAATATTT CCCACGATAT TCTGTACACA AAATGTTCTT TTGTTACAA GAGCTGAGTT GCATATACTG TAGATAAATC ATATTATTTT TGCCAATTTT ACAAATTCCT CTGGCCCATC ATGTCAGTCA TTATTGAGTA TATGCACACA TTGCTACTTA TTGATTATG TATCTTTTAA ATTGATTGAG TGCATAGAAA ACTATCTCTT ACAAACCTTA AGTGCTCTGA TATGACTTCC CCCCCAATT TTATTATGAA CATTTTAA AACAGAAAAA TTGAAAAACT GTTTGGTAAG CACATGTATA TCTACCATTT AGATTACGCA GTTGTTAATG TTTTGTCAAT TGTCTTCTCT ATACCTATAT ATGTATAGAT ACAGCTAGTT ATGCATATAT ATGCATATAT GTGTTTGTGT GTGTATGTAT ATATGCTTTT TTCCCTCTGA ACCATTTGGA TGTTACAGAC ATACTTATCA CCGTGAAAAA ACTTCAAGTA TCTCCTACAG ATAATGACAT TCTCCTAAAA ATCCGTAATA CCATTGTAAA AGTAATAATT CCCCAATATC ATCTAATCAA GCCATATTTA AATTTCTGAA GTTAACTCCA AATTTCTTTA TAGCTGATTA TTTCAAACTA GGATCCAATT AAAGTTTACA TATGACACTT GGTATAACT CTTTAGTTGG ATATAACATT ATTATTATTT TGATAAAATA TGGAAACAAAT CAATTCATT AATAAGTGGT CACATTGTT TTGGGCTTAA ATTACTTTT AAAGATACTG GATTTTCCTA AGATTTCTGA TTTACACTGA TATTTTCTTT TGTCATCTT AATTGCATCA CACAATAGAT GTAAATGAAG ATGTAGTCAC CTCAGATAAA ATTGGTATCG TGTATGATAA TATTGTATCA TTTATATTTG CCTTATGTTA ACTTTAAGAA ATTGATTTTT TTGTATTAAT CATTTTCCCA TTGCAACAGA GCTATATTTT TTCTATTTTA AGAATCATAT TTTAGGATTA TTTTGGCAA ATACAGTGAG CACTTATGTA ACCAGATGAT AATGAACTCA AATGTCATGA TAGCTTGCAT AAATGGTGAC TCTAGTAGAT TTGACTCAAG CACTTCTAGA ATCATGCACT GAATTCAAAA GAAAAATCTT GCTGCTTTT GTCCAGGGCT TGTCTATTTC AACTTCTAAT TTGAAAGCTG TACAAAGTAA TAGAAGTICC ATTTAAATAT GAGTTCAAAA CTGTATTTAC TTTTATGTG GCCCTCTCTT TAGGGGATTC TAATTTTACT TAGGGTCTCT AAGTGCAGCA TAATGTTCTT GATGTTAACA	
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[0108]

		GAAGACTGTA TTTTAAAGT TACAAATTTG TATATGGAAT TAAGTAATGG CGCTATATAC GCTGTTGTGG GGAAGGGGGA AGAAAAGGAG GAACCAATTA AATAGGACCT TTTAAAAATT GTTAATTTTG TAAACTTTGC TTCTCTTATA AGTTATTGTG ATTCATTTTA GTTACTGTGT TTTATTTTGA AAATATTTAA ATATTGCACT TCTATAAATA GTATGATAAA TGCACAGACA ATTGCAGTAA ATTCTTTTTT AAGCTAGGAT ATTTGAAATG ACAACCTTTG GTTAAGTGTG TCAAGGTTGC AACAGAATTT TCACAATTTT TTGTTGTTT GCAAATTGTT ACTAATATTG AAGAGGTAAG GGAGGCAATG CAAATGATT TTAATCTTTT TTTATTATCT TTTCAGCAGT TTATATTTTT TGTGACTTTA TGCAACCATA TTTTACTTT GTCTTGACAA CTGAAAGATG TATAAGGTTT TTGCCAGAA ATGTACTGTA TACATAGTTT TAAGTATAAC AGATTTTACT GATATGTAAA AATTTTGCCA TTAAATAAAA TGATTTCTCA CTGAGAGGAA CTTTTCTACC AGGTTGGGGC ATATGGGAGC TTAATATATC ATATCTAATT TAAAAATAATT TCACTGAAAT AAACCTCATT GCTTTTACCT AATTTTTTTC TTGAGATGCT TTGTAGTTT TTCAGAGTTT TAGATGATTT TATACAAAAT CCTCTGCCTA GCACTGCTCT TTTTGATGTT GTAGTGACAC CATTTACATT GAATTAATGC TTGGTAGCCT GGGGCTAGAT GTGGAACCTC ATGGATCTGT GTTCTGACTG GCACCTTTGG AATGAAAGAA AAGTGTGTGC TGTCACAAAT TTTTCCCTT AATTCTTTCC CTCATCTTCT CACCCATAAT AGAAATTTTA TTTCATTGT GAGTTCTGAC AAGAATGAAA TTCCACATAC AACATAACTG TAAATTGTTG GTAGGTAGAA GTTAATATTT GTGGTTCATG TATATTTTGA CCAGAGTATA TTAAAGTATA TAATTTGAGC TTCCTTGATT TAGAAATATG ATATAATAAA GAAAAACTCC ATTTATCATC TGTTA	
SCYL2	NM_0 013177 84.1	AGGAAGTGAC GTCATGCCCC CGGCCGGCAG GTCTTTTAGT CTTTTTCCCC CTCCTTACT CTTCGTCCCC GGTCCCTCCC CTCCCCACCC CTTTCCTTCT AGCTCCGACG TTTCGGGCCG CGGGGGCGGC GGAGGATATG GAGTAAAGCC AGAGTCAGTG GCCAGGCACG AAGGCAGAGC AGGAACAGCC AGGAGGCGTT TATTAGGGGG GCGGGGGGAA AGAGCCCCAG CACCGCCCT CCTGGAAGAA GGAAGAGGTA ACTATAACTA CCAATATTG CAGCCATGGA GTCCATGCTT AATAAATTGA AGAGTACTGT TACAAAAGTA ACAGCTGATG TCACTAGTGC TGTAAATGGGA AATCTGTCA CTAGAGAATT TGATGTTGGT CGACACATTG CCAGTGGTGG CAATGGGCTA GCTTGGAAGA TTTTAAATGG CACAAAAAAG TCAACAAAGC AGGAAGTGGC AGTTTTTGTC TTTGATAAAA AACTGATTGA CAAGTATCAA AAATTTGAAA AGGATCAAAT CATTGATTCT CTAAAACGAG GAGTCCAACA GTAACTCGG CTTCGACACC CTCGACTTCT TACTGTCCAG CATCCTTTAG AAGAATCCAG GGATTGCTTG GCATTTTGTA CAGAACCAAGT TTTTGCCAGT TTAGCCAATG TTCTTGGTAA CTGGGAAAAAT CTACCTTCCC CTATATCTCC AGACATTAAG	18

[0109]

	GATTATAAAC TTTATGATGT AGAAACCAAA TATGGTTTGC TTCAGGTTTC TGAAGGATTG TCATTCTTGC ATAGCAGTGT GAAAATGGTG CATGGAAATA TCACTCCTGA AAATATAATT TTGAATAAAA GTGGAGCCTG GAAAAATAATG GGTTTTGATT TTTGTGTATC ATCAACCAAT CCTTCTGAAC AAGAGCCTAA ATTTCTTGT AAAGAATGGG ACCCAAATTT ACCTTCATTG TGTCTTCCAA ATCCTGAATA TTTGGCTCCT GAATACATAC TTTCTGTGAG CTGTGAAACA GCCAGTGATA TGTATTCTTT AGGAACTGTT ATGTATGCTG TATTTAATAA AGGGAAACCT ATATTGAAG TCAACAAGCA AGATATTAC AAGAGTTTCA GTAGGCAGTT GGATCAGTTG AGTCGTTTAG GATCTAGTTC ACTTACAAAT ATACCTGAGG AAGTTCGTGA ACATGTAAAG CTACTGTAA ATGTAACCTCC GACTGTAAGA CCAGATGCAG ATCAAAATGAC AAAGATTCCC TTCTTTGATG ATGTTGGTGC AGTAACACTG CAATATTTTG ATACCTTATT CCAAAGAGAT AATCTTCAGA AATCACAGTT TTTCAAAGGA CTGCCAAAGG TTCTACCAAA ACTGCCCAAG CGTGTCAATTG TGCAGAGAAT TTTGCTTGT TTGACTTCAG AATTGTAAA CCTGACATG GTACCTTTTG TTTGCCCA TGTCTACTT ATTGCTGAGG AATGCACAA AGAAGAATAT GTCAAAATTA TTCTTCTGA ACTTGGCCCT GTGTTTAAAG AGCAGGAGCC AATCCAGATT TTGTTAATTT TCCTACAAAA AATGGATTG CTAATAACCA AAACCCCTCC TGATGAGATA AAGAACAGTG TTCTACCCAT GGTTTACAGA GCACTAGAAG CTCCTTCCAT TCAGATCCAG GAGCTCTGTC TAAACATCAT TCCAACCTTT GCAAAATCTTA TAGACTACCC ATCCATGAAA AACGCTTTGA TACCAAGAAT TAAAAATGCT TGTCTACAAA CATCTTCCCT TGCGGTTTCG GTAAATTCAT TAGTGTGCTT AGGAAAGATT TTGGAATACT TGGATAAGTG GTTTGTACTT GATGATATCC TACCCTTCTT ACAACAAATT CCATCCAAGG AACCTGCGGT CCTCATGGGA ATTTTAGGTA TTTACAAATG TACTTTTACT CATAAGAAAT TGGGAATCAC CAAAGAGCAG CTGGCCGGAA AAGTGTGACC TCATCTTATT CCCCTGAGTA TTGAAAACAA TCTTAATCTT AATCAGTTCA ATTCTTTCAT TTCCGTCATA AAAGAAATGC TTAATAGATT GGAGTCTGAA CATAAGACTA AACTGGAGCA ACTTCATATA ATGCAAGAAC AGCAGAAATC TTTGGATATA GGAAATCAAA TGAATGTTTC TGAGGAGATG AAAGTTACAA ATATTGGGAA TCAGCAAAT GACAAAGTTT TTAACAACAT TGGAGCAGAC CTCTGACTG GCAGTGAGTC CGAAAATAAA GAGGACGGGT TACAGAATAA ACATAAAAGA GCATCACTTA CACTTGAAGA AAAACAAAAA TTAGCAAAAG AACAAAGAGCA GGCACAGAAG CTGAAAAGCC AGCAGCCTCT TAAACCCCAA GTGCACACAC CTGTTGCTAC TGTTAAACAG ACTAAGGACT TGACAGACAC ACTGATGGAT AATATGTCAT CCTTGACCAG CCTTTCTGTT AGTACCCTA AATCTTCTGC TTCAAGTACT TTCATTCTG TTCCTTCCAT GGGCATTGGT ATGATGTTTT CTACACCAAC TGATAATACA AAGAGAAATT TGACAAATGG CCTAAATGCC AATATGGGCT TTCAGACTTC AGGATTCAAC	
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[0110]

	ATGCCCGTTA ATACAAACCA GAACTTCTAC AGTAGTCCAA GCACAGTTGG AGTGACCAAG ATGACTCTGG GAACACCTCC CACTTTGCCA AACTTCAATG CTTTGAGTGT TCCTCCTGCT GGTGCAAAGC AGACCCAACA AAGACCCACA GATATGTCTG CCCTTAATAA TCTCTTTGGC CCTCAGAAAC CCAAAGTTAG CATGAACCAG TTATCACAAC AGAAACCAAA TCAGTGGCTT AATCAGTTTG TACCTCCTCA AGGTTCCTCA ACTATGGGCA GTTCAGTAAT GGGGACACAG ATGAACGTGA TAGGACAATC TGCTTTTGGT ATGCAGGGTA ATCCTTTCTT TAACCCACAG AACTTTGCAC AGCCACCAAC TACTATGACC AATAGCAGTT CAGCTAGCAA TGATTTAAAA GATCTTTTTG GGTGAGGTGT CTTACTTCTA TTTTGAAGGA TTATTTCACT TTCAATCATG GGTGAGCTGA TTTACATCTT TATATAGTTG GCTTGGAGGA AGTACTTCTA TGGGAAAGTG AACAGTTCTG TGACAGGAAA CATCTCTGTC CATGCCAGCA TAGTAGTTGT ATGGACTTCT AACCAGTTGA GTTTTTTAAA GCATTGAGGA TTTTTCTC TTACCAACTC CTCTTCAGGT TTTTAAAGAC CCAGCCCTTC CCAATCTCAA AGAGAAAAAG GAACTGAGT TATCTTGAAT AACATAACTT TTTAATCAAA TGTTTATTTT GGCTTGTGGA TCTTGGTGTT ATTTAAAAAA TTGAGGTGAT GGTCAATTGCA AGCTCATCTA TTAAGTACTA TATGGTACAC AGTCTATGAG TCATTAGTCT TCATTTTAAT ATGTAAAAAA TCTTGATGCT GTATTGATTT GTTTGCATTT AAGATGACAG TGAGAAAAATG ATAAGCATAA AGAGAAGTAT CAGGTTATTT GCTTTTTCCA AACTTTTCAG ATGAACATTT GTTTAGTACA GAGACTGAGC AAATACTACA AAATTCACT TAACCTTCAT TTCATTGGTT TAAATGCGTT ATTAACCATC TTAAGTGCAA ACTAATCAT GTAAATTATA TTTTAGCATG GTCTGCCTCA AATAGTAATG TATTTTTCTG CATTCACTTG GATATATTTA GAATCACTTT TTTCTCCTG TATCAAGGAA GAGGTATGTG CTGATTGTG TGGATATTTG ACAAGGCACT CTGATGTGAC TTCCTGACT ACTACCTTCA TATTTCAATT CAAATTCAAA CTCTGAGGT TGCAGCATAT ATGAATTGCA TTTTCAAAAAG AAGATTTGTA AGAATTAAAC TATATTTATG AGTAACTTT TGAGGTTTCT GCTGTATTGT TTCAAATGTA ATAACTTTA CTCTGTAAA AATTGAGCAG TTGTATCTTC TGACCACCAA CAGATTTTCA GCTTGCCATG ATAGTCTGAC CTCATTAATT ACTGCTACTG AAGTTCAATT TTTTCTAGG AATTTTAGGA ACCTTTGTT TAAATATTTT AATTTCTATT AGCCATTTT AGGAAGGAAA GAATCAATTC TCTTAACAGG AAACATGCTT TATTTTCAA AACCTTTCTC TGATATTTT CTTTAATTG CTGATTATTC AACCACAGAG CCTTATGCTA TAAATGTCAT TTGTATTTTA AAAAATAATA TTCCACTCAT AAAACTTTAA AACCATCTTT CAACGAACCTA TATATGTATT ATAGTTGCTG CCATAGAGTT GATGGTTTTT AATTATCTGG AACCAGCAAT CATTTAAAA AAACCATATT AAGTTTAGTA TGCTGGTATT GTTTATTCAT TTTATATGAA TATTCATTGA AAATATATAC ACAATATATG TAATACACAG CACTTGATTA CAAAATGTAA TTTAATTATA	
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[0111]

		TTATTGCTGG CAGCATTGAG TTAAGAGGGT ACTTTAAAAA ATAGAAGTCA GCTTTCACAT CTGATTTCTG TATGGGCTGT ACTTGGTTAA CTGATTTTA GAAAAAGGAC TAACAGAATT GCTAAAGAAA TGCATCCAAT AAATGAAAAA CAGTAGGAAG ATCAAATGTT TTTGTCAAAT ATATTCACAA CTTGACCAGA TTAGCTGTCC TGTGTGTAAT GCAATATTAA TATGCTTTT GGGAAAAAGC CTACATATGG AATAAAATAA GTATTGAAGA ATTTTCTTT GTAACAATTT AGTAGTCACT GTTATTGAG AAATTTGTTT TTATTTTGTA AAATAACATG ATGTTAGTGT TGAACCTTA AACAGAAAAG AAGCTTAATA TAACAGCTTA TAGAACTGA ACTACTAAAT ATGAAAATAA GTCATTTGAA AAAAAATACAG TATGTAAAAAT TGTTCATTG GTTGAGGTAA TGGTGCTATG TTTTACAAA ATTGTTCTTA CACCTTTTT CTACTTCAGG TATTTTATTT CAACCATTTC CATCAATTGA ACTGTTACCA TTGCCTTTTT CTGTTGAGAA ATTGCCTCTG AAAAAATAGT CTATTTTCA GCTTAAGTGT TCTTAAGTGA ATGAAATTTT CAAAGTACTA GATCACCTTA AAATTATTTT ACGTACTGAA GACAATTAAG TCCGTTATGT TTAGAGTGA AAATGTTTAG GTTAAAGAGC ATCTGTCAAC AGAATCTACA AAAAAAGATC CTTGCAATTT GAATTAGTTC TCTATTCTCC TATTGCTAAA TGTGTGATAT ATAGAGAGGA TGTATAAAG GAAATGGAAA TAGACTATGT ACTTGTCTGG TTTTGTGTTG TTTTATTTT GGAATGCTTA TAAGCCTCCT TTACACTGAA TAAGGAAGTA GTTTTGTGTT TCTTTTGACC TGTAATAAC CTCACATGGT TGTTTTACAA CATGAAAGAA AAAGGTATAT GCGAACATAC CTGATATCAA GAGGAGTATG CACCAAATAA ATTTTAGCTT TGATAAAACT TTCCATAAAA AAAAAA	
SMARCD 2	NM_0 010984 26.1	GTTGGGCGGG GCAGGGAGTT CGTAGCCGCC TCTGGGTAAC TCGACTCGGG CGGCCAAACC TCCGGAGGCC GGGGACGGAA GGCGGGCCCG CAGCAGATCC TGGATCCGGA ATCTCCCGGG CAGGAGCGGA ATCTGTCCCG AACCGGGTCT GTGAGGAACT CGCGAACTTG GATTAGGAAA TCCCGGAGCC CGGATCGACA AATCCCGGAA CCCGGAATTA AGATCGCCAA GTCCCGGATC GCGGAGCACA GAGCACGGAG TGGACTCGAC GCGGAGCCCG GAGTCCGGAT CGCGGCACCG CGGGACGGGA CGGAGCGATG TCGGGCCGAG GCGCGGGCGG GTTCCCGCTG CCCCCGCTAA GCCCTGGCGG CGGCGCCGTG GCTGCGGCC TGGGAGCGCC GCCTCCCCC GCGGGACCCG GCATGCTGCC CGGACCGCG CTCCGGGGAC CGGTCCGGC AGGAGGCGTG GGGGGCCCCG GGGCCGCCGC CTTCCGCCCC ATGGGCCCCG CGGGCCCCG GGCGCAGTAC CAGCGACCTG GCATGTCACC AGGGAACCGG ATGCCCATGG CTGGCTTGCA GGTGGGACCC CCGTCTGGCT CCCCATTGG TGCAGCAGCT CCGCTTCGAC CTGGCATGCC ACCCACCATG ATGGATCCAT TCCGAAAACG CCGCTTGTG CCCCAGGCGC AGCCTCCCAT GCCTGCCAG CGCCGGGGGT TAAAGAGGAG GAAGATGGCA GATAAGGTTT TACCTCAGCG AATCCGGGAG CTGTTCCAG AGTCTCAGGC GTACATGGAT	19

[0112]

	CTCTTGGCTT TTGAGCGGAA GCTGGACCAG ACCATTGCTC GCAAGCGGAT GGAGATCCAG GAGGCCATCA AAAAGCCTCT GACACAAAAG CGAAAGCTTC GGATCTACAT TTCCAATACG TTCAGTCCCA GCAAGGCGGA AGGCGATAGT GCAGGAACTG CAGGGACCCC TGGGGGAACC CCAGCAGGGG ACAAGGTGGC TTCCTGGGAA CTCCGAGTGG AAGGAAAAC TCTGGATGAT CCTAGCAAAC AGAAGAGGAA GTTTTCTTCA TTCTTTAAGA GCCTCGTCAT TGAGCTGGAC AAGGAGCTGT ACGGGCCTGA CAATCACCTG GTGGAGTGGC ACCGGATGCC CACCACCCAG GAGACAGATG GCTTCCAAGT AAAACGGCCT GGAGACCTCA ACGTCAAGTG CACCCTCCTG CTCATGCTGG ATCATCAGCC TCCCAGTAC AAATTGGACC CCCGATTGGC AAGGCTGCTG GGAGTGACA CGCAGACGAG GGCCGCCATC ATGCAGGCC TGTGGCTTTA CATCAAGCAC AACCAGCTGC AGGATGGGCA CGAGCGGGAG TACATCAACT GCAACCGTTA CTTCGCCAG ATCTTCAGTT GTGGCCGACT CCGTTTCTCC GAGATTCCCA TGAAGCTGGC AGGGTTGCTG CAGCATCCAG ACCCATTTGT CATCAACCAT GTCAATTAGTG TCGACCCTAA CGACCAGAAG AAGACAGCCT GTTACGACAT CGATGTGGAG GTGGACGACC CACTGAAGGC CCAAATGAGC AATTTTCTGG CCTCTACCAC CAATCAGCAG GAGATCGCCT CCCTTGATGT CAAGATCCAT GAGACCATTG AGTCCATCAA CCAGCTGAAG ACCCAGAGAG ATTTTCATGCT CAGTTTTAGC ACCGACCCCC AGGACTTCAT CCAGGAATGG CTCCGTTCCC AGCGCCGAGA CCTCAAGATC ATCACTGATG TGATTGGAAA TCCTGAGGAG GAGAGACGAG CTGCTTTCTA CCACCAGCCC TGGGCCCAGG AAGCAGTAGG CAGGCACATC TTTGCCAAGG TGCAGCAGCG AAGGCAGGAA CTGGAACAGG TGCTGGGAAT TCGCCTGACC TAACTGCTCA GGGATCTTTC TTCCCAGCCC TGGAGCCTGG AGGGAGACCA CCCTCTGGGT CCTTGCTGGG GCCGCAGACA CGTAGGCTGG GGTGAGGAGT GTCTGCTGTC ACCCTCTACT CTCCAGCTTT AGTCTTATAA ATGTAGTGAT AGGATTCTTT GTTGCTTGGT CCCCAAAGCC TTATACTTTT TGCATTGGCT TTAATTGGGT TCAGCAGATG CTCCTCTGC CCCCTGCAG GCAGGCCCAA GTAGGACTGC TGGAGGCTGT GCTTTGACAT TGTAAGACAT TTCCGAACCA AAGGCTGCTG GGTTTGATG TTTACAGACT CCCCCTGGGG CGAGGGTCAG AGCTGGCTCT GGGGAGCTGG GCTAGGAAGA GGAGGTGCAG CCCAGACTCT TCCTAGCCTT TCTAAACCAA AGTTCTTTGC CATTCTACA AGCCCAGCCT TGCTGCTGGT TTTTCTTTT CTTTGGGTA TTGCACTAT TTTGGGAGCA AGTTTCTAT GTGGGAGCCA CTTTTTTTGT ACAGGGGTAA GTTGGGGGTT TTCAGGGAGC CTGTTAGGTG CCTCTTCTT TTCTTCTC AATCTATGCA AGCGGCTCTG GCCGCCATCA TCTCTGGGA TGCCAGAGGG CTGCCTCTCC AGCGGCTTGG GCCGGGGAGG GGACACTCCA GTTCTTAGC ATGGCTGAG GTATGGGGTA TGTGCATGTG GAGGCCAGGG TAAGGTGAAT GGGGAGGCTG GGAGGACTGG TGTGCCCTT TGGAGCTTGG TGAGGAGGGT GGGCCTAGGG CTGGCGAGT	
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[0113]

		GCCACATCTG GCAGGTTTGG AAATTTCCAA ATAAATCCTT TTGCTATTG	
	NM_0 012518 25.1	GTCCCGGTTT GCTTGCCTCG TCAGCGTCCG CGTTTTTCCC GGCCCCCCCC AACCCCCCG GACAGGACCC CCTTGAGCTT GTCCCTCAGC TGCCACCATG AGCGACCAAG ATCACTCCAT GGATGAAATG ACAGCTGTGG TGAAAATTGA AAAAGGAGTT GGTGGCAATA ATGGGGGCAA TGGTAATGGT GGTGGTGCCT TTTACAGGC TCGAAGTAGC AGCACAGGCA GTAGCAGCAG CACTGGAGGA GGAGGGCAGG GTGCCAATGG CTGGCAGATC ATCTCTTCTT CCTCTGGGGC TACCCCTACC TCAAAGGAAC AGAGTGGCAG CAGTACCAAT GGCAGCAATG GCAGTGAGTC TTCCAAGAAT CGCACAGTCT CTGGTGGGCA GTATGTTGTG GCTGCCGCTC CCAACTTACA GAACCAGCAA GTTCTGACAG GACTACCTGG AGTGATGCCT AATATTCAGT ATCAAGTAAT CCCACAGTTC CAGACCGTTG ATGGGCAACA GCTGCAGTTT GCTGCCACTG GGGCCCAAGT GCAGCAGGAT GGTTCGTGTC AAATACAGAT CATACCAGGT GCAAACCAAC AGATTATCAC AAATCGAGGA AGTGGAGGCA ACATCATTGC TGCTATGCCA AACCTACTCC AGCAGGCTGT CCCCCTCCAA GGCCTGGCTA ATAATGTACT CTCAGGACAG ACTCAGTATG TGACCAATGT ACCAAGTGGCC CTGAATGGGA ACATCACCTT GCTACCTGTC AACAGCGTTT CTGCAGCTAC CTTGACTCCC AGCTCTCAGG CAGTACCGAT CAGCAGTCTT GGGTCCCAGG AGAGTGGCTC ACAGCCTGTC ACCTCAGGGA CTACCATCAG TTCTGCCAGC TTGGTATCAT CACAAGCCAG TTCCAGCTCC TTTTTCACCA ATGCCAATAG CTACTCAACT ACTACTACCA CCAGCAACAT GGGAATTATG AACTTTACTA CCAGTGGATC ATCAGGGACC AACTCTCAAG GCCAGACACC CCAGAGGGTC AGTGGGCTAC AGGGGTCTGA TGCTCTGAAC ATCCAGCAAA ACCAGACATC TGGAGGCTCA TTGCAAGCAG GCCAGCAAAA AGAAGGAGAG CAAAACCAGC AGACACAGCA GCAACAAATT CTTATCCAGC CTCAGCTAGT TCAAGGGGGA CAGGCCCTCC AGGCCCTCCA AGCAGCACCA TTGTCAGGGC AGACCTTTAC AACTCAAGCC ATCTCCCAGG AAACCTCCA GAACCTCCAG CTTCAGGCTG TTCCAAACTC TGGTCCCATC ATCATCCGGA CACCAACAGT GGGGCCCAAT GGACAGGTCA GTTGGCAGAC TCTACAGCTG CAGAACCTCC AAGTTCAGAA CCCACAAGCC CAAACAATCA CCTTAGCCCC AATGCAGGGT GTTTCCTTGG GGCAGACCAG CAGCAGCAAC ACCACTCTCA CACCCATTGC CTCAGCTGCT TCCATTCTTG CTGGCACAGT CACTGTGAAT GCTGCTCAAC TCTCTCCAT GCCAGGCCTC CAGACCATTA ACCTCAGTGC ATTGGGTAAT TCAGGAATCC AGGTGCACCC AATTCAAGGC CTGCCGTTGG CTATAGCAAA TGCCCCAGGT GATCATGGAG CTCAGCTTGG TCTCATGGG GCTGGTGGTG ATGGAATACA TGATGACACA GCAGGTGGAG AGGAAGGAGA AAACAGCCCA GATGCCCAAC CCCAAGCCGG TCGGAGGACC CGGCGGGAAG CATGCACCTG CCCCTACTGT AAAGACAGTG AAGGAAGGGG	20
SP1			

[0114]

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[0115]

	CATGATCATG GGAATGATAG CCCAGAACAA AAAGAAATCT TGTCCTTACCA CAGTGTTTTA TAGGAGAGAT TGGGAGAAAT CATCTGTTT TCTCTGTGAC CTGATTTTCAG AAGAGACTGA TCCAAAAATT ATAACGGCAG GGAACCTAGT GCATTTGGCA CTGAGATTTA AATGCAACCA GAATTGTCCT CAAGGCCAG CCATAAAAGC ATTGTCTCTC TCGACCTTCT GGTATCTTGT TAGAGAGCTT TTCACTGTGA GGAAGTGTGG AAAAATAGCT CTGTGTGTGT GTGTGTGTGT GTGTGTGTGT GTGTGTGTAA TCTGTTAGGT TGGGGATAGG TTTTCTGCTA GCCAATATTA AAAGAGACCT GCAATAAAAA AATTACCCTG ATCTGATAGA AAGCAAAGTGT TTTTGTATGT GTGGGTGAAT GTGTGTTCAT GCCCGTATAT GTCTACACAC AGATGACAAA TTATATTTGA AATCGTTGGA AAATAAAATTC AGATCAAAAT GCCTTTCAGG CCCATTACCT AGAAATCTAT CTTAAAACT GGGTATGTTT CTAAGGTCAT TTCTTTGCTT ATGCTAAAT AATTACAATT ATGAATGGAG GATATTCTAC TGTACTTTTT TAAAAAGAAA CTATTTTTGT GTTTGAAAGT GAAACCAACA TCCAGATCTA TAGCAGAGTC CTTATTCTTC TCATAAATCT TTTTACTTTG GCTACAAATA GATGATGGTA TGATTCTATT ATATATTTTA TATAAAATCC ATCCAAATTA AGTTTTGGGT AAGTGTGTG TTTAATCTGA ACTATAGTAA CTTAATACTC TAAACAATAG TTCCTCCAT TTGGTCCTTT CTCCACAGAT GTAATTATGT TTTCAACTCA GGAACATGG CAAGGAACTT TCCCCAGATC AAATCTTATT AACGCTGAGA TACAAGTCAT CCATGCACAG CCACTATCAT ACCCTTTATT CTCCTGAAA GGCAGAACTC AGAACCTGTT ATTTTATGTC TGAATCATG TACTTTGGCA TCTTTTGGAG GAAAGGGGCA GGATAACTCA CTGGAATGTA CAGTATTTTG CTAGTGCATT TCAAGGAATG GAATCTTCTC CAGTATGAAA TTACCAGATA TAAATAATG TAATGATGCT GAGGATATAA GCTTTTAGAA GGTAATTTGA TGGTATTTCT TTCTCGAATG AAAAGCTGCT GGTTTACCCT CAACCTTATT CATTAGCATT ACCATGAGTG AATTTATATC TAATTTTTC CACTTGCCCT GTTCTCTTCA CACCAAGGAA GCTCCAGATC CAGTATCTTG TTGGCCTCA AAACAGAAGC AGCTTCTTTT GTCTCCCAGC AGTAGTGAGC CACTCAGTCT CTCCACAGG AAGTTTGGAG CCTACATTCC TTGAGTCAGG AGCTTATTAC AGAAAAACCC CGTTTCCCTG AACTTTTGGC TAACAGAAAT TAATTTAACT GACATGCATA TTGATTCTGA AATTTTTC CTAAGTTTTT TTTATTTTT TGAATGAGTT TTTTAAATTT TTTAGATGAC CAAAACCTGC AGGGCAGGGG ATGCCAGAA GAGTGGTGAG ATAGTAAAAC ACTTATTCCC TCATCCTTTC AGGTTTTCAG GTTGCCCAT TATATTCATT TACATGTAT TTGACTGTCT CACTTTTAC CCAGAACAGT AACAACCCAC ACCGTCTTCC TTCAGGGATT TCCAACCTGGC ACTCTGTGGG TGCTACACAG AATGCAATTT AATGGATATT TCTCAGCCTG GTTTCAAGATA AATTGATCCT TTGATCCCAG AAAGTATATA CTGAAGTGTG GGATAAAGAT TATGATTAGG GGAGGGTTGG AGACAAAAGC TGTAATTTAC TATGGCTGAT TTATTTCTAC	
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[0116]

	TATATACATA TATATTTTT GCTTTTGTAT ATCCTATATA GGAAACTAAG CATTGTATTT TTTTAAACAA ATCTAAAAAA GCACTATGAA CTACAGGTGT TTGACTTTCA AAATATATTT TGTATTGTTA ATATCTTCAC ATTGTGTGAA TACTGGAAGC TGCAGATCTT TGCTAGGACG CAATAAATTT ATATACTTTT TGAGGGGTTT TCTGGGGTG CTAATCAGGC CCTGTATTG CTTAGGGGGA GCCCTGGTGC TACTTGCTTG AAGTTTTAG TGTAAGTACC CTGATGCCTT TTGGACCTTG GGATCAGATC AAGAGTTTTG GAGATCAGGT ACCAAGGAAA TAAGGACAGT CTAGCTGCCT CAAGTGAGGG GCCCTTTGCA TAGCTCTCCT TCCCCCTCAC TGAAGCTGGG TAGCCTATTG GGGTTGAGAG GGAAAATGTG AAATCTCAGA ATTTATCTCC CTAGAAGAG AGCCAGTAAC TTATGTACAA GGATGAAAGA AAGGTCGCAG CAGTAGCTTT GGGGAAAGGG AGGAAGATAT GGCACCTCTC CAACCCCGGA AAACATTGCT TTTGAAAAC GCTGATAAAA TATGAGCCGG TTATTACTTC TGTGTTGGAG ACTGTGCTCT CTGTGGTGCC TCTCTGGCT CACTCCACA GATACCAGAC CTCTTCTAAG AGGATGAGCA GACCAGCTTT GAGGTTGACC TGTTTCTCTT TGTCTGCCCT CCCAAAACAC CAGCCCCCAG GAAGACATTA AGCAGCCTTA AGCTTAAATT CCTACTCCT CTTCCAAATT TGGCTCATT GCCTTAGATC CAAGGCAGGG AAAGGAAAAG AAGGGGGGTC TCTGGCTTTA TTACTCCCT AAGTCTTTAC TCTGACTTCC CCAAACCCAG AAAGATTTTC TCCACAGTGT TCATTGAAA GAGGAGTATT TTGTCCCAT TTCCCTTCC TCATTATCAA ACAGCCCCAG TCTCCTTGT CTCTGCTAAG AAAGTAGAGG CATGATGATC TGCCTCTCAA CTGCCCTAAG TCCTAGCTAA GTATCAGGGG AAAAAAAAAA AAAAAAGCC TAACAAATGG GATTAGACTA GGGCTGCAAG TAGTGAGGAT TTGTTGATA CCTCTGCTGG GATGTGTGCT TTCCCATATC TTGCCTTCAG GAATTACACT GTGCCTTTTC CCCAGGGATA TGGGCTCTGT CTACCCAGTG CTCCAGTTTC CCGTAACTG CTCTTGAACA TTGTGGACAA GGCAGGTCT TCATATTTT GATCATCCCT TTCTCCAGT GAAATCCCAT AGCCCTTACC TAGAGTCTAG GGCACAAAGA CTCGGGGAA GATACACTGA GATTGACCTG AGGAGACATC TACACACACC AGTGGCAGCT GCCCCAGGGC CTGCTTCCCC TTCCTAAGTC TGTCATCTC TGGAAGGGAT GGGTGGTGCT CCAATCTCTG GTGCCTAAAA ACCCAAGTTT ATTTCTCTCT TAACACTGGC AATAACCACT CCACACCACT GTTGCTTTT AAAACCTCTT AATAATCTCA TGCTGTGTTT GTTTTGATTC CAATCCAATT ATCACCAGGG CTGTGTGGGT AAATGCTTTT AAATGCTCTC TCATCTTGT CTTCCTCTC ACCCCCCACT CTAGGTATG TATGATGCTA ATCTGTCCC TAAGTAAGTT TCTCCTGCT CCTTTTGTAT CTTCCTTTCT TGTCTTCTCT CCTACCTTTT GTCCTTGGT GTTTTGGGAC TTTTTTTTT TTTTTTTGG	
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[0117]

		CCTTTTGTAC AAAGATTAGT TTCAATGTAG TCTGTAGCCT CCTTTGTAAA CCAATTAAAA AGTTTTTTAA TAAAAA AAA	
SRSF5	NM_0 010394 65.1	ATTTTGTGGA GCGCCAGAGC TGCTAAGTGC GTCAGTTGTG GAGTGGCGTA GACGAGTTAA GTCCTGGTCT GCGTGGAGGT CGACGACTCC GTCGCAGACT ACGGACCTGT CTGGGTCTCA GCCGCCAAAG ACCCCGTCCG GTAGGTGAGT GGCTCACTTT GAGGGCAAGC CTTCTCGGAT CGAGGCTTCT TCATGGCCGC TCAGATCGTG AGCGGCCGGG GCTGCTCTCT TTGCGGAGGA TGGCGTCTAA TGAGCGCAGT TGATTGAGG AAGTACTAGC CGGACATCAT GAGTGGCTGT CGGGTATTCA TCGGGAGACT AAATCCAGCG GCCAGGGAGA AGGACGTGGA AAGATTCTTC AAGGGATATG GACGGATAAG AGATATTGAT CTGAAAAGAG GCTTTGGTTT TGTGGAATTT GAGGATCCAA GGGATGCAGA TGATGCTGTG TATGAGCTTG ATGGAAGA AACTCTGTAGT GAAAGGGTTA CTATTGAACA TGCTAGGGCT CGGTACAGAG GTGGAAGAGG TAGAGGACGA TACTCTGACC GTTTTAGTAG TCGCAGACCT CGAAATGATA GACGAAATGC TCCACCTGTA AGAACAGAAA ATCGTCTTAT AGTTGAGAAT TTATCCTCAA AGTCACTG GCAGGATCTC AAAGATTCA TGAGACAAGC TGGGGAAGTA ACGTTTGGCG ATGCACACCG ACCTAAATTA AATGAAGGGG TGGTTGAGTT TGCCTCTTAT GGTGACTTAA AGAATGCTAT TGAACAACTT TCTGAAAGG AAATAAATGG GAGAAAAATA AAATTAATTG AAGGCAGCAA AAGGCACAGT AGGTCAAGAA GCAGGTCTCG ATCCCGGACC AGAAGTTCCT CTAGGTCTCG TAGCCGATCC CGTTCCCGTA GTCGCAATC TTACAGCCCG TCAAGAAGCA GGAGCAGGAG CCGGAGCCGG AGCAAGTCCC GTTCTGTTAG TAGGTCTCCC GTGCCTGAGA AGAGCCAGAA ACGTGGTTCT TCAAGTAGAT CTAAGTCTCC AGCATCTGTG GATCGCCAGA GGTCCCGGTC CCGATCAAGG TCCAGATCAG TTGACAGTGG CAATTAACT GTAAATAACT TGCCCTGGGG GCCTTTTTT AAAAAACAAA AACCACAAAA ATTCCCAAAC CATACTTGCT AAAAAATTCTG GTAAGTATGT GCTTTTCTGT GGGGGTGGGA TTTGGAAGGG GGGTTGGGT GGGCTGGATA TCTTTGTAGA TGTGGACCAC CAAGGGGTG TTGAAAACTA ATTGTATTAA ATGTCTTTG ATAAGCCTTC TGCTCACATT TTTGTGAATG TCTGAAGTAT ATAGTTTGTG TATATTGACA GAGCTCTTT ATAATAAAG CAAATTTAAT TTTTTTGTAC TAGAAAAAAA TTTGAACATT TTAGTCTTG GTTATAAAAA TGTTAATTCA GAATTAGTTT AATGCCTTAA TTAAACTAAT TAATAGCTTT GGACACTTAA AAGAGCTCTA AATTTGCTTG TACATAAAGG CTTAATTGT TTTCTTGT AGGGTCAAGG GTGCTCTCA CTCITTAACA GCTGCTGGAC AGACACATTA GAGCAGCTGT TTGTTATTGA TAATAAATA TTATAAACT A	21

[0118]

TAGAP	NM_001278733.1	ATACTATTGA CCACATTATG CGGCCAACGA TACCCATTTT CTTACCTGGA TCTTTGCTTC TTAACACTGT AGTCTAATTT TTCTCGTTGC CTGTGTTTCT TGGCTGTAGA AGTTAAGAAG AGAAAGAAGG TGCTGTCTCTG GCCCTTTCTC ATGAGAAGGC TCTCCCCTGC ATCAGATTTT TCTGGGGCTT TGGAGACAGA CTTGAAAGCA TCGCTATTG ATCAGCCCTT GTCAATTATC TGCGGTGACA GTGACACACT CCCCAGACCC ATCCAGGACA TTCTCACTAT TCTATGCCTT AAAGGCCCTT CAACGGAAGG GATATTCAGG AGAGCAGCCA ACGAGAAAGC CCGTAAGGAG CTGAAGGAGG AGCTCAACTC TGGGGATGCG GTGGATCTGG AGAGGCTCCC CGTGCACCTC CTCGCTGTGG TCTTTAAGGA CTTCTCAGAG AGTATCCCC GGAAGCTACT TTCAAGCGAC CTCTTTGAGG AGTGGATGGG TGCTCTGGAG ATGCAGGACG AGGAGGACAG AATCGAGGCC CTGAAACAGG TTGCAGATAA GCTCCCCCGG CCAACCTCC TGCTACTCAA GCACTTGGTC TATGTGCTGC ACCTCATCAG CAAGAACTCT GAGGTGAACA GGATGGACTC CAGCAATCTG GCCATCTGCA TTGGACCCAA CATGCTCACC CTGGAGAATG ACCAGAGCCT GTCATTTGAA GCCCAGAAGG ACCTGAACAA CAAGGTGAAG AACTGGTGG AATTCCTCAT TGATAACTGC TTGAAATAT TTGGGGAGAA CATTCCAGTG CATTCCAGTA TCACTTCTGA TGAATCCCTG GAGCACACTG ACAGTTCAGA TGTGTCGACC CTGCAGAATG ACTCAGCCTA CGACAGCAAC GACCCTGATG TGGAAATCAA CAGCAGCAGT GGCATCAGCT CTCCCAGCAG GCAGCCCCAG GTGCCCATGG CCACAGCTGC TGGCTTGGAT AGCGCGGGCC CACAGGATGC CCGAGAGGTC AGCCCAGAGC CCATTGTGAG CACCGTGGCC AGGCTGAAAA GCTCCCTCGC ACAGCCCGAT AGGAGATACT CAGAGCCCAG CATGCCATCC TCCCAGGAGT GCCTCGAGAG CCGGGTGACA AACCAAAAC TAACAAAGAG TGAAGGGGAC TTCCCCGTGC CCCGGGTAGG CTCTCGTTTG GAAAGTGAGG AGGCTGAAGA CCCATTTCCA GAGGAGGTCT TCCCTGCAGT GCAAGGCAAA ACCAAGAGGC CGGTGGACCT GAAGATCAAG AACTTGGCCC CGGGTTCGGT GCTCCCGCGG GCACTGGTTC TCAAAGCCTT CTCCAGCAGC TCGCTGGACG CGTCTCTGA CAGCTCGCCC GTGGCTTCTC TTCCAGTCC CAAAAGAAAT TTCTTCAGCA GACATCAGTC TTTCACCACA AAGACAGAGA AAGGCAAGCC CAGCCGAGAA ATTA AAAAGC ACTCCATGTC TTTCACCTTT GCCCTCACA AAAAAGTGCT GACCAAAAAC CTCAGCGCGG GCTCTGGGAA ATCGCAAGAC TTTACCAGGG ACCACGTCCC GAGGGGTGTC AGAAAGGAAA GCCAGCTTGC CGGCCGAATC GTGCAGGAAA ATGGGTGTGA AACCACAAC CAAACAGCCC GCGGCTTCTG CTGAGACCC CACGCCCTCT CGGTGGATGA TGTGTTCCAG GGAGCTGACT GGGAGAGGCC TGGAAAGCCA CCCTCTTATG AAGAGGCCAT GCAGGGCCCC GCAGCCAGAC TAGTGGCCTC CGAGAGCCAG ACCGTGGGGA GCATGACGGT GGGGAGCATG AGGGCGAGGA TGCTGGAGGC GCACTGCCTC CTACCCCTC TTCCACCTGC TCACCACGTA GAGGACTCAA GACACAGGGG CAGCAAAGAG	22
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[0119]

		CCACTCCCTG GCCACGGACT CTCTCCCCTG CCTGAGCGAT GGAAACAGAG CAGAACTGTC CATGCTTCTG GGGACTCTCT GGGGCACGTG TCTGGCCCAG GGAGACCTGA GCTCCTCCCG CTGAGGACCG TCTCCGAGTC CGTGCAGAGG AATAAGCGGG ACTGTCTCGT GCGACGATGT AGCCAGCCGG TCTTTGAGGC TGACCAATTC CAATATGCCA AAGAATCGTA TATTTAGGAG GGAGGCCATA CGCCATGCCA TAGCTTGTGC TATCTGTAAA TATGAGACTT GTAAAGAACT GCCTGTAGAT TGTTTTAAA AGGTCTTGAA TAAGCTCCTT GAGAAAAGTTG TGGAAAGCCC TCCTCAGTGA GGATAGCTAC ACCATGGCCA TGGCGCATCA GATAGTCTCT GTGTACCTGG ATTTGTGCAA TATGTAAAAA TGTATCAAAT GTATTATAGA TAAGGTGTGA GGTGCAAAAGG ATGTCTAATA ATCCCTGCAC ACGTTTTGAA CTTCAGTGA AGTACACTGC TGTTCCTTGC TTCCTGGGGC ACTTTTCTCT TGGTTAGTGT TAAAAAATTA TCTTCGCTTT TTTAATGTGG CCTCAAATGT CATGCCAATT TTCACATCTT CCACAACTC CATTTAGGGA GAAATGTTTA AATCTCTGGT ATAAGTTTAC TCCATACCAG AGTAAACTAT ATATTACTCT ATATAAGCAG TCTTGCAATA ACTAATCACC ACCATAGAAG AAAGAAACAG ACTGCAAGGA ACAGAGTTGA GTGTCTGGAG TCATCAAAGG CATTAAAAAC TCCAGTAAAA GCTGGGGCCG TAGCAAAAAT CATGAAAAAC ACTTCAACGT GTCCTTTCAA TCATCCAATT AAATGTGGGT AGATTAATGA AAATGTATTA CATCAATATT AACTCATCTA TAGCACTTTG AGTATCTTTG TAGTTCATGA TATCCTATCC TATAATGTGG AGGTAAATGA TTTTATATGC ATTGGGGGTC ATATATAAAA CTTCAAATGTA ATTTCACTAC AATAAATTGC CTTCCTTATT TGAAAGTAAA AATGTTCTTT TTTTATTGAC ATGTTAACTC CTTCCCTCA ATTAATAGAA ATCCACTAAG AAAATCATTG ACATATTGGT TCACTAACA AGCATTTATT AAATATATAT TCACTATTCT AGACTAATAG CAAGACCGGG GATCTTGTTT AGGAAGAAGC AGTCCTGTT CTCCAGAATT TGCAAAACCA TTAaaaaAGC ACCTACTTTA AGCCATTTTT TTTAGCAAG GAGTCAATTCT GCCAGAAAAA TGTAGTACAC AAATACAGGA TAATATAACA AATGTAAAAAT TTCTCATTTT TAGTGAATTA AACTTTCCAG TAATTTTACA TCTCACCTCA TTCTTATGAT GCTCAGTTTG CTTAATTATT GGCAACATA ATGGTAAAAAT GTTTGTACTG TATTAGAGCT TTACTGTTG ATTATTAAGA TATTTATCCA GTATCTTAGA GATGCTGGAC TTCAATTTTC CTATTTTAT CTTTTTAAAA TAAAAATCA TGCATGCTTC TGATTTGTGA TAGAAA	
TANK	NM_001199135.1	ACTCGGCCAG GCGCCGGCGA CCTGAGGGGA GAGGGAACGC AGCTGAAAGC GTGAACTGTA CCTGTCAATT ACTCCATCCT TTATAGTGAT GCTACAGGAC GAAGAGGAAT GGATAAAAAAC ATTGGCGAGC AACTCAATAA AGCGTATGAA GCCTTCCGGC AGGCATGCAT GGATAGAGAT TCTGCAGTAA AAGAATTACA GCAAAAGACT GAGAACTATG AGCAGAGAAT ACGTGAACAA	23

[0120]

	CAGGAACAGC TGTCAC TTCA ACAGACTATT ATTGACAAGC TAAATCTCA GTTACTTCTT GTGAATTCCA CTCAAGATAA CAATTATGGC TGTGTTCCCTC TGCTTGAAGA CAGTGAAACA AGAAAGAATA ATTTGACTCT TGATCAGCCA CAAGATAAAG TGATTTTCAGG AATAGCAAGA GAAAACTAC CAAAGGTAAG AAGACAAGAG GTTTCTTCTC CTAGAAAAGA AACTTCAGCA AGGAGTCTTG GCAGTCCTTT GCTCCATGAA AGGGGTAATA TAGAGAAGAC TTTCTGGGAT CTGAAAGAAG AATTTCATAA AATATGCATG CTAGCAAAAG CACAGAAAAGA CCACTTAAGC AAACTTAATA TACCAGACAC TGCAACTGAA ACACAGTGTCT CTGTGCCTAT ACAGTGTACG GATAAAACAG ATAAACAAGA AGCGCTGTTT AAGCCTCAGG CTAAAGATGA TATAAATAGA GGTGCACCAT CCATCACATC TGTCACACCA AGAGGACTGT GCAGAGATGA GGAAGACACC TCTTTTGAAT CACTTTCTAA ATTCAATGTC AAGTTTCCAC CTATGGACAA TGACTCAACT TTCTTACATA GCACTCCAGA GAGACCCGGC ATCCTTAGTC CTGCCACGTC TGAGGCAGTG TGCCAAGAGA AATTTAATAT GGAGTTCAGA GACAACCCAG GGAAC TTGT TAAACAGAA GAAACTTTAT TTGAAATCA GGGAAATTGAC CCCATAGCTT CAGCTATACA AAACCTTAAA ACAACTGACA AAACAAAGCC CTCAAATCTC GTAAACACTT GTATCAGGAC AACTCTGGAT AGAGCTGCGT GTTTGCCACC TGGAGACCAT AATGCATTAT ATGTAAATAG CTTCCTCACT CTGGACCCAT CTGATGCACC TTTCCCTCA CTCGATTCCC CGGGAAAAGC AATCCGAGGA CCACAGCAGC CCATTTGGAA GCCCTTTCCT AATCAAGACA GTGACTCGGT GGTACTAAGT GGCACAGACT CAGAACTGCA TATACCTCGA GTATGTGAAT TCTGTCAAGC AGTTTTCCCA CCATCCATTA CATCCAGGGG GGATTTCCTT CGGCATCTTA ATTCACACTT CAATGGAGAG ACTTAAGACA CATTTGAAAA CAGACATATC AAGTTCTATG TGATGATTTT GGGTTTTTAA TACTATAAAT ACTTGATTGT AAAC TAAATT CAAGATCATT TATAGGAAAA TCTAGTTTCA CAGCTATTTG AATTTTTTTC TGGATTTACT ATATAACTCT TATTTTTTAA AAGATCATTC TGTTCTTTCA AGGAGAAATA AGCCTAAAAG AAGAAAAACA AAAAAAATTC TGTATAAAAC TGTAATCCTT TGTATTCATG TTTACAGTGC TATTACTATA ATTCAAAATT ATGTATGTGA CTTAGAGTTA TATAATCATA ATTTATGTTT ATTTCAAATA TCTAAGTTTA TTGCTTGGAT TTCTAGTGAG AGCTGTTGAA TTTGGTGATG TCAAATGTTT CTAGGGTTT TTTAGTTTGT TTTTATTGAA AAATTTAATT ATTTATGCTA TAGGTGATAT TCTCTTTGAA TAAACCTATA ATAGAAAATA GCAGACAACA TAAACATCTT TGTAATATC AAACCTAATA CATTTCTTGT CCAGTGATAA AACAACTGGT AGAATTATTT AAACACTTTA GATTTTTAAA TAATATACAT GGCTTTAATT TTTACTGTGT GTATAGCTAC ATGATGAAAT TAATTAATA TTAAGAGGTA AAAA TAAAAA AAAAAAAAAA	
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[0121]

TLE4	NM_001282748.1	GGAGAGCTCG CCAGAGCGCT CGCATGGCGG GCCGGTGATT GTAGTCAATC TGGCCGTATT CTCAGGCAGG GTCGCCCGGG GCGGACTACA TCTCCCGGGA TGCTGCGCGG CCGCCCCGCG GAAGATTGTG AATATGTATC AGAATGTTAA TGATTAGCTG CTGCTAAATT TGGTCAAAGA AGTCACCTAC ACAGAGCGTG TTGTTAGAGC TGTGCTGAGC GGGTGTTGG GTTGTTGGCT GCTTTCTTCC CCTTTCTCA CACACTTGTA TATTATTTTG AGGTGGTGTG CGCAGAGTTT GAAAGGAGAG AGAATTAATA AAAAAGCCG CAAGCGTTT ACTCTTTTAT TTTATAATC CCCTTCAATT TGGGGTAAA AAAAAGACAA GAAAACAGGA AGGAAGAGAA ATAAGGAAAT GAGATGTGGT AAAAGAAGCT AAAAGGTGCC TTTTAAAAGA TCGTTGCTGT GAAAGTAAAA AAATCTCCAG AGAAACCAAA AAGCACCGCC GAGACCTCTT CCGAACCAAA GGAGTTTGTG TTTGCTTTA GGGAAAGAAG AAGATCATTC ATTCCGAGGA ATAACAACCA ATTAAGAC AAATAAAAA AGTTTGGAGT GGGACGCAGA GCGAGCGAGA GGAGCTCCG GCGGGCGGTG GGGCGCGGAG CCCGCACTTT CCCGCCCGG TGAGCGGCGG CCGCGGCGCC GGGCTCGGCG GGTGCGCTC GCGGAGCGA ACGTCGGAGC GTTGCTTGG GAGACGCGCG CCGGACAATG CCCGCGGCGG GCCAGTGACG CCCGCGGGGA ATGCGGAGCG GCCCGGCAGC CGGCACCCAG CCGCCGCCG GCGTTCTGC CGCCCGTGT ACAGGAGACC CGGCGGGGGC CGGGACCGCC CGAGCCGCC CTCAGACCGA GCCGGCCGCC TCCGCTGCCG CGGCCGCTC CTCTTCGGGG TCATTAAAGC CAATGAGCCG CGCGCTCTG CCGAGCGCAG CCAATAAAT CGGCTTGGAT GATTGCGGAC CTGAGCAAGA TGTACCGCA GACCAGACAC CCGGCACCGC ATCAGCCTGC TCAACCTTT AAATTTACAA TTTCCGAATC CTGTGATCGG ATTAAGGAAG AGTTTCAGTT TTTACAGGCT CAATACCACA GTCTGAAGCT GGAATGTGAG AAATCGCCA GTGAGAAGAC AGAGATGCAG CGGCATTATG TCATGTATTA TGAAATGTCC TATGGGTTGA ATATAGAAAT GCACAAGCAG GCAGAGATTG TCAAGAGGCT GAATGCTATC TGTGCACAAG TCATTCTTT CCTGTCCAA GAGCACCAGC AACAAGTGGT GCAGGCTGTG GAACGGGCCA AGCAGGTGAC CATGGCAGAA CTGAACGCCA TCATTGGGCA ACAACTCCAG GCCCAGCATT TATCATATG ACATGCTCT CCCGTACCTC TGAATCCACA CCCTTCAGGG CTCCAGCCCC CTGCCATTCC ACCCATCGGT AGCAGTGCCG GGCTTCTGGC CCTCTCCAGT GCTCTAGGAG GTCAGTCCCA TCTTCCAATT AAAGATGAGA AGAAGCACCA TGACAATGAT CACCAAAGAG ACAGAGACTC CATCAAGAGC TCTTCAGTAT CCCCATCAGC CAGTTTCCGA GGTGCTGAGA AGCACAGAAA CTCCGAGAC TACTCCTCAG AGAGCAAAAA GCAGAAAACT GAAGAAAAGG AAATTGCAGC TCGTTATGAC AGCGATGGTG AGAAAAGTGA TGACAACTTG GTGGTTGACG TTTCCAATGA GGATCCATCT TCCCCTCAG GGAGCCGAGC ACATTCCCC AGAGAGAATG GCCTAGACAA GACACGCCTG CTCAAGAAAG ATGCCCCGAT TAGTCCAGCC TCTATTGCAT CTTCAGCAG	24
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[0122]

	TACTCCCTCC TCCAAATCCA AAGAACTTAG CCTTAAGAGG GATATGGGGA AATTGAGTGA AACACGTCTT AGCGAAGATG AACAATGCAC ATTGGGGTTA CAGAGATGGT TTTGTGCGCT GTGGTTTATG AATGAAAAAT CTACTACTCC CGTCTCAAAG TCCAATACCC CTACTCCACG AACTGATGCG CCCACCCAG GCAGTAATC TACTCCCGGA TTGAGGCCTG TACCTGGAAA ACCACCAGGA GTTGACCCCT TGGCCTCAAG CCTAAGGACC CCAATGGCAG TACCTTGTC ATATCCAAC CCATTTGGGA TTGTGCCCCA TGCTGGAATG AACGGAGAGC TGACCAGCCC CGGAGCGGCC TACGCTGGGC TCCACAACAT CTCCCCTCAG ATGAGCGCAG CTGCTGCCGC CGCCGCTGCT GCTGCTGCCT ATGGGAGATC ACCAGTGGTG GGATTTGATC CACACCATCA CATGCGTGTG CCAGCAATAC CTCCAAACCT GACAGGCATT TCAGGAGGAA AACCAGCATA CTCTTCCAT GTTAGCGCAG ATGGTCAGAT GCAGCCTGTC CCTTTCCAC CCGACGCCCT CATCGGACCT GGAATCCCC GGCATGCTCG CCAGATCAAC ACCTCAACC ACGGGGAGGT GGTGTGCGCG GTGACCATCA GCAACCCAC GAGACACGTG TACACGGGTG GGAAGGGCTG CGTCAAGGTC TGGGACATCA GCCACCCAGG CAATAAGAGT CCTGTCTCCC AGCTCGACTG TCTGAACAGG GATAACTACA TCCGTTCTCG CAGATTGCTC CCTGATGGTC GCACCCTAAT TGTTGGAGGG GAAAGCCAGTA CTTTGTCCAT TTGGGACCTG GCGGCTCCAA CCCCACGCAT CAAGGCAGAG CTGACATCCT CGGCCCCCGC CTGCTATGCC CTGGCCATCA GCCCCGATT CAAGGTCTGC TTCTCATGCT GCAGCGACGG CAACATCGCT GTGTGGGATC TGCACAACCA GACCTTGGTG AGGCAATTCC AGGGCCACAC AGATGGAGCC AGCTGTATTG ACATTTCTAA TGATGGCACC AAGCTCTGGA CAGGTGGTTT GGACAACACG GTCAGGTCCT GGGACCTGCG CGAGGGGCGG CAGCTGCAGC AGCACGACTT CACCTCCAG ATCTTTCTC TGGGCTACTG CCCAACTGGA GAGTGGCTTG CAGTGGGGAT GGAGAACAGC AATGTGGAAG TTTTGCATGT CACCAAGCCA GACAAATACC AACTACATCT TCATGAGAGC TGTGTGCTGT CGCTCAAGTT TGCCCATTTG GGCAAATGGT TTGTAAGCAC TGGAAAGGAC AACCTTCTGA ATGCCTGGAG AACACCTTAT GGGGCCAGTA TATTCCAGTC CAAAGAAATCC TCATCGGTGC TTAGCTGTGA CATCTCCGTG GACGACAAAT ACATTGTCAC TGGCTCTGGG GATAAGAAGG CCACAGTTTA TGAAGTTATT TATTAAGAC AAATCTTCAT GCAGACTGGA CTTCCTCCTC TGGTAGCACT TTGCTCTGTC ATCCTTTTTG TTCACCCCCA TCCCCGCATC TAAACCAAG GATTTCAGAT ACTCATTGCA GTTGTGGAGT TTAATCCCCCT TTCTTAACCT CACTTCCAC TTGCTATTGA ATTGTGAATA GTCATTAAAA ACCTGTGATA CCAAACTCTC AGCTGTCTAC TTGGAAGAAC ATGGAATAAG CATACTTAAC AGTGAAGAAGA ATCTTTAATT ATGTATTATA TCTGTAATAT ATTTATTTTG TTTAAAGAAG GCTTCTAAC AATGACTGAC TAAATAAAGC TGTCTGCTCC TGCATTGATA ATGAAGGTGC GTTGTATTTG ATACCCCTCC CCCCCTTTTT TTGGCAAAGG	
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[0123]

		AGGGGAAAAGG AAGGTTTAAA ATAATTGATT TAAAAATGTCA CTAAGTGTAG ACTGATGACT GTATAGAGAT GTGAAATGTA TAATTACACA TGGAAAGCAAT ATGTTGCTGT GTTGTATTATTA GGTTTTTTTT GTTTTTGTTT TCTACATCTT TAAAAGACTT TTGGAAATTT GGCTGAACAA TTAGAACACA ACAGGCCAAC TCATACTCAT TTGGATCTAT TTAGACAACG TTAACCAATA TATCTATAGC TTTAGATTAT ATTCGATAAA AGTAATTGGA CTTTTTTCT TTTTTGACT CGTTGACAAG TGTCTTTGTA ATATGTTTTT AGTTCCCTTT TTTTGTGTGA TTATAGGCAG ATGAACAAAT TAAATTTGGC CTCAAAGAGA GAACTTACTC CCTTCTGGAT ATTTTTGCCA CATTCTTTG CAAAAGGAGA TATATATATC TTTAGTCAGT TTTGTTGTTA TGAGAAATTA TGGGTATTTT TGTGGCATGC TCTTTGGGAG CTGCACAGTT ATGGGGAGGA CTCCCACTGC TGTGCAAGTT AAGTCTTTTA CAAAACAAGG ACAGCAGAGG AGGGTTTGCA GAGACCTCCC TCTGAAAAAC ACAAAGAATG GACTCTCTCC TGGGATGAGG ACTTGCTTTC TTTACCTCCG GTTCTTTCCA TGTCTTAGTT GGATGTCCCT GAAATGGACA CAGGCTGTGC CATTGTGCCA GAAACATIGT GTTATCTTTT ATGTIGTGT TGTGCTGTT AAACTATAAT ATGTGACTTC TTTTTTATT ATTTTTGTT TGAATGCTTT AAAAAATCTT TAAGTCTGTG GATCTGCTGA TGTACAGTGC CTITGCTGCT ATGGATCAAA ATCAAAAAGAA CCGTGTAGAT ATACTTTATT GTATAAGTAG AAAATTACTT AATTTCATAC TAGAAATGGA TGGATGCTGC AAGTTGAAAT GGACTGTCCA TTGACGTTCC TAATGTGGTA GCAGAAAAAA AAAAATGGTG TCTTAAGTGC TTAGTGTTTG ATGTCATTAA CAGTTTCGTA AAACTCTACA GTGTAGAAAAG ATTTTGATAC TAAACTGTGC GTTGATACATA GTTCTAATGC ATTGTATTGA CCACCAGTAC TTCTATAATG GTAGATTGTT TGTGAATTCA GACTTTTAAG CATTAAACAT AAATAACTTC TAGTATGCTT ATTTTCTFAA TTCTTTGCT TGAATGACATT AGTTTATTTT TTATCTTTGG CTGTGCCACT CCTATATATT AAAAAATGCCT AGTTTTTTCA AGGGAGATTG TTGTTAAAGT AAAGTGGTTT TTTTTGTGT TAAA	
TPT1	NM_001286272.1	CTTCGTGCCA CGTCACCGCC TGCCTCGCTT CCGGAGGCGC AGCGGGCGAT GACGTAGAGG GACGTGCCCT CTATATGAGG TTGGGGAGCG GCTGAGTCGG CTTTTCCGC CCGTCCCCC CTCCCCCGA GCGCCGCTCC GGCTGCACCG CGCTCGCTCC GAGTTTCAGG CTCGTGCTAA GCTAGCGCCG TCGTCGTCTC CCTTCAGTCG CCATCATGAT TATCTACCGG GACCTCATCA GCCACGATGA GATGTTCTCC GACATCTACA AGATCCGGGA GATCGCGGAC GGGTTGTGCC TGGAGGTGGA GGGGAAGATG GTCAGTAGGA CAGAAGGTAA CATTGATGAC TCGCTCATTG GTGGAATGC CTCCGCTGAA GGCCCCGAGG GCGAAGGTAC CGAAAGCACA GTAATCACTG GTGTCGATAT TGTCATGAAC CATCACCTGC AGGAAACAAG TTTCACAAAA GAAGCCTACA	25

[0124]

	AGAAGTACAT CAAAGATTAC ATGAAATCAA TCAAAGGGAA ACTTGAAGAA CAGAGACCAG AAAGAGTAAA ACCTTTTATG ACAGGGGCTG CAGAACAAAT CAAGCACATC CTTGCTAATT TCAAAACTA CCAGTTCTTT ATTGGTGAAA ACATGAATCC AGATGGCATG GTTGCTCTAT TGGACTACCG TGAGGATGGT GTGACCCCAT ATATGATTTT CTTTAAGGAT GGTTTAGAAA TGGAAAAATG TGATGCAAAA GAAAGAAATC CCTGCGCTT CTGTCTGTCT TTGTGGCGGC CCAGATTGAA TTGGGGAATA CATCTTTAGC CTGGAAATGT AGGCTGCATG TTAATGGTAA TGTAACCTTT GCAGTGTAAAT GTTTGAAAAA TATTAATGTA GTTTTTGCTT TTACAGTAAC AAATGTGGCA ATTATTTTGG ATCTATCACC TGTATCATA ACTGGCTTCT GCTTGTCTATC CACACAACAC CAGGACTTAA GACAAATGGG ACTGATGTCA TCTTGAGCTC TTCAITTTATT TTGACTGTGA TTTATTTGGA GTGGAGGCAT TGTTTTAAAG AAAAACATGT CATGTAGGTT GTCTAAAAAT AAAATGCATT TAAACTCATT TGAGAGAATG CCTTTTAGTT TAATGCATAT TTAAGCTAAA TTGATCCTGT AGTGTCTCTG GAGAAGCTAG AGCCTGATTG TAGGCTACTA CTCATCAATT AACTTCTACA GTGGAGACTA CTTCTGGGAC TGGAATATAA AAAAGAATCA AAGGTTCTGA TTTTGAGTTG CAATAAAGGG AAAGACCATG CTCATAGCAG TGCCAACATC TGAAGTGTGG AGCCTTACCC ATTTTCATCAG CTACAACGGA AGTAGTTAAC TGGAAGAGAT TACCAAGAGA ATAAAAAGAG ACTCATTGAG TGGAAGCAAC TTTGTCTCAG CTTATTTTAC ATAAAGAGAG CGAAGTCTTT TGGGATGAAT GTTAATTAAG CTCCCTGGTA ACTAGAACAG GGACTGGCAA ACTAGCCTAT CTGACCACCT GTTTTGTACA CTTTAAGGTG GTTGGTTGCC TTTTTAAATG GTTGAGGGGA AAAGAATACC TTGTGGGATA TGGAATTTAA GTTCGAGTCC AGTTTTATTG GAACGTGGCT ATGCTTATTC ATTTATGGAT TGAAGTGGC TGTGTGTCAGT GCATGAGCAG AGTTGTGTCT AACAGACTAG AGCCTGCAAG TTTGCCAGCC CTTGATTTAA AAGATGAAGG TACACAGAAT GTGGGCTGGC TGGTGGGCAA AGGGGTAAAA ATGTTCTCTA TATTGTATCT GAAAAGATGG GGTGTCTGAA TAAGAAAATG CATCTATTTG ACAGACCTGG AGCAGTTGCT ATCTGCTGCT ATGGTTTCCA CCACAGATGC AAGAAGAACA TGTCCTTGCG CTTCCGTCT GTCTAATTGT GGCAGCTGAG ATTGAATAGA GGAATACAGG AGGAAAAAAA GCGGGAAGAG TTTTGTAGGC AGGTCGGTCA CCCAGGCTTG TAGTGCAAGT GCACAAGCAA CTCACTGCAT TCTCTGCATC CTGTGCTCAA GCCATTTTCC CACCTCAGTC TCACTAGTTG CTGGGACTGC AGGCATGCAC CCCTATGCCC AGCTAATTTT TGTAGAGACC GAGTATCGCT TAGTTGCCCA GGGTGGTCTC AACTCCTGGG CTCAAGGAGA TCTGCCCACC TCAGCCTCCC AAAGTGCAGG CCTAGCCTGG GAGGGGAATT TTCAAACGT GAGTTTGGG AAATAGTCTA TCAGCCTTAC CTGGTTGATT AACTTTGTAA AAGAAAGATT AAAAGCAGGC CAGTGACTCT GGTCTGCTTG AACATGTGAA TGTAAGGTTT TGAGCAATCT GGAGTTTGCC CTAGTGTCAA	
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[0125]

	ATTCCAGACT GTCCATAGTG TCCAAAACCT GAGGCAGATA CTAATGTTAA CCCCCAGCAC CCCGTGATTG GAAACAAACC TAAATACGTA TTGGGAACCT AATAGCAATT TTAAGCATTC TGATAGATTT TTTGTAGGGA TGGGGTCATG CCATGTGGCC CAGGCTGGTC TGA AAACTCT GGCCTCAAGT GATCTCAAGC TTTGGCCTTC TAAAGTGTG GGATTACAGG TGTGAGGCAT TGCACCTGGC TTAGCGTTCT GATTTGACAT TGTAATGAAA AGTGTGAGTC TCATCTACAG GGCCTTTTGT CCTCTGAAAT GATAGCAGGA AGGGAATTTT CAGGCAGTGG TCAAAGCTGG GGAAACCAGG ATAGTGAAGA AGGCCTTGAG GTGAGAGATG GAAGCTAATT GGTGAAGTAG CCTTGGAAGC CTGAAACAGA CAAGTAGCAA TTCAGAGACT TTGTGGGCTC CACTGCTCCA ACTTGTTTTG AAGATTTTCA GTTCTGCAGA AGAGGTATTT CCCCAGTTGT CCTTTCAGTG CTCTTAGCTG TTTTCCCAAC ATCCAGATCC AATCAAGGCT GGGACATAGC ATTTTATCAT GTCTATTTAA GTCAGAAAGTG ATGAACCCCA GCTGTTTACC TCATGGTAAA CCTTTGAAGA TTCCAGGTAG AATCTTCTCA GACTTTGAAG ACTGTCTCAT TTTATATCTT TTTCTCGTTA TTCCTAGGGT CAAGACGTTT TGGGCAAGAA TAAGGATGTG AACATCAGAA AGCTCATAAC ATTTTGTGTT TGATGCTAAG TTTAACAAAG GCATGCTTTA GTAGCCTGTG GGCCTTAGGG TTTGTAAAG TGTGGAGAAC AACTGAGTGG AGCAAGAGGA CTTTTCTAGG AAGGTCCTTG TAATGTGACA TTTGAAAAA AATGAAGGTG TGGAAAGTAG CCATGTGGAT ATCAGGACAA ACCATTCCAG GCCAAGACAA CAGCAGTTAG TCTGGAGTGT GATGTGTTCT GGGAAAAAAG TGGCCACTTT GCTAACCCAA GAAGACAGGA AGGGTTGTAA AGCAGTGGGA GTGTGCAAGG AAGGAAGACC AGACCTCAAG GAAACACAG GCGCTCTGAG CAGAAGAGTT ACATGATATG ACTCAAATTT TTAAGGATC ACTTTGGCTG CCAGGTGGCA GGGTAAAAGC ATAGAATAAT TGTGTATAAT GTGTTTTTAA GGCAAAGATA GTGGCTTAGT CTAGGGTAGT AGACTGAGGT GGTAGGAAAT GAAGATAGAG ACAACAGGAT ATGCTGGTGG GTGAGGATGG ATTTAATGTT GATACAAGTA TTTTGGTCTG AGCGTTTGA AGAAAAGTTGG CACTGAGGTG GGAAGTCGAG TTTAGTTTTG TTAGTTTTGG ATGTGTAAAG TTTGAGATGC TGATTCTCA GAGAAGTCTA AGCTGGAGAA CTATATAGAG AGTGGAAAGA TAACAATAGA CATTGAAAGC CATGATACAG GATAAGGTCA TTTGGAGAGA GGATAGACTG CATTCCAACA TGAGATTGGT TGACAAAGAG AAACCAACAA AGGTAATTAA GAGGTGCTCC CACTGCACCT GTACTCAGAA GGCTGAGGTA GGATTGTTAG AGGCCAGCCT GGGCACCACA GGGAGACCCC ATCTCTAAAA TTTAGCCAGG AACCATGGCT CATGCCTGTA GCCCCAGGAA TTTGGGAGGC TGAGTGGGGA GGATCGCTTG AGGTCAGGAG TTTGAGACCA GCCTGGGCAA CATAGGGAGA CCTAAAAAAA TTAATTGGGC ATCTGTAGTC CCAGCTACTC AGGCGGCTGA GCTGAGAGGA TGGCTTGAGT CCGAGAGATT GAGGGTGCAG TGAGCTGTGA TCATACCACT GCACTCCAGC CTGGGCGGCA GTGAGACACT	
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[0126]

		ATCTGAAAAA AGTTTAAAAA TTTTAAAAA GAAGGAACTG CCCCTGAGGT AAGAACCAAG GGAGGGCCTC CCAGAGGTCA GGTGGA AAAA GTTTTAGGAA GGAGGAAGTA GTCAACAGGG TTACCTGTTG CAAAGTACTT AAGTAATATG AGGCCTGATA GTGGTAAACT TGA CTACCGT TGGATTTCAC TAGTGGGAAA GGAAGTCTAA TTA AAAATGCA CTCAAGAGAC TAACAGTCGC AGGCATGAAA TACAATACAG GTACATGGTT TTTTATTATG TGTGCATCTG CTT CAGTAAT AGGTGTGAAT TACTCATTTG GATCATTAGG AGTTTCAAAA TCTAGTTAAA TGA CTAGATT TTTGTTGATG TAAATTCTGT CATTCTGAAC TGCAGGGATT GTCAGTAACT TAACTGCAAA CTAACTGGT GATAATTATG GTAAAATTGC AAGACGAGCA ATAAATCTCA ACCA ACTTGA GAGA A CACTG ATAA	
TSC22D3	NM_001015881.1	CGCCGTGAAA ACCAGCTGCT GCAGCCGCAG AGGCAGCCGG AGGCAGAGGG GCGGCGGGCA GGACCAGACA GGGCTGGGCA GGGGGCTGGC CGAGCGCCGT GCGCCGCTTG GGAGAAGGCC GGAAGCTTAC CAGCCGAGAA GGAATTCCTA GCTAGCTTCA GAGCCGGTGC CTCCGGAGCC AGCGTGGTGG CCATAGACAA CAAGATCGAA CAGGCCATGG ATCTGGTGAA GAATCATCTG ATGTATGCTG TGAGAGAGGA GGTGGAGATC CTGAAGGAGC AGATCCGAGA GCTGGTGGAG AAGAACTCCC AGCTAGAGCG TGAGAACACC CTGTTGAAGA CCCTGGCAAG CCCAGAGCAG CTGGAGAAGT TCCAGTCCTG TCTGAGCCCT GAAGAGCCAG CTCCCGAATC CCCACAAGTG CCCGAGGCC CTGGTGGTTC TGCGGTGTAA GTGGCTCTGT CCTCAGGGTG GGCAGAGCCA CTAACTTGT TTTACCTAGT TCTTTCCAGT TTGTTTTTGG CTCCCCAAGC ATCATCTCAC GAGGAGAACT TTACACCTAG CACAGCTGGT GCCAAGAGAT GTCCTAAGGA CATGGCCACC TGGGTCCACT CCAGCGACAG ACCCTTGACA AGAGCAGGTC TCTGGAGGCT GAGTTGCATG GGGCCTAGTA ACACCAAGCC AGTGAGCCTC TAATGCTACT GCGCCCTGGG GGCTCCCAGG GCCTGGGCAA CTTAGCTGCA ACTGGCAAAG GAGAAGGGTA GTTTGAGGTG TGACACCACT TTGCTCCAGA AAGTTTAAGG GGTCTGTTTC TCATCTCCAT GGACATCTTC AACAGCTTCA CCTGACAACG ACTGTTCCCTA TGAAGAAGCC ACTTGTGTTT TAAGCAGAGG CAACCTCTCT CTTCTCCTCT GTTTCGTGAA GGCAGGGGAC ACAGATGGGA GAGATTGAGC CAAGTCAGCC TTCTGTGGT TAATATGGTA TAATGCATGG CTTTGTGCAC AGCCCACTGT GGGATTACAG CTTTGGGATG ACCGCTTACA AAGTTCTGTT TGGTTAGTAT TGGCATAGTT TTTCTATATA GCCATAAATG CGTATATATA CCCATAGGGC TAGATCTGTA TCTTAGTGTA GCGATGTATA CATATACACA TCCACCTACA TGTTGAAGGG CCTAACCAGC CTTGGGAGTA TTGACTGGTC CCTTACCTCT TATGGCTAAG TCTTTGACTG TGTTCAATTA CCAAGTTGAC CCAGTTTGTC TTTTAGGTTA AGTAAGACTC GAGAGTAAAG GCAAGGAGGG GGGCCAGCCT CTGAATGCGG	26

[0127]

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UBE2J1	NM_016021.2	GCGGCCGCGG CAGGGCTGGG CCTGCGACTA CCCGAGGAGG CTGACCTCCA GCCCGGGCGC CCGGTCAGC GCCGCCCCGG CCGGCGCCGG TGCTGCCAG GCACTAAGG AGGCGGGGGC GCAGTGGAGG AGGCGGCGCC ATCGCGAAGC GAGCGCCTCG CCCGCACTCA GCCTTGCCAC CCCGCCGCA GTCCAGGCTG GACTGGGCGG CATTTGCCGA GGCTCCTCGG CCAGGCCCGG TCCGCCCGAG CCGCGCTGAG ACCCGGGCAG CGGCCCGGTG GAGAGGAGGT GGCAGCGGCC CGGGAGGCCG GAGCCAAGCC AGCGACCCAC CATGGAGACC CGCTACAACC TGAAGAGTCC GGCTGTAAA CGTTTAATGA AAGAAGCGGC AGAATTGAAA GATCCAACAG ATCATTACCA TGCGCAGCCT TTAGAGGATA ACCTTTTTGA ATGGCACTTC ACGGTTAGAG GGCCCCAGA CTCCGATTTT GATGGAGGAG TTTATCACGG GCGGATAGTA CTGCCACCAG AGTATCCCAT GAAACCACCA AGCATTATTC TCCTAACGGC TAATGGTCGA TTTGAAGTGG GCAAGAAAAT CTGTTTGAGC ATCTCAGGCC ATCATCCTGA AACTTGCGAG CCTTCGTGGA GTATAAGGAC AGCATTATTA GCCATCATTG GGTTTATGCC AACAAAAGGA GAGGGAGCCA TAGGTTCTCT AGATTACACT CTTGAGGAAA GAAGAGCACT TGCCAAAAAA TCACAAGATT TCTGTTGTGA AGGATGTGGC TCTGCCATGA AGGATGTCCT GTTGCCTTTA AAATCTGGAA GCGATTCAAG CCAAGCTGAC CAAGAAGCCA AAGAAGTGGC TAGGCAAATA AGCTTTAAGG CAGAAAGTCAA TTCATCTGGA AAGACTATCT CTGAGTCAGA CTAAACCAC TCTTTTTCAC TAACTGATTT ACAAGATGAT ATACCTACAA CATTCCAGGG TGCTACGGCC AGTACATCGT ACGGACTCCA GAATTCCTCA GCAGCATCCT TTCATCAACC TACCCAACCT GTAGCTAAGA ATACCTCCAT GAGCCCTCGA CAGCGCCGGG CCCAGCAGCA GAGTCAGAGA AGGTTGTCTA CTACACCAGA TGTAATCCAG GGCCACCAGC CAAGAGACAA CCACACTGAT CATGGTGGGT CAGCTGTACT GATTGTCATC CTGACTTTGG CATTGGCAGC TCTTATATTC CGACGAATAT ATCTGGCAA CGAATACATA TTTGACTTTG AGTTATAATA TGTTTTGTG ACTTATGAGC TGTGACTCAA	27

	CTGCTTCATT AAACATTCTG CATTGGGTAT AATCTAAGAA TTGTTTACAA AAAGATTATT TTGTATTAC CCTTCATTCC TTTTTTTGAT CCTGTAAAGT TTAGTATAAA TATATCTAGA CATTCAAGACT GTGTCTAGCA GTTACGTCCT GCTTAAAGGG ACTAGAAGTC AAAGTTCCTT GTCTCACTAT TTGATCTGCT TTGCAGGGAA ATAACCTTGT TTTTCTCATG TTTTCATCTTC TTTTTAAGTA AATTGTGAAT ACTTTCCTAT ATTGCCCTTT GAAATTTTTG GATAAAAGAT GATGTTTTAA GTTCCAATGA GTATTACTAG TTAACAATA CCACTTATTG AGTACTCTGT TTCTACGTAT GTAGAATGTA TAGGGATAGA AGAGTTGAAA AGGGAAAGCA AAACCTCTCA AGTAGCTTCC TTAATATGTC ATTCATAGGA GATGTACTGG AATTGCTCAT TCTGTGACTT TATTGTGTG CTAAACATTG TTCAGTGAAA ATAATTTTAT TTCAGTCAAA CATTTATGAG GAAATGAGAT CACATCTTTG TCACTGGATG CTAATTGAAG AGGGAGTACT TTGTAACCAC TTTGATATGC TGTTATCACC ACCCCCTGCC CTCTGCTGCC ATAATCACAC AAATTTAAAA AGAAAGAAAA CAGTCTTCCA TAGATTTTTA AGGAAGAAAG GGCCCAAGCC AGGAGATCGC TTGGTTTTCT TCCAGAAGTT AAATGGGGGG ATCTGAAGAT TTGAATGTTT GGTCTGCTTT GAAATGTATG TCTTTTGGGA TGTATTATAT GCCTAGCTTT ATAATCAGTA TAAATTTTAA TTATCCAGG AATATGCATA ATATTGAAAT ATTTTCATGT CTATTTTAAAT AGAAAACCTC AGGGCCCAAG TAACAGTGAT AGAAGTTAGA AAAACCTTTA CTTAGAATTG TCCACCTAGT CAGAGCCCAA GAAAGAATTG TCAGTGGAAG AATCAATATA TAACTTAGTG CTAGCTAGCG CCACAGACTC TAGTAGATAA TATTATCATC ATAATGGCTG GTGAAACCAT ATAATCACAG AAAAACATTG CCTTCAGCAT GTTCAGTTTC CAGCACTGAG GGCACTCTTG AGGGTGTGT TAATGAAGAT TTAATTTTTA AATACAGGTG GTTCCAAGCT TTCAAATAGG TTATGTCCA AAAGTGTTAT TTGTAAAGTA ATTTTTTTAC AAGTCAAACA ATGTTGGAAG TGGTATTAG GTTCTAGATC GGTCCACGAA AGTTAGCCCA TATGTATATC TTGAATAGTA TAGGGGAGGG TATTCATAAA GTCCTTATGT GGTTTTAACT AAGTGAAATT ATGGACAAGA GAAATAATTG TAAATCGTC TTAAGGAAA ATTTAATTTT TACTCCTGTT TATGGGACAT TCGTTCTATT AACTGTCAGA CACAATTCT GTTTTCATCT GAGAGCCAGT TTTCTTTTAT TTCTACATCT AAAATAAGAA CATATTGTAC ACTATTATAT AATACAGAAT TGTCTTAAAC TTAATAAAT TCGCATTTTA AAGGTGTTTA CAGATTATTT TTTATATCTG TAGCTGAATT TGTTAAAGTC TAAAAAGCTC AAGGACTTTA TGAAGATCTC ATTATATGAG GAAAAATCATA GGTACCATT TTATAACTCT ATTGCCATAA GAAAATACAC TCTAAAATCT TGATTTGAAA CATATTAGAA ACCTTGATTG AGTGCTCAGT GGTCTCCTAG TAAGAAGTCA CCGACGGTAG CGTCATATGA GAAGAAAGAA ATCCCCACCA CCTCAACCTC TGCTGAGATT GTGTGCTAGG AACAGCCTTC CCTCCGTTTC CCCTCAGTCA AACTTGAGCC AGCCTCTGGA TCGATGTGAT CTTATTGCAT	
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[0129]

		GTTTCATGG GGTGTACCTA TACTTTAAGC CAATCCTGCT GCATTCACCTG CTAAGTTAAA TAAAAAGCCA AGAAGATTTT GCACTGTGCA GATCCTTTGC TATCTGACTT GCATCTCTTC CCCCACCTGT CAGCTAGCCA CCTGCTTGTT TGTGTTGGGA TATTTTTTAG CACCTGAAGC ACCATCTGAA AGGGGCACCA TTTTCTTCTT CCCTTTGATC TCACATATGC TCCCTAAAAA TCCTTAAGTT GTCAATCTGA TCCCCAGTGT GAGGTTAATG AGCAAAATTG GTCTTTGGGG CCCTTTTTGT CCAAGCCCCA CTGAAAGGCC TCTTCAGAAA ACTATTATCT TTAAGCCCT ACTTTAACTC CTTAATTCCA GCATACAGCT AAAACTGGAT GTATATTCTG GCAAGTAAAG GCTGAGGACT CCTCTTTAAT CCTCAGATCT AGATAACTCA TGACATTTTA TTTGACCAAC ATAGCACATG ATGAGATATC AAGGTAATTA AAATAGCATG CTTGAAAAAA AAATACGTAA TCTGTTTAC CTGTAAGTGT TTAAGCCAAT AAACCTTTCA AAATTTATGT AATGTGGGGC TTTTATGTAG CACTTTACGT TTTCATGCTG CTTATTGTTT TATTCTACTG AAAAAATGA ATTTCAAGAT TCTCAACTTT TTTAATTTCA AAAATTGTTT ATTGTTTGA CTATAGGAAT ACAAATTTCT CTATTTTGGG AGAATAAGAA CTCTTTTGT CATTTTTGGC TATGAATAAA CTTTCTGGTC TTTTGAGACC ACCCATTTTT ATAGATCAGA ATCAGAAAAAC AGGTAAACCT CACTCACACA TTTGGACTCA TTTGAACAAA AATCTAGGCC AAAAATACTGA AAAGCCTATG TGTTTTTTTA ATTGGAAGTA TATGTAAGGT TAATGCATTT AGTGAACGTG ACTAACAAAG ACTAATGTGC ACATTAACAG ATGTAATTTT TAAGGTTTTA TGGGAGGCTG TGCATTGCTC AAAAGCTGTT GGAACGCCT TCTGAACAGT TGCCTTCAGA ACTAGTTTGA GCTGCTCAAT AAAACCAGTG ACTTTACTCA TAAAAAATAA AAAAAAATAA	
ALG9	NM_001077690.1	GTCTTTTGTC CCTCGGCGGA CACCGTTTGC CAGCCAAAGC TATGTCTGCG CGCTCACCGA CTTCATAGGG TGCCGAATTC TTTTTCCTCC AGGCTTGCCA TGGCTAGTCG AGGGGCTCGG CAGCGCCTGA AGGGCAGCGG GGCCAGCAGT GGGGATACGG CCCCAGGCTG GGACAAGCTG CGGGAGCTGC TGGCAGCCG AGAGGCGGGC GGCGCGGAGC ACCGGACCGA GTTATCTGGG AACAAAGCAG GACAAGTCTG GGCACCTGAA GGATCTACTG CTTTCAAGTG TCTGCTTTCA GCAAGGTTAT GTGCTGCTCT CCTGAGCAAC ATCTCTGACT GTGATGAAAC ATTCAACTAC TGGGAGCCAA CACACTACCT CATCTATGGG GAAGGGTTTC AGACTTGGGA ATATTCCCCA GCATATGCCA TTCGCTCCTA TGCTTACCTG TTGCTTCATG CCTGGCCAGC TGCAATTCAT GCAAGAATTC TACAACTAA TAAGATTCTT GTGTTTACT TTTTGGCATG TCTTCTGGCT TTTGTGAGCT GTATTTGTGA ACTTTACTTT TACAAGGCTG TGTGCAAGAA GTTTGGGTTG CACGTGAGTC GAATGATGCT AGCCTTCTTG GTTCTCAGCA CTGGCATGTT TTGCTCATCA TCAGCATTC TTCTAGTAG CTCTGTATG TACTACTAGT TGATAGCCAT GACTGGATGG	28

[0130]

	TATATGGACA AGACTTCCAT TGCTGTGCTG GGAGTAGCAG CTGGGGCTAT CTTAGGCTGG CCATTCAGTG CAGCTCTTGG TTTACCCATT GCCTTTGATT TGCTGGTCAT GAAACACAGG TGGAAGAGTT TCTTTCATTG GTCGCTGATG GCCCTCATAC TATTCTGGT GCCTGTGGTG GTCATTGACA GCTACTATTA TGGGAAGTTG GTGATTGCAC CACTCAACAT TGTTTTGTAT AATGTCTTTA CTCCTCATGG ACCTGATCTT TATGGTACAG AACCCTGGTA TTTCTATTTA ATTAATGGAT TTCTGAATTT CAATGTAGCC TTTGCTTTGG CTCTCCTAGT CCTACCACTG ACTTCTCTTA TGGGAATACCT GCTGCAGAGA TTTCATGTTT AGAATTTAGG CCACCCGTAT TGGCTTACCT TGGCTCCAAT GTATATTTGG TTTATAATTT TCTTCATCCA GCCTCACAAA GAGGAGAGAT TTCTTTTCCC TGTGTATCCA CTTATATGTC TCTGTGGCGC TGTGGCTCTC TCTGCACCTC AGAAATGTTA CCACTTTGTG TTTCAACGAT ATCGCCTGGA GCACTATACT GTGACATCGA ATTGGCTGGC ATTAGGAACT GTCTTCCTGT TTGGGCTCTT GTCATTTTCT CGCTCTGTGG CACTGTTTAC AGGATATCAC GGGCCCCTTG ATTTGTATCC AGAATTTTAC CGAATTGCTA CAGACCCAAC CATCCACACT GTCCGAGAAG GCAGACCTGT GAATGTCTGT GTGGGAAAAAG AGTGGTATCG ATTTCCAGC AGCTTCCTTC TTCTTGACAA TTGGCAGCTT CAGTTCATTG CATCAGAGTT CAGAGGTCAG TTACCAAAAAC CTTTTGCGA AGGACCTCTG GCCACCCGGA TTGTTCTTAC TGACATGAAT GACCAGAATC TAGAAGAGCC ATCCAGATAT ATTGATATCA GTAAATGCCA TTATTTAGTG GATTTGGACA CCATGAGAGA AACACCCCGG GAGCCAAAAT ATTCAATCAA TAAAGAAGAA TGGATCAGCT TGGCTATAG ACCATTCTCT GATGCTTCTA GATCTTCAAA GCTGCTGCGG GCATTCTATG TCCCTTCTCT GTCAGATCAG TATACAGTGT ACGTAAACTA CACCATCCTC AAACCCCGGA AAGCAAAGCA AATCAGGAAG AAAAGTGGAG GTTAGCAACA CACCTGTGGC CCCAAAGGAC AACCATCTTG TTAATAATTG ATTCCAGTGA CCTGACTCCC TGCAAGTCAT CGCTGTAAC ATTTGTAATA AAGGTCTTCT GACATGAATA CTGGAATCTG GGTGCTCTGG GCTAGTCAAA GTCTATTTC AAGTCTAATC AAAGTCACAT TTGCTCCCTG TGTGTGTCTC TGTCTGTCAT GTAAACTTTT TGCAGCTAGG CAGAGAAAGG CCCTAAAGCA CAGATAGATA TATTGCTCCA CATCTCATTG TTTTCTCTCT GTTCAATTAT TTAGTAGACC GGAGAAGAGC AGAACCAACT TACAGGAAGA ATTGAAAATC CTGGTACTGG ATGGCTGTGA TAAGCTGTTT TCCACACTCT GGCTTGGCAT CTGAGAACTA GCAAGCCTCT CTTAGGCCAT ATGGGCTTCT CCACCAAAGC TGTTTGGCAG CTCCTAGCAG ACCTTCTTAT TGAAATCCTC ATGCTGAAAA TGAACACAGC CTAGTTGCCA ACCCACATGT CCTTTTACC TCCAGCAAGA CTAAGCTTCT TTAAAGCACT TCACAGGACT AGGACCTGT CCTGGAGCTA TCTCAGGAAA AAGGTGACCA TTTGAGGAAC TGTGACCTAA TTTTATTATA ATGATGCCTC TAATTTTCAT TTCCTTTACA ACCAACTGTA ACTATAAGGT TGTATTGCTT	
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[0131]

	TTTTGTTCAG TTTTAGCATG CTATTTTTTG AATTCTAGAC TCCTCCATGT GAAGATATCA ACAGACAAAA CTACAACTGT ATAGGACATA TTTGGAGAAA ATTCTATCAA TTGATACATT TGGATGACAT CACATTTTTA AGTAATGTAA TCTGAGGCCA TTGCTGAGGA AATTAAGAAT TTTCCTTTTT TTTAACCAC CCCCAGTGAA AAGGATCAGT GTATATTTAT AGCACCTATT TTTTAGTTCT GTCTGTGTG AGGCACATCC TGCATGGGGC ACTTCTAGTC AAATAGGCAA TGATAAGGAC CTAATTAATA TGTGATAAGT GTATACTATT ACTTTAAAAG CCTTTACAGT CAGTACTTCA GTTTACAAGG CACTTTCACA GCATCTCGTT TGATCCTCAC AGTCACAACA TGTGGTAGAC AAGGCAGGTG ATTTTATCC CCATTTTACA GATAAGGAAA CAGGCTGCGG GTGGGGAGTG AGGGGAGGTA AAGATAGTTA GTTGCCTAAG GTCACACAGC CAGTAAGTAA TAGAGCTGGG ACTGGAACCC AGGTTTCCTT ACTCTCATCT ATTGCTCCTC CATATTCCTC ACTCAACCAT GAAAACATTA CTTGAAAGGA CTGATGAGGT TAACCAGAGA CCTAACTGAT ATTGTAACCT TCTATTTTAA GGAAGAATTG TGCTGTGATT TGAGTCTTT GGAGCCTCCA GTCTGCCTGT GTGTTAGACC AGCACAGCAG TGCTGTGTGA TGCAGCCTGA CTTGTGGCAG GAAAGTAGTG CTTCTGTTTT GAAGTCATGT TCTTTTGAG CCACACAGGA TCCAAATATC AGTACTATTC CTGTAGTCAA TCTGGGGTCA CATTATAGGT GCCTTATTT CCTAAGGGA ACTGATCTGA ATATCTGCAA ATAGGATGAA TCTATTTTC AGAAGTTCCA TCTTTCATT TTCTTTTTTT TTTGAGACA GAGTCTCATT CTGTCGCCA TGCTGGAGTG CAGTGGCGCG ATCTCGGCTC GCTGCAACCT CTGCCCTCCA GGTGAAGCA ATTCTCATGC CTCAGCCACC CGAGTAGCTG GGATTACAGG CATGCGCCAT CATGCCCAGC TAATTATGT ATTTTAGTA GAGTTGGAGT TTCACCATGT TGGCCAGGCT GGTCTTGGAC TCCTGACCTC AGGTCATCCA CCCGCTCAG CCTCCCAAAG TGCTGGTATT ACAGGCGTGA GCCACCGCAC CCAGCCCAT CTTTCATTT CAAAGAGAAG GGCATCTAA TAGGAAGTGG TGCCAAGAGA GAAGAAAAGA AGTGATAACA GAAGAAATGG CTAGTTACAA TATTAATAAG CTCCTCTTG AGATCTCCTC TGCAGGAATA TCAGAGACGG AGTTGAAGCG CTGGAGAGGT AATAGGTCTA GACAGTACAG AACAATAACT GGGGAGTGTG TGAGGATAGA CTGGGCTCCC CCTTGCTTGA AAGATCTCTG GCATTTAATT CTCAATTCTT GATTACTATT TTCCAGTGTA AAACAGCAC ATATGATCTG ACTACAGGAC AGAGAATTTT AAGTGAAACA TTTGCCTTAC TTGCAGTAAT AATGTGCTGT TCTTCACAGT AGCTAAGGCC CTCTATGTT CCCAGAGGTA AATAAGAATC CAGGAATGGA GGTCCATCTG TGATGAATGG CTTTTTCTA ATCAAAGTAG TATAATGCTG TTTTATCTGT TTGTCTATCT TGTTTTTTT TTTTTTTAAA AAAACAAAAC CTTAATTATA ATATAGCGCA AAGAAAGGCC AGGACTGATG CAGGGATTCC TTGGAAATAT CAGTTCCTAT CACTTTTAAA ACCTGATTTT GGATCTCTCT GTTCTATGTA TGCTTTTAGT GAGAGCACAA TACATGGCAG	
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[0132]

		AACGCTGTGC CAAATGTTAT AGGTAAGGAA TATAGAAATG AATGTTTTTT GTTGGAAGG TGTTTCATG TGATATTTTA TAAACACATT TTAATAAATC TCCATCACIT TTAGTATAG GAAGGATAGC TTTGCCTGGG AAAAACAGTT TCAACACACC TGCTCAGAGT AGCAGTTCTC CCTCAAAAAA GCAGTGTTCA GCCTGCACCTG ACTGTTCTGC TTGCCAAAAG GAGGAAGCAT GCAAGATACT TATTTCTCCA TAGATTGTGG AGTATAGAGG GATGTGGGAC TACAGATTAT TATTTTTTTT CCCCAGAGACA GAGTCTTGCT CTGTGCGCCA GGTTGGAACA CAATGGCACG ACCTCAGCTC ACTGCAACCT CTGTCTCCCG GGTTC AAGCA ATTCTCCTGC TTCAGCCTCC TGAGTAGCTG GGATTACAGG CACACACCAC CACCGCACTC AGCTAATTTT TGTATTTTAA GTAGAGGTGG GGTTTTACCA TGTTGGCCAG GCTGGTCTTA AACTCCTGAC CTGTGAATCA TCCCGCCTCG GCCTCCTAAA GTGCTAGGAT TACAGGCATG AGCCACCGCA CCCGCCCCAG ATAATTTTTA ATAGCCTTTG ATCATGGGGT GAGTGAGGGA GTAGGTATAC TTGGCAAATG CATGGTTCTC TGATTTCTAG CTCTAAAGCA GCCTTATCTG AATCCCCAAA TCTTGATGATG CTGAGTACCA TTAAGTGAACC AGTCTGCACG GTAGGCATCT GCTACCAAAA TTTACCTCCT ACCTGGTAGG TGTCATCTGA TAAGAAAGAA GACAGGTTAT TTTAATTTTT TGAGATAATC ACAGAAAATT GCAGCCCATC CTCTTTATTA CCGAATTCAA GTTTGGAAT AGACCCTTTG TTTTAAATCA TGATGGGTCT TTATCCCAAT CATTATCTG GGTCATTTT CCAACTTTGG AGTTCTAGGA AAGAACCTTG AAAACCTGAT ATGATTCTGC AGCATGAGGT CTACGGTGAC CATTGGGCA AAGCTCCAGT GGCAATCATT TATTGTGTTT TGCATTTCT GGGATTTATT GAAATAAGAA TTCCTGTGA TTATGTAGTC TTCTGGCTAG TATCAGGCAG CTCTGCTTTT AATTGGGTTA ATTTTATTTT CTCTGAAGAG GGAGAAGAGG TACAATTTAA TCTTGGCCTC CACAAGCATA TTAAAGCTCA CGTGTTAATC AGTGCATTCT TATGCTCCTA CATTAAATGC CTGGGGTAAA TGGATAAATG GACATGTGCC CAGCTTTAAT TTTTTTGGCA ACAGAAAGAT CAGACTTCCG TATGGCATCG TTGGATTTCA GAGGCTTTCT GGTGTATCTG TAAATCTGAA TGTTGCCTTC TGCCAGTCTG TATAACCAGG TGATTCTATG TGCAATGAA ATCAGGAAGC AGTAAAGTGT TAAAGCAAGA GTATTGTCCA ATTCATTGT CTTCTGATC CTGTACTTT ATTTACCGTG TCGGTGTTTA CATTACATAC TTATATTTCC TGTGAAAGAA AGAGTTAAAT AAATTGTAGC AGTTTGA	
SEP	NM_0 31475. 2	AGCGGAGCGC CAGGCAGCGC GGAGCGGAGG CCAGGCCAC AGCCGCTCCG CCTCCCGGCC CGCAGATCCC CGACGGCCGC ACCGCGGGCT CCTCTGGCCC GCAAGAACAC GTGCATGGCG TCCTGGGGAA GCGCTGAGT GCGGAGTCGC GCGCGCGCAC GCGGCACCAT GGCCCTGGAG CAGGCGCTGC AGGCGGCGCG GCAGGCGGAG CTGGACGTGC TGAGGTCGCT GCACGCCGCA	29

[0133]

	GGCCTCCTGG GGCCTCGCT GCGCGACCCG CTGGACGCGC TGCCCGTGCA CCACGCGGCC CGCGCTGGGA AGCTGCACTG TCTGCCCTTC CTGGTGGAGG AAGCCGCCCT CCCCGCCGCG GCCCCGCCCC GCAACGGGCG CACACGGGCC CACGACGCT CCGCCACCGG CCACCTCGCC TGCCTGCAGT GGCTGCTGTC GCAGGGCGGC TGCAGAGTGC AGGACAAAGA CAATTCTGGT GCCACAGTCT TGCACTTGGC TGCCCGCTTC GGCCACCCCG AGGTGGTGAA CTGGCTCTTG CATCATGGCG GTGGGGACCC CACCGCGGCC ACAGACATGG GCGCCCTGCC TATCCACTAC GCTGCCGCCA AAGGAGACTT CCCCTCCCTG AGGCTTCTCG TCGAGCACTA CCTGAGGGA GTGAATGCCC AAACCAAGAA CGGTGCCACG CCCCTGTACC TGGCGTGCCA GGAGGGCCAC CTGGAGGTGA CCCAGTACCT GGTGCAGGAA TGCGGCGCAG ACCCGCACGC GCGCGCCAC GACGGCATGA CCCCGCTGCA CGCCGCGGCG CAGATGGGCC ACAGCCAGT CATCGTGTGG TTGGTGAGCT GCACCGACGT GAGCCTGTCC GAGCAGGACA AAGACGGCGC CACCGCCATG CACTTCGCGG CGAGCCGCGG CCACACCAAG GTGCTCAGCT GGCTGCTGCT GCACGCGCGG GAGATCTCGG CTGACCTGTG GGGCGGGACC CCGCTGCACG ACGCCGCCGA GAACGGGGAG CTAGAGTGCT GCCAGATCT GGTAGTGAAC GCGCGGAGC TGGACGTCCG CGACCGGAC GGGTACACGG CCGCCGACCT GTCGGACTTC AACGGCCACA GCCACTGCAC CCGCTACCTG CGCACGGTGG AGAACCCTGAG CGTGGAGCAC CGCGTGCTTT CCCGGGATCC ATCCGCAGAG CTGGAGGCTA AGCAGCCGGA TTCAGGCATG TCCTACCCA ATACCACGGT GTCGGTCCAG CCGCTGAACT TTGACCTCAG CTCGCTACC AGCACCTCT CCAACTACGA CTCCTGCTCC TCCAGCCACT CCAGCATCAA GGGCCAGCAC CCTCCATGTG GGCTTTCCAG CGCTAGAGCT GCAGACATAC AGAGCTACAT GGACATGCTG AACC CGGAGC TGGGCCTGCC TCGGGGCAG ATTGGGAAGC CCACACCCCC ACCACCCCA CCCAGCTTCC CCCCGCCACC CCCGCCCCA GGCACCCAAC TGCCCCCACC CCCACCTGGC TACCCAGCTC CCAAGCCTCC TGTAGGACCA CAGGCAGCTG ACATCTACAT GCAGACCAAG AACAACTCC GCCACGTGGA GACAGAGGCC CTCAAGAAGG AGCTGAGCTC CTGTGACGGC CACGACGGGC TCGGAGGCA GGACTCCAGC CGCAAGCCCC GCGCTTCAG CAAGCAGCCC AGCACGGGGG ACTACTACCG GCAGCTGGGC CGCTGCCCCG GCGAGACGCT GGCCGCACGC CCGGGCATGG CGCACAGCGA GGAGGTGCGT GCCCCCAGC CCGCGCGGC CGGCTGCCC CGCCTCGGC CTGCCGCCCG CGGCTCACTC GAAGGCCCT CCGTCCCCC GCAGGCGGCG CTGCTTCTG GGAACCATGT TCCTAACGGC TGCGCCGCGG ACCCAAGGC GTCCAGGGAG CTGCCACCGC CGCCCCACC GCGCGCGCG CCCCTGCGG AGGCCGCGAG TTCGCCACCG CCGCCCCCG CTCTGCCCC CTGAGAGCGCT GGCCTGGCT GCGGGCAGCG CCGCTCTCC TCGTCCACCG GCAGACCAA GTCTTTCAAC ATGATGTCCC CGACGGGCGA CAACTCGGAG CTACTGGCTG AGATTAAGGC AGGCAAGAGC	
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[0134]

		CTGAAGCCGA CGCCCCAGAG CAAGGGGCTG ACCACAGTGT TCTCAGGCAT CGGGCAGCCG GCCTTCCAGC CCGATTCCGC GCTGCCCTTCT GTGTCACTG CACTGTCAAC AGTCCGGAGC CCCACACCGC CAGCTGCCGG GTTTCAGCCG CTGCTCAATG GAAGCTTGGT TCCCGTGCCG CCCACTACTC CTGCGCCGGG AGTGCAGCTG GACGTGGAGG CTCTCATCCC CACGCACGAT GAGCAGGGCC GGCCCATCCC CGAGTGGAAG CGCCAGGTGA TGGTGCGCAA GATGCAGCTG AAGATGCAGG AGGAGGAGGA GCAGAGGCGG AAGGAGGAGG AGGAGGAGGC CCGGTGGCC AGCATGCCCC CTGGAGGCG GGACCTCTG CGGAAGAAGC TGGAAGAAGA GAGGGAGCAG AAGCGGAAAG AGGAGGAGCG ACAGAAGCAG GAGGAGCTGC GCGGGGAGAA GGAACAGTCA GAGAAGCTGC GGACGCTGGG CTACGATGAG AGCAAGCTGG CGCCCTGGCA GCGACAGGTC ATCCTGAAGA AGGGGGACAT CGCTAAGTAC TAGAGGCCGC AGACTCCTGT CCGCAGCCTC GCAGTCCGT GGGGCCCTCC GCCCAGCCC CAGCCAGCCA GGCCCTGGTG GAAAGGCTGG GAGCCGCACA GCCCTCCCT CTGCGCTGG AAACCTCCC TGACCCCCAC CTGGCCCCC CGTATCCCCA GCCCTTGGCA AACTGGAGT GCACACGCCG CCACGGTTGC CCAGAAAAAG TGCCCAAGCT GCTGACGCAA ACAACAACAA ATGCTGCTTA TTTGCATGCC GACTTACATA TATTTGCATG TTCGTTGACT ATCAAAGAGT GCAGAGCTCT CCCCAGCCCC GTGGGTGGTG ACTTTGTTTT CTGCGGGGC TCAGCCCCCT CCAGGATGCA GCCCCTCCC CCGCACCCCG GAACCGCGT CGCTGGCGCA TCCTGGGTGG AGGCAGGCC CGAGTCCGGG GAAGGGGTTT TCCCTTCCTC TCTGACCCAG ATCTGCGCGC GGCCTAGCCC GGGCCTCATT TCTTATCCCC GCCAAGGGTT TCCTCTCAGT CATTGTGTTA CCAGAAACAT GAAAACCTGC TGTCTGGCCG GGCCGCACTT GTGGCCCCG GGACCCCAAC TCTGGCCCA CCTCCCTCAA GTCTGCGCCC CGTCCCAGC CAGACCCACT CGTGCCGGG ACCCTTTCAC TGCCCGGTG GAGTGAATAG AGGATGAGGG GCCCTGACCC TGTGTCTCCA ACTGCTGCAC CCCATCCGA CCTGTCTCC GCCACCTCGC AGCCCCATTA AAGCGCTCTC ATCTGGGCTC CGGTTCACTC A	
YWHAQ	NM_006826.3	TTGGGCGGTG GACCGCCCCT CGGCCCGGG GTAGGCTGAC ACGGGAGGGT CCTCAGCTAA AGCCAAAAGC AGATCAAAGT GGTGGGACTC GCGTCGCGC CGCGGAGACG TGAAGCTCTC GAGGCTCCTC CCGTGCGGG TCGGCGCTCG CCTCGCTCT CCTCGCCCTC CGCCCCGCC CCGGCCCGC GCCCGCCATG GAGAAGACTG AGCTGATCCA GAAGGCCAAG CTGGCCGAGC AGGCCGAGCG CTACGACGAC ATGGCCACCT GCATGAAGGC AGTGACCGAG CAGGGCGCCG AGCTGTCAA CGAGGAGCGC AACCTGCTCT CCGTGGCCTA CAAGAACGTG GTCGGGGGCC GCAGGTCCGC CTGGAGGGTC ATCTCTAGCA TCGAGCAGAA GACCGACACC TCCGACAAGA AGTTGCAGCT GATTAAGGAC TATCGGGAGA AAGTGGAGTC CGAGCTGAGA TCCATCTGCA	30

[0135]

		CCACGGTGCT GGAATTGTTG GATAAATATT TAATAGCCAA TGCAACTAAT CCAGAGAGTA AGGTCTTCTA TCTGAAAATG AAGGGTGATT ACTTCCGGTA CCTTGCTGAA GTTGCGTGTG GTGATGATCG AAAACAAACG ATAGATAATT CCCAAGGAGC TTACCAAGAG GCATTTGATA TAAGCAAGAA AGAGATGCAA CCCACACACC CAATCCGCCT GGGGCTTGCT CTTAACTTTT CTGTATTTTA CTATGAGATT CTTAATAACC CAGAGCTTGC CTGCACGCTG GCTAAAACGG CTTTIGATGA GGCCATTGCT GAACITGATA CACTGAATGA AGACTCATAC AAAGACAGCA CCCTCATCAT GCAGTTGCTT AGAGACAACC TAACACTTTG GACATCAGAC AGTGCAGGAG AAGAATGTGA TGCGGCAGAA GGGGCTGAAA ACTAAATCCA TACAGGGTGT CATCCTTCTT TCCTTCAAGA AACCTTTTTA CACATCTCCA TTCCTTATTC CACTTGGATT TCCTATAGCA AAGAAACCCA TTCATGTGTA TGGAATCAAC TGTTTATAGT CTTTTCACAC TGCAGCTTTG GGAAAACCTC ATTCCTTGAT TTGTGTTTGT CTTGGCCTTC CTGGTGTGCA GTAGTGCTGT AGAAAAGTAT TAATAGCTTC ATTTTCATATA AACATAAGTA ACTCCCAAAC ACTTATGTAG AGGACTAAAA ATGTATCTGG TATTTAAGTA ATCTGAACCA GTTCTGCAAG TGAAGTGTTT TTGTATTACT GTGAAAATAA GAAAATGTAG TTAATTACAA TTAAAGAGT ATTCCACATA ACTTCTTAAT TTCTACATTC CCTCCCTTAC TCTTCGGGGG TTTCTTTTCA GTAAGCAACT TTTCCATGCT CTTAATGTAT TCCTTTTATAG TAGGAATCCG GAAGTATTAG ATTGAATGGA AAAGCACTTG CCATCTCTGT CTAGGGGTCA CAAATTGAAA TGGCTCCTGT ATCACATACG GAGGTCTTGT GTATCTGTGG CAACAGGGAG TTTCTTATT CACTCTTTAT TTGCTGCTGT TTAAGTTGCC AACCTCCCT CCCAATAAAA ATTCATTAC ACCTCCTGCC TTGTAGTTC TGGTATTAC TTTACTATGT GATAGAACTA GCATGTTGCT GCCAGAATAC AAGCATTGCT TTTGGCAAAT TAAAGTGCAT GTCATTTCTT AATACACTAG AAAGGGGAAA TAAATTAAAG TACACAAGTC CAAGTCTAAA ACTTTAGTAC TTTTCCATGC AGATTTGTGC ACATGTGAGA GGGTGTCCAG TTTGTCTAGT GATTGTTATT TAGAGAGTTG GACCACTATT GTGTGTTGCT AATCATTGAC TGAGTCCCA AAAAAGCCTT GTGAAAATGT TATGCCCTAT GTAACAGCAG AGTAACATAA AATAAAAAGTA CATTTTATAA ACCATTTACT ATGGCTTTGT AACAAATTGCA TACCCATATT TTAAGGGACA GGTGAATTTA CACTTTCTA AAGTTTATTG ATACTTCCCT TTTATGTAAA ATGTAGTAGT GATACCTATA TTCCACATT GTGCATTGTG ACACACTTGT CTAGGGATGC CTGGAAGTGT ATAAAATGG ACTGCATTTC TTAGAGTGTT TTAATAAGA TCAGTCTCAT GGGCCATCTC TTCCTCAGAT GTAAATGATA TCTGGTTAAG TGTTATATGG AATAAAGTGG ACATTTTAAA ACTAGCAAAG TTAATAAAAAA AAAAAAAAAA AA	
VPS37A	NM_0 011451 52.1	GCAGAGGGGG CGGAGAGCGC CCCCGGGGGC GGGGCACGCA AGTGACGGCG GCGCGGGTGG TGGAGCGCTG GCGGGCCAGG CTCCCTGGCT GGCCGGTTTG GCGCTCTGGG CCGTGAAGGT	31

[0136]

	GGGACCTCCT GTTCCGGGCC GCAAGTTTCC CTCTCCAGCC GCCCCGCGTT CGTAGCATGT CCCCCAGAAC TCGGGGAGCG CAGGCAGGAC AGGCTTAGAG AAGACGCGGT CCCCAGCGCT TGGGCCACGG ACGTCCCACC CCGCTCCTCT GTCGCTGGAG AACCGCCGGG CCGAGCCACT GGGAGAAGCA GGCCAGAGCC TTCCAGGGCC TCCGGCCCGT GGACCCGAGG AGGATGAGCT GGCTTTTTCCT CCGACCAAG AGCGCCTCCT CTTCCGCGGC TGGGTCCCCC GGTGGCCTCA CCAGCCTCCA GCAGCAGAAG CAGCGCCTGA TCGAGTCCCT CCGGAACTCA CACTCCAGAT TGCTTCTCCT ACAGTTTCTC CAGGAAAAAC CAGTGATCAG TGTTTTATCCA CCAATACGAC ATCACTTAAT GGATAAACAA GGAGTGTATG TTACCTCTCC ATTAGTAAAC AATTTTACAA TGCACCTAGA TCTTGGAAAA ATTATTCAGA GTCTGTTGGA TGAGTTTGG AAGAATCCTC CAGTTTtagC TCCTACTTCA ACAGCATTTC CTTATCTATA CAGTAACCCA AGTGGGATGT CTCCTTATGC TTCTCAGGGT TTTCCATTTT TTCTCCATA TCCTCCACAA GAAGCAACAA GGAGTATCAC TTCTTTATCT GTTGCTGACA CTGTTTCTT TCACAACA AGTCATACCA CAGCCAAGCC TGCCGCTCCT TCATTTGGTG TCCTTTCAAA TCTGCCATTA CCCATTCCCA CAGTGGATGC TTCAATACCG ACAAGCCAAA ATGGTTTGG GTACAAGATG CCAGATGTCC CTGATGCATT TCCAGAACTC TCAGAACTAA GTGTGTCACA ACTCACAGAT ATGAATGAAC AAGAGGAGGT ATTACTAGAA CAGTTTCTGA CTTTGCCTCA ACTAAAAACA ATTATTACCG ACAAAGATGA CTTAGTAAAA AGTATTGAGG AACTAGCAAG AAAAAATCTC CTTTGGAGC CCAGCTTGA AGCCAAAAGA CAAACTGTTT TAGATAAGTA TGAATTACTT ACACAGATGA AGTCCACTTT CGAAAAGAAG ATGCAAAGGC AGCATGAACT TAGTGAGAGC TGTAAGTCAA GTGCCCTTCA GGCAAGATTG AAAGTAGCTG CACATGAAGC TGAGGAAGAA TCTGATAATA TTGCAGAAGA CTTCTTGGAG GGAAAGATGG AAATAGATGA TTTTCTCAGT AGCTTCATGG AAAAGAGAAC AATTTGCCAC TGTAAGAGAG CCAAGGAAGA GAAACTTCAG CAGGCGATAG CAATGCACAG CCAATTTTCT GCTCCACTAT AGATTTTCTC GGAAACATGA ACTGCCAAGA GAGGAATGGG ACACAAAACC AAACACTGTT TTATATTAT GGTTTGCAAA CTGGCATTTC ATCAGTGGCT AAATTCACAG ATATCCTATA TAGATTGTAT ACAGAACTGA GACTGATTTT GTACCGATTA GAATGATTGC TATGATCTTT GAGAAATTTT TCTGCACTAT TTGCACTGAA ATGTTTATTT ATTGTTGATA AATTGTATCA TATTTAAGTT CCACTGCTGT TCCTCTTACC TTGATTAAAT GCCTATGCAT GTACTTTTAG CTAGTTTATA ATATTTTATA AAATTCATT TAAATTTGTA TTTTAACTT GAAGTTCCAT TTCTTTATCA AGGATGGTAT TTAGATTTT TTCTCTTAA CCTTTTTTCA AAAACTATTT TCAACTGTGA GGAAACCCTT ATTTTCTTT CTTTGTGGAT AAAACTTTCA AAAGCAATTT AAGATATTCA TAGTGTAGG AAACACCAAA CCTGCCTATG TGCCATCTCA CAAAAGAAAC TTTTAATACC TACAATAAAT CAAAAGAATA	
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[0137]

	AACCAGCTGT TCTTATATAT TGTTTCATTT TAAAACTAA AGATGCATTT AAGAAGCAAT ACAAGTAAAT ATTTTACCTA ATAGGAAAAA AAAAAGTTC CTTTCATTTA AACCATTCCTA ACAGAAATTC TTATGCTAAT TAAAAACATA TATATATCTG GTAGGTTTGT GGTGGATAG GTTTTCTAAA TTCCTAATGT TAAAAACAAT CTTTATGTTA ATATACACTA AATCTATACA CAAAAAAAGT CAGTGAACCTT TTCTGACCTT TACTGTGAGT TACCTTTTCC TAAGAGGAAA GCTATAGTAA TAAGTAAAAAT TTAATTTTTA GGCAATCCTG ATTTTAAATG AATTTAATTG AGTGTTCCTG TATACTACAT TGAGCAGTTT GCTTCATAC CGTGTCAAA AATTCATGTA TTTCTTGAGA AGCCCTAAAA GCTCATAAAG GAAAAATGCCG TGAACATATGT AGCTCAGGCT TGGTAAGGTG CCATCTAAAT TACAAAACAA ACTAATGCAT AATTTTGCTT AAATTTTCATC CCAGTATGAT TGTCTTCCCA ACACCAGCAT ATAGTATAGA TTGTCTGTCT TTTTATATT TTTTAGTTCT TCCTGTACAT GTTTTGGCA ATAAAGTTAT AGGAAGAACA AAATTATTTT GTTAGAATTA AAACATGCTT AATATTTAGT CTGTTTGTGG AGGGCAGGTA TTCACGTGGA CTGAGATACA ATGTTGGATA CAGAAAATAA CTTTCATTGT CTTCCTGACA CTGTGCTAAG GACATGCTGT TAAAGCTTCA AAGTGACCAG ATGAGGAAGG AATAATTAAT TATTACTCCT GATTTGTAGA TAACTGAGGT AAGAGTGTIT CAAATTTATG ATAGTCTTTT GGGTATTGAG AAACCTTTCC TTATACTGCA CTGGCCACCA GAGCTTAATT TTCCAGCAG TTACAGCAAT GGGAGATAGA ACAGTCTCAA TCTTTTGCCA ACCATCAGGT TCCTAGAAAC CAGGTAGGTG TATCCCATAA CAAGGGAGGA GCATACCACA GCCCCTCATT TGATTAATTC ATTTGATCTA TCTATGTTAT TAAGTACCTA CTAGGAATAA GGCATTGTGG AAATACTATA CAAAGATAAA CATTGTTTAG ATGCTTATCT ACTTTCCTTT TCACCAGAAA AACAGAAAAA AAAGAAACAT TTTCTTACAG AGTAAAAATG TTCTACATAA TCACATGAGT AGTTCATCTC AGTGTTTTTT ATTCTTTAAA GTTGAACAT CCCAGTTTCA TTCTATACCA TTCATTGGAT AACCTTGTTA CAACCCAGTC ATGAAACAGA GCAGTGTGAT CAGTTATCTG CATTFAACAA ATAGACAAAT CAGTTTACAT AAAGGTTATG TATGTCACCC ACGATGAAAA GAATCTGCAT TTGAATATGC CCGTATGAAT GTGGGTTCTG TTTTGTCAAC AGAGATTAAG TGACCATTTT TTCTAATTTT ATGGCTATAT ATTTCTTCA TAAAAATTGG TCACATCGGA GAAGCAGTGC CACAGGAAAA ATGAAATGCA TGTGAAAGTT TGTATTCTGA TTTTACAAGA TGAGATAGAA ATCAGAATTA AAGAGGAATA CTTAGGAGTT ACTAGGCTAA TCAGTGTACG AATTTGTGAT AGGTAGAGAT TTAAAGGTAA ATATCTTAAA ATAGAAGAAA ATTCTAAATC AATCAATCAG TGAGATATAA ACTAAACAGA CCCACTTCAA AGTTGAAAGA AATTTCTAGG CATAAATTGA GACTAGGAAA TTTATATCAG AATAGAGGGT GCTTGACACA TATATATGCT TAAATTGAAG GACAGCTCAG ATTCATTTTT AGGAGAAGAA AGTAAACTAA TGTGCTCTTA AAGAATAAAA ATTTATTCTA	
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[0138]

		TGGTTTCTGT CTCTGATCAT CACCTTCCAT TCTATAAAAA GCTCAGTTAC TGATTTGCTG GGTATGGTC AAAATTCCTA CCTATTTATT TCATATCAAC TTAAAAAAT AAATTACTTG CATTCTATAT ATTACTAATT GGGAAAGTAAT ATGCCTCAAA TCAGTTTTAT ACTGGATTAT TCCCTATGCT TAAACCACT GCTCTCAATA AAACACTTCC TGATTAATGT TTGATTATTA GATATTTAG TCTTGTGGG GATATTTAG TCTTGTGGG TTAGCCATGC TCTGAAGAAT CTGTGAAAGT ACAGTAAAGT TTAAATAAGC AATAAATGTA ACCTTTATA TAAATCTCAG TGCTAGGTAA ACTTCTAATA AGCAGACGAA CATGTTACAT AAATTATAAT GTCTGTCTTG TAAAAAAGTT GAGGGGACTA AAAGTTTATG ACTCTGATAT GGAAGTTGTC ATATTAAAAA ACTACATTTT AAAACATCAA ATATTATAC TATTTGCTTT TCAATAAAAA GCATAGTGCT GTTTGGCATA	
PRRC2B	NM_0 13318. 3	GCAGATCGGG AGCGGTGCCG AGAAAAATTT CCTTACTAGA TGACATTTCA TCGCAATGTC CGATCGTTTG GGGCAAATTA CCAAGGGCAA GGATGGGAAA AGCAAGTACT CGACTCTCAG CCTGTTTGAT AAGTATAAAG GAAAATCAGT AGACGCGATT AGATCCTCAG TTATTCCTAG ACATGGCTTA CAGAGTCTTG GGAAAGTTGC TGCAGCCCGG CGCATGCCAC CGCCTGCAAA CCTGCCAAGC TTGAAGTCTG AAAACAAAGG AAACGACCCC AACATCGTGA TAGTACCCAA GGACGGGACG GGATGGGCAA ACAAGCAGGA TCAGCAAGAC CCAAAGAGTT CCAAGTGCAG GGCCTCTCAG CCGCCGGAGT CGTGCCGCA GCCGGGTTTG CAGAAATCTG TCTCAATTT GCAGAAACCG ACACAGTCAA TCAGTCAGGA GAATACAAAT TCAGTGCCAG GTGGACCAAA GTCATGGGCA CAGCTGAATG GAAAGCCAGT AGGACACGAA GGTGGTTTAA GGGGCTCAAG CCGACTGTTA TCCTTCTCTC CCGAGGAATT TCCGACGCTG AAAGCAGCTG GAGGGCAGGA CAAGGCTGGC AAAGAAAAGG GCGTCTTAGA TCTGTCGTAT GGGCCAGGAC CAAGCCTCCG CCTCAGAAT GTGACAAGCT GGAGGGAGGG CGGTGGGCGA CACATAATTT CTGCCACGTC TCTGAGCACC TCCCAACTG AGCTGGGCG CAGGAACTCG AGTACGGGAG ATGGAGCCCC CTCCTCGGCA TGTACCAGCG ATTCTAAGGA CCCCTCTCTC CGCCCGGCTC AGCCTGTCCG AAAAGGGGCT TCACAGTTCA TGGGAAATGT ATACCACCCA CCTACATACC ATGACATGCT TCCTGCTTTT ATGTGTTTCG CGAAGTCATC AGAAAACCAG GGTACAGTGG AACGAGGCTC TTTTCCCCTT CCTCAGCTCC GCCTTGAACC TCGAGTTCTT TTTAGACAGT TCCAGATGAA TGACCAAGAC GGAAAAGAAA ACAGGCTGGG ATTGTCTCGC CCACTCCGCC CACTAAGGCA GCTGGTGGAG CGGGCACCAC GGCCCACCAT TATCAATGCG GAAAACCTGA AGGGCCTTGA CGATCTGGAC GCCGATGCCG ATGATGGCTG GGCAGGCCTC CATGAAGAAG TGGACTATT TGAGAACTG AAGTTCAGTG ATGATGAAGA GGAGGAAGAA GTTGGAAGG ACGGCAGGCC AAAGTGAAC AGTTGGGACC CTAGGAGGCA GCGGCAGTTG TCAATGAGCT CTGCAGACAG	32

[0139]

	TGC GGACGCT AAGCGGACTC GAGAGGAAGG GAAGGACTGG GCTGAAGCAG TGGGTGCGTC CCGTGTGGTC CGAAAGGCGC CAGACCCTCA GCCACCGCCC AGGAAGCTTC ATGGCTGGGC ACCAGGCCCT GACTACCAGA AGTCATCAAT GGCAGCATG TTCCGGCAAC AGTCCATCGA GGACAAGGAG GACAAGCCCC CACC AAGGCA GAAGTTCATT CAGTCAGAGA TGTCGAGGC GGTGGAGCGA GCGCGAAAGC GCCGGGAAGA AGAGGAGCGC CGAGCCCGGG AGGAGAGGCT GGCCGCCTGT GCTGCCAAAC TCAAGCAGCT GGACCAGAAG TGTAAGCAGG CACGAAAGGC AGGTGAGGCC CGGAAGCAGG CAGAGAAGGA AGTGCCCTGG TCTCCAAGTG CTGAGAAGGC ATCTCCCCAG GAAAACGGCC CTGCTGTCCA CAAAGGCTCC CCAGAATTCC CTGCCAAGA GACCCCAACC ACATTCCAG AAGAGGCACC CACAGTGTCC CCAGCAGTGG CACAGAGCAA CAGCAGTGAG GAAGAGGCCA GAGAGGCTGG GTCCCCTGCA CAGGAGTTCA AGTATCAGAA GTCCCTTCTT CCCCATTCC AGCGCCAGCA GCAGCAACAA CAGCAGGAGC AGCTGTACAA GATGCAGCAC TGGCAGCCGG TGTACCCCCC GCCGTCCAC CCCCAGCGCA CCTTTTACCC ACACCACCCC CAGATGTTGG GCTTCGATCC CAGGTGGATG ATGATGCCTT CCTACATGGA CCCACGTATC ACGCCCACTC GGACCCCGGT GGACTTCTAC CCCTCCGCCC TGCATCCCTC AGGACTGATG AAGCCCATGA TGCCCCAGGA GTCCTCAAT GGGACAGGCT GTCGCTCTGA GGATCAGAAC TGTGTGCCCC CACTCCAAGA AAGAAAAGTG ACCCCCATCG ACTCACCCCC TGTGTGGAGC CCAGAGGGCT ACATGGCACT GCAGAGCAAG GGCTACCCGC TCCCGCACCC GAAGTCGAGT GACACCTTGG CTATGGACAT GCGTGTCAAG AATGAAAGCT CTTTCTCTGC CTCACTCGGA AGGGCAGGGG GCGTAAGTGC TCAGCGCGAT CTCTTTGAGG AGAGAGGGGA GGAGTACTTG AGTGCTTTTG ACAAGAAGGC CCAAGCAGAC TTGACAGCT GTATCTCTTC TCAAAGAATA GGCCAGGAGC TTTTGTTC ACCCCAAGAA AATGTTCAAG ATGCAGGTGC TCCTGGGGGT CACACCCAAA ACCTCAGGTG TTCCCATTG GAGCCTGACT TTGTCCCAGA TGAGAAAAAG CCAGAGTGTG GCAGTTGGGA TGTTAGCCAC CAGCCAGAGA CCGCTGACAC AGCCCCATGG GTTGAGCGGG AGACACCCCG GGAGGGGACG GCCTTTAACA TCTCCTCTG GGACAAGAAC GGGAGCCCCA ACAAACAGCC ATCCTCGGAG CCTGAATGGA CTCCCGAGCC CCGGAGCTCC AGCAGCCAGC ACCCGGAGCA GACGGGCAGG ACCCGGAGGT CGGGACCCAT CAAGAAACCA GTCCTGAAAG CCTCAAGGT GGAAGACAAG GAGAAGGAGC TTGAGAAGAT TAAGCAGGAG CTAGGGGAGG AGAGTACCCG GCTGGCCAAG GAGAAGGAGC AGAGCCCCAC GGCAGAAAAAG GATGAGGACG AAGAGAACGA TGCCTCTCTG GCCAACTCCT CCACCACCAC TTTGGAGGAC AAAGGCCCTG GCCATGCCAC TTTTGCCGC GAGGCCACCA AATTTGAAGA GGAGGAGAAA CCTGACAAGG CCTGGGAAGC CAGACCCCA CGAGAGTCCA GCGATGTTCC CCCCATGAAG AGAAATAACT GGATCTTTAT TGATGAGGAG CAAGCCTTTG GGGTCAGAGG	
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[0140]

	ACAGGCCCGG GGCCGGGGCC GTGGTTTCAG AGAGTTCAC TTTCGTGGTC GGCTGCTGG CGGAAATGGG AGCGGCCTCT GTGGTGGGGG GTCTCTGGGG GCCCGCAGCA TCTACTGCAG CAGTCAGCGC AGCGGCCGTG GCCGGGGCCT GCGAGAGTTT GCGCGGCCAG AGGACTGCCC CAGAGCCAAG CCCCAGCGGA GAGTTGCCAG TGAGACCCAT AGCGAGGGCT CAGAGTATGA AGAACTTCCC AAGCGCCGCC GGCAGAGGGG CTCCGAGAAC GGGAATGAAG GCTCGCTCCT GGAGAGGGAG GAGAGCACCT TGAAGAAGGG CGACTGCAGA GATTCTTGGC GGTCCAACAA GGGGTGCTCT GAGGACCACA GCGGTCTAGA TGCCAAGAGC CGAGGCCCTC GGGCCTTTGG GCGAGCCCTC CCTCCCCGGC TGAGCAATTG CGGGTATGGA CGGAGAACCT TCGTCTCAA AGAGTACCCC CACTGGCAGA GCAAAAGTCC AGGCAGCTCT TGGCAGGAAT ATGGCCCTTC CGACACATGC GGATCCCGGC GACCTACAGA CAGAGACTAT GTCCAGATT CCTACAGACA CCCTGACGCA TTTGGTGGCC GGGGCTTTGA GGACAGCCGC GCGGAGGACA AGAGATCCTT CTCCAAGAT GAACACGTGG CAGATTCTGA AAATGCAGAG AACCGGCCCT TCAGGAGAAG GCGCCCCCA CGCCAAGATA AGCCCCCTCG ATTCCGGCGC CTCCGCAAG AGCGGGAGTC CCTGGGCTTG TGGGGACCCG AGGAGGAGCC CCACCTGCTG GCAAGTCAGT GGCCAGGCAG GCCCCAACTG TGTTCTGGGG ACAAGAGTGG CACTGTGGGC CGCAGGTCCC CTGAGCTCTC CTACCAGAAC TCCTCCGATC ACGCCAATGA GGAGTGGGAG ACGGCCTCCG AAAGCAGCGA CTTCAGCGAG CGGCGGGAGC GCGGGGAAGG CCCTGGGTCC GAGCCCGACT CCCAGGTGGA TGGTGGCCTG TCGGGGGCTA GTTTGGGTGA GAAGAAGGAG CTGGCCAAGA GGAGCTTCTC CAGTCAGAGA CCCGTGGTTG ACAGACAGAG CCGAAAGCTG GAGCCGGGAG GGTTTGGGGA GAAGCCCGTT AGGCCAGGTG GTGGTGACAC CTCCCCTCGC TATGAGAGCC AACAGAATGG GACGCCTTTG AAAGTGAAAA GATCCCCAGA CGAGGCCTTG CCTGGAGGTC TTAGTGGCTG CAGCAGTGGG AGTGGCCACT CCCCCTATGC CCTGGAGCGG GCAGCCCATG CCAGTGCTGA CCTTCCCGAA GCCTCCAGTA AAAAGGCAGA GAAGGAGGCC AAGTTGGCTG CTCCGAGGGC AGGTGAACAG GGAGAGGCCA TGAAACAGTT TGACCTGAAC TATGGAAGTG CCATCATTGA AAATTGCGGG TCCAGCCCCG GGGAGGAGAG TGAGGTGGGT TCTATGGTGG GCGAAGGCTT CATCGAAGTC CTGACCAAGA AGCAGCGCCG CTGCTGGAG GAAGAGAGAA GAAAGAAGGA GCAGGCCGTG CAGGTGCCTG TCAAAGGTCG AGGCCTTTCC TCCCGTATTG CTCCTCGATT TGCAAAAAAG CAGAACAACT TATGTCTGGA GCAAGGTGAC GTGACCGTGC CTGGCAGCAG CCTGGGCACT GAGATCTGGG AGAGCAGCAG CCAGGCTCTC CCTGTGCAGG CCCAGCCAA CGACTCCTGG AGGAAAGCTG TCACTGCCTT CAGCAGCACC GAGACTGGCT CTGCGGAGCA GGGTTTTAAG AGCAGCCAGG GAGATAGTGG CGTTGACTTG AGTGCCGAGT CTCGGGAGTC GTCTGCGACC TCCTCGCAGC GCAGCTCCCC ATATGGGACT CTGAAGCCAG AGGAGATGAG	
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[0141]

	CGGGCCCCGGC CTGGCGGAAC CCAAGGCCGA CAGCCACAAG GAGCAGGCTC CAAAGCCATC TGAGCAGAAG GATTACAGAAC AAGGCTCTGG ACAGAGCAAG GAGCACAGAC CAGGACCCAT CGGCAACGAG CGTTCTCTGA AAAACAGAAA GGGCTCGGAG GGGGCCGAGC GGCTGCAAGG GGCTGTCTGC CCGCCTGTTA ACGGGGTGGA GATTACGTG GACTCCGTGC TGCCTGTGCC ACCCATTGAA TTGGAGTCA GTCCAAAAGA CTCCGATTTC AGCTTGCCAC CTGGTTCTGC CTCTGGTCTT ACTGGGAGTC CAGTTGTAA ACTTCAGGAT GCCTTGGCCA GTAATGCAGG GTAAACACAG AGTATCCCCA TCCTGCGGCG GGACCATCAC ATCCAGAGGG CCATCGGTCT CTCCCAATG TCCTTCCCA CCGCCACCT TACTCTGAAG ATGGAGTCTG CGCGCAAGGC TTGGGAAAAC TCCCCAGTT TGCCGGAGCA GAGCTCTCCA GGCGGCGCTG GCTCAGGCAT CCAGCCTCCA TCCTCTGTGG GTGCCTCCAG CGGGGTCAAC TACAGCTCCT TCGGTGGAGT GTCCATGCCA CCCATGCCCTG TGGCCTCTGT AGCACCTTCT GCTTCTATGC CAGGCAGCCA CCTCCCGCCC CTGTACCTGG ATGGCCATGT GTTTGCAAGT CAGCCCCGGC TGGTTCTCA AACGATACCT CAGCAGCAGA GTTACCAACA GGCCGCGGCT GCCCCAGCA TCCCGATCTC CCTTCACACA TCTCTGCAGG CACAAGCTCA GCTTGGACTG AGGGGTGGGC TTCTGTGTG CCAGTCCAG GAGATCTTCA GCTCCTGCA GCCCTTCA TCTCAGGTGT ACATGCACCC CAGCCTGTCA CCGCCAGCA CCATGATCCT CTCTGGGGC ACAGCCTTGA AGCCTCCATA CTCGGCGTTC CCAGGCATGC AGCCCTTGA GATGGTGAAG CCGAGTCTG GCTCACCCTA CCAGCCCATG AGCGGGAACC AAGCCCTGGT CTACGAGGGC CAGCTCAGCC AGGCTGCTGG CCTGGGTGCC TCCCAGATGT TGGACTCCA GCTCCACAG CTGACCATGC CACTGCCTCG GTACGGCTCC GGGCAGCAGC CACTGATCCT GCCCAGTCT ATTACGTGC CACCTGGGCA GAGCCTCTCC GTTGGGGCCC CCCGAAGGAT TCCTCCGCCC GGGTCCAGC CGCCAGTCCT GAACACCAGC AGAGAGCCCT CTCAGATGGA GATGAAAGGC TTCCACTTTG CCGACAGTAA ACAGAATGTC CTTTCAGGAG GCCCCGTGCC ATCGCCACAG ACCTACAGGC CTAGCTCTGC TAGCCCCAGT GGGAAAGCCCT CTGGATCAGC AGTTAACATG GGCTCTGTGC AGGGACACTA CGTGCAACAG GCAAAACAAC GAGTGGATGA GAAACCCAGC CTGGGAGCCG TGAAGCTGCA GGAGGCCCCC TCGGTGCTCT CCCAGATGAA GCGAACCAGG GCGATCAAGC CTCGGGCTGT CAAAGTGGAG GAGAGTAAGG CCTGACAGTG CCTGGCTGCC ACCTCGCCTC TCCCTACTGA GGACGGTGCC GCCATGCGGC CTCGACACAG CCGACACTCG GGAGCCTCAC CAGATCCACC GTCCAAATGC GTGGCCCACTGAGAGACC TCCCTCCTCT CCACTCCCGA AAGCTCCGTT GTCAACCAGC TTGCACCCGT GGATATATGG CATTGACCCG CTGCTTTGA TACGAAACAA AAAAGCAGAC GACTCCTTCA TCCCATCTGC TCCTACCGTG ACTGTGGAGT GACGCCTCCT GTGCAGTGCA GATTIGCCCT CCCTGCCTCC TCCCTGTCTT GCCGCGCAGC CAGGGCGCCT	
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[0142]

	TCTCAGCAGT GCTTCCGGCC CAGCCGCCA TCCCTAGGCA CAGTGATTG GCAGCAGGGT CATTTTACTT TGAGGCTTTT TGTTTTAAAA TGAGCCAAG GTTTTTACAA AGGGGAAAGG AAAAGAAAAC AAAAACGCAA GCTCCATGTG TATAGCTGAA CTTTTATATG TTTCTTGCCA GCCCTCCGC TCCCTTCCAT CTCTAGCCTC TGTCTGTIT AGTTTGATAC GTCATGCGAG TACCTTAAGA GGTGACTCTT AAGAATGCAT CCCCTCCTGA TTCCTCAGCT GGTTCACCCT TGAGGTTATT TGCAAAAAGA AAAGGAGGTT CTTGAGGGCA CCGATTGCGA GCATTCTGGT GCCTGGCTCC CCGCTGGGA AGCGATGGGG TGCTCAGAGC AGCAGGCAGG TTGGGGGAGG GGGGGGGTCA TAGTTGGGTT CCAGCTCCTG GCTTGATGAG CCCAGGGCGC TTACAGGCAG CCCATGAAGT TGATGACAGT TTTAGCATGA GAATCACACA GGGTCCCTGT CTGGGGTCC TCTAAAGCCA GTGGATGTGC TGGGCACCAG AGACAAATCA TGGAGATGGC TGCTGGTGGC TCCCAGGTTG GCCCAGATGG GGTGAGCTGA CATAACACAG GCCCCATCCA GGCCCCGTGG GCTCTGCTTC TGGGGCTCCA TACCTGCCC TGCAGGGGTG CTGTGTTTTT CACACATTTT TTTCCTGAA GCCTTCTGTA ACCTGTCATT TTCCTTCTT CCTCTTCCGG AGCTGCTGC TTTCTCTGGA CCTGTCTCCA CCTCCACAC AGCTCATCGT GAACACCACT TGGTGATGGA GGGAGTGGAC CCGTGTGTGG TCCCAAGTG AGGCCACTGG GAGTTTGTC TTTTCTCTT TTGCTTCACT CCCAGCAGCA GACCCAGGTT GTCAAGACAG GAGGGCCTGA GCTAAGCAGT AGGCATCAGT CTCGTTTGTG TTCAGACGGC GGGGGCAGGT CCAGGGTGAG GCTGGGTGGA GGGCTGACCA AGGTCCAAAG GGCCTGCGCA GCCTCCGGGA GGGCAGCTTC TCCAGCCAGA GGCTTGTTG AGCCATCGTG TGCTGGGCTT GTTTTTAAGT AAGAAACAAG GAAATCACTC CAGATTCTGT CATTCCAAGG AAAGGGAAGG GGACAGTTCA GGTTTCTCAG CTGTTCTTAG GGGTCACTGA GCGTCTACCT CCTCTCCAG AGGAGGCTGG CTCAGAACAC CTAGAGGAGG GGGCCGGGGA TGCACCCCC ACCAGAGGCT GCCTTCAGCG TCTACGGGT GCAGGACAGC GCTCAGGCTT GGGCTCTAAG CTCTGTGTCT AGTGTAAGAC ATGGGGAAAG AGCATCTTAG GAACTGCTGA AGTAACCTCT TACTGCTCTC ACAATTCTAA GGAAGCGGGA GAACGGCCTC CTACCAACAG CGCCACCCC AGAGCTGCCT GGGAAAGGGC AGTTTTACTG AAAGGTGCTT TACTGTTTAC CTGCATCTTT CAGCAGCTCC CCTCTGCCC TCACCTGGTC TTTTCCCTCT TTATCCCAAG CCTTTATGCT TGAGTCCCTT CCCCAGGGG TGCCACCCG ACAGTTCCAG GCATTCCCTA CCTGAGCTTC TTGTCTGCTT TTTCTTCTCC CACTGCAAGC GGCTGCTTGT GGGGCCTGGG ATGAGCCCTC TCTGTCCCA CCGGCCCTCC TTGCCAAGCC ATTCTGGGT GAGTTCAGGC CTGCGGGAGC CACACATTCA TCTCCACCTG GACACTTGAG CCGCATGGCC AGACCCCTCC CACCTGATGC GGTGGTGGT GTGATTTGTC AAAAGAAAGC CTTCTGGATG CTGTTAAGAT GTACCCCTCA GGTGAACCTG GTATCAGACC CACAGTACTT GCTGTTTGAG	
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[0143]

	AAAAAATAAA AACAAAAAGG TCACCTGTTT TCCAGCCCTT TTCTCTTACC TGGTATTTC TTCTTTCTC CTCCCCACC CCAAATAAAA AAACAAAAAA CACTAGAATT TATTTATATG TATTGATGTT GTAGGTCTAG GTGAAAAAAA AAGAAGTAAA TGTTTCACTG CTCTATTAT ATATAATGTC TGAATTAATT CTGTGCAGGA AAGGCCAGGA AATTGCATGT GAAGTTCGGT GCAGTCACCA CCTGTGTGTG ACCTGAGCTG CAGTCTCTTC GCTGAGATGC AGGTTTAAA TGAGACTTGG GGGGCTGAGG GCAGGCCTCA GGCCTCCCAG CGCCCCAACC CCTCTTGGT CTAATGAAAT GCAGTTCTTA GTGCAGAGAT GTTTTAAGGT GCAATATATC TCTTCTTTC CCGTGGTTTT AGAGCCAAGC TCAAGGTAGT AGGACGTAGG GTCTTATTTT GTTTTCAAA CCCCATCCTC AGAGCGCAGA TACATGCAGA GGCTTCTGCC AGGATACCAC GGGGCCTTAG TGGGAACAGG TGGAGACCAG CACTTCCCTT TCCTGCTGCT GAGGTAGGGA TTGGGGGGTC AGAACCCACT CACTTTTGCC TGTTAAAGTT GCCCTCTGA CGCTGGCAGC TCTGCCTTGG TCACTGGGGA TGGGGCTCGT TGCTCAGCCA CCAGTGGCCT TGGGGTATTG TCCACCATCC ACTAGAGTGG GATGAAGTCC AGAGTGTGGG TATACATCTC AGATGCCCAT CTACCCACTG GGGACTTCAA TGCCAGCTGC ATTGGTTTG GTTTTCTTAA CTGTTGGCTT CTCCCCACAG CGTTTTTGT TTTTTTTTAA ACATTCATAT TGTTTTCAA CTTGGAAATC ATAGACACTG TGGCTCTAGG TTCTTAAAG GGGAAAACAA AAGATGACTT TATTTCAT TCAAGAAAAT CAGTTCAGTT CCAAAGCTGT GGTCTTCCA GCCACTTCTA GGGACACTGG GGAACCTTGT TAAACGTTGA CATCAGTGCT CTCCAGCCGT GCTGTCACCC TCCTATCTTC TGGATCTGCC TTCGCGATGG TCAGTGACAG CTCTGGAAG CTGAGCACAC ACAGGTGCAC AGCCATGCTG TGGTCTGGCC TGCTACGGCA GCATGGCAGC TCTGGTGGAG CTTTCTCCCT TGCCATTGG TTCCCTGTG CCAAGTAGCT GCAGGCTGCC CTCAAATCT TCATTTGTCC CTTTCACTT CTGCGAAGC AAGCCTGGGT TAGAGGGTCT GCTGGAATG GCCTTTGAAG ACCAAGGATA CCAGGATGTG TGCACCTCTG CGTGTCTGT GATGAATGGG AAACGTAGGC TTCCAGAAAG CCAGCTCTCT TCTGAAATGT GACGGACCTA AGCAGGAAGT CATCCAGGAC AGGAGTGGCT CAGTGTGGG GATGGACGCT GTCGCCAGC CATGCTCCAC CAGGGCCACC AATGTGTAGT TGGCTGGTGG TCTTCGGGCA TGTGAGACCT GCTTCTACT GTTTCCACCC CACTGGTGG CCTCCAGGAT GGTAGTGGCA CCCTCAGAGC CCCATCTTCA GCATGTTCTG AAGCCTCAGA GTGGAAATTC CTGCTAAGGC TCTGTGTGGA CGCCTTCTC CCGTGATCTA AAGGGGACAC TGTACTCAAG CTTTGGACCT CATGCCTTGT GTAGTAAAA AGGATTGGG GGTGTGTGT GTTCTCTGAG AGGGTTGTGT TTGTGTGTG TTTCTTTTG TTTATGTTTT GGCCTTCTCT CTTTGTCTT CCATGTAGAC CAGATATTTT AAAGGGCAGA CGATGGCTAG AGGTGTAATG TGCAGCTTGT TTATACGGTA TTTTGGGAAA CTACCTTGG ATGGGAAATC GAATCGTGGA	
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[0144]

		TTCAACCAGGC CGGTGCTGGC AACTCACC TCGCCCTTTC CCTCCGGTTC AGTACCTATT GTTCTCCTT TCAATATATG GATTGTAATA GCTCTTTCCA TATGAAAGAA TTCTCCTTAT TTAAATAAAA AAAGTTTAAA AA	
DOPEY2	NM_0 05128. 3	TCCCACAGTG CCTGGCCAG AAGCCTTGCT AAATATTTGA ACAGGATTGC CCAATACTTT TCTGCTGTGA GAATGTAAGA TGGATCCAGA AGAGCAGGAG CTCTTAAATG ATTACAGATA CAGAAAGCTAC TCTTCAGTGA TTGAAAAGGC TTGAGAAAAT TTTGAGTCCT CGAGTGAATG GGCGGATCTC ATATCTTCAC TTGGCAAACT CAACAAGGCT CTTCAGAGTA ACCTGAGGTA CTCCTTGTG CCAAGACGGC TCCTCATCAG CAAAAGATTA GCTCAGTGTT TGCACCTGC CCTGCCAGT GGTGTCCACT TAAAAGCTCT GGAACCTAC GAGATTATCT TAAAAATCGT GGGGACCAAA TGGCTGGCCA AGGACTTGTT TCTGTACAGC TGCGGGTTAT TTCCTCTCCT GGCACACGCG GCGGTGTGG TGAGGCCGGT GCTGCTACC CTGTACGAGA AGTACTTCCT CCCACTGCAG AAGCTGCTCC TGCCAGTCT GCAGGCCTTC ATCGTGGGCC TGCTGCCCGG CCTGAAGAG GGCTCCGAGA TCTCCGACAG AACGGATGCT CTGCTCTGA GACTGTGCT GGTGGTTGGC AAAGAGGTGT TTTACACCGC CCTCTGGGG AGCGTCTGG CCAGCCCGTC CATCCGCTC CCTGCCTCAG TCTCGTGGT GGGCCACATC AACAGGGATG CCCCAGGCG GGAGCAGAAG TACATGCTGG GGACCAATCA CCAACTCAG GTGAAGTCTT TGCCTGCTC CTGTTGGAG TCAAAATGTT TTGTGCAAAG AAATAATCTG GAAATCGTTC TGTTTTCTT CCCATTTTAT ACCTGCTGG ATTCCAATGA GAGAGCCATC CCCCCTCTCA GATCTGACAT CGTGGCATT CTCTCAGCCG CCACCCAGAC CTAATGAGA AGGGACATGT CCCTGAACAG AAGACTGTAT GCATGGTTAC TAGGCTCAGA CATAAAAGGA AATACCGTTG TGCCAGAATC TGAATCTCA AATTCTTATG AAGACCAGTC GTCTTATTT TTTGAAAAAT ACTCCAAGGA TCTTTAGTT GAGGGTTGG CTGAGATATT GCATCAGAAG TTCATAGATG CTGACGTGGA GGAACGCCAT CATGCATACC TGAAAGCCTT TCGCGTCTC ATCAGTCTGC TTGACAAGCC AGAAATAGGG CCTCAAGTGG TTGGGAATTT GTTCTCGAA GTCATCAGGG CCTTTTATTC TTAATGAGA GATGCCCTTG GCTCTGATCT TAAACTTAGC TACACCCAGA GTGGAAATTC GCTGATAAGT GCAATCAAGG AAAACAGAAA TGCCTCTGAG ATTGTCAAAA CGGTAAATTT GCTGATAACT TCTCTAAGCA CAGACTTTCT CTGGGATTAT ATGACAAGGT GTTTTGAGGA ATGCTTTAGA CCAGTGAAGC AGCGTTACAG CGTGAGGAAC AGCGTCAGCC CTCCCCCAC GGTCTCGGAG CTCTGCGCCC TCCTGGTCTT CTGCTGGAT GTCATTCCTT TGGAACCTTA CTCTGAGGTG CAAACCCAGT ATCTCCCTCA GGTGCTCGGC TGCTGGTGC AGCCTCTTGC TGAGGACATG GAGGCCTTAA GTTTACCTGA ACTCAGCAT GCCTGAAGA CGTGTTCCTCA	33

[0145]

	GGTGCTCAGC AAAGTCCAGA TGCCTCCTTC CTACCTCGAC ACGGAGTCCA CCAGCGGAAC CTCGAGTCCA GTAAAAGGTG AAAACGGCAA AATAATTTTG GAAACAAAGG CAGTGATTCC CGGTGACGAA GATGCTTCGT TTCCCCCTCT GAAGTCTGAG GACAGTGGGA TCGGGCTCAG TGCCTCGTCA CCGGAGCTCT CTGAGCACTT GAGGGTTCCT CGAGTTTCTC TGGAAAGGGA CGACGTTTGG AAGAAGGGCG GGAGCATGCA GAGGACGTTT CTTTGCATCC AAGAGCTAAT CGCCAACTTT GCCAGCAAGA ACATTTTTGG AGTACAGCTG ACAGCGTCAG GAGAAGAAAG CAAGTCCGAG GAGCCTGCAG GGAAGAGGGA CAGGGATGGG ACGCAGAGCC TGGCAGCAA TGATTCCAGC AGGAAGAACT CTTGGGAGCC CAAGCCCATC ACTGTGCCTC AGTICAAGCA GATGCTGTCA GACTTGTTCA CAGCACGAGG GTCTCCATTC AAGACAAAAA GTTCAGAGTC ACCATCGTCT TCGCCAGCA GCCCTGCCAG GAAAAACGGG GGAGAATGGG ATGTTGAGAA GGTGTGTCATT GACCTGGGGG GTTCCAGGGA GGAACGCAGG GAGGCCTTTG CCGCCGCTG CCACCTGCTG CTGGATTGTG CCACTTTCCC TGTCTACCTG TCCGAGGAAG AGACCGAGCA GCTCTGTGCA ACGCTCTTCC AGCTGCCAGG AGCCGGTGAT TCCAGTTTTC CATCTTGGCT GAAGTCCCTC ATGACTATTT GCTGCTGTGT GACTGACTGC TACCTCCAGA ACGTGGCCAT TTCCACTCTG CTGGAAGTGA TAAACCATT CAGTCCCTG GCGCTGTGCA TTGAAGACAA GATGAAACGC TATAAGAGCT CTGGACACAA CCCTTTTTTT GGCAAGCTGC AGATGGTGAC GGTTCTCTCC ATTGCTCCAG GGATATTGAA AGTCATTGCA GAGAAAACAG ATTTCTATCA GAGGGTGGCT CGTGTGCTTT GGAATCAGCT GAACAAAGAG ACCCGGGAGC ATCACGTCAC CTGCGTAGAA TTGTTCTACC GGCTGCACTG CCTGGCCCCC ACGGCCAACA TCTGCGAGGA CATCATCTGC CATGCCCTCC TGGACCCTGA CAAGGGAACA AGGCTGGAAG CTCTGTTTAG ATTTTCCGTG ATCTGGCATC TGACAAGAGA GATCCAAGGC AGTCAGTAA CATCTCACA TCGCTCCTTT GATAGGTCCT TGTTTGTCGT GCTGGACAGC CTGGCCTGCA CGGATGGTGC CATCGGTGCG GCAGCCCAGG GCTGGCTGGT GCGTGCGCTC TCCCTCGGGG ACGTGGCTCG CATCCTCGAA CCCGTGCTCC TGCTGCTGCT GCAGCCAAAA ACCCAGAGAA CCTCCATCCA CTGCCTCAAG CAGGAGAACT CGGCCGATGA CTTGCACCGT TGGTTTAACA GGAAGAAAAC CTCTTTCAGA GAGGCATGCG CAGTGCCCGA GCCTCAGGAG AGCGGGCTCTG AAGAGCACCT GCCTCTGAGC CAGTTCACCA CAGTGGACCG TGAAGCCATT TGGGCCGAAG TGGAGAAGGA GCCCGAGAAG TACCCGCTGC GAGGCGAGCT GAGCGAGGAA GAGCTGCCCT ACTACGTGGA GCTTCCAGAC AGGACGGCCC ACGGCGCCCC GGACAGCAGC GAGCACACCG AGTCTGCAGA TACAAGCTCC TGCCACACGG ACAGCGAGAA CACGTCCTCC TTCTCCTCCC CTTCACACGA CCTGCAGGAG CTGAGCAACG AAGAGAATCG CTGTGCACCC ATCCCCATGG GGGGCAGGGC GTACCCCAAG CGCTCGGCCC TGCTGGCGGC CTTCAGTCA GAAAGCTTCA AGGCTGGGGC	
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[0146]

	CAAGTTAAGC CTGGTGCGGG TGGACTCGGA CAAGACGCAG GCTTCTGAGT CGTTCTCCAG CGACGAGGAG GCGGACTTGG AGCTCCAGGC CCTCACCACA TCCAGGCTGC TAAAGCAGCA GCGGGAAAGG CAGGAGGCCG TCGAGGCCTT GTTCAAGCAC ATCCTGCTCT ACCTGCAGCC CTACGACTCT CGGCGGGTCC TCTATGCCTT CTCGGTGCTG GAGGCTGTGC TCAAAACCAA CCCTAAGGAA TTCATCGAGG CTGTGTCCAG GACTAGCATG GATACCAGCT CCACCGCGCA CCTCAACCTC ATCTCCAACC TCCTCGCTCG CCACCAGGAG GCCCTCATTG GCCAGAGTTT CTACGGAAAG CTCCAGACCC AGGTCCCCAA CGTGTGCCCC CACTCTCTGC TCCTGGAGCT GCTCACCTAC CTCTGCCTGA GCTTCCTGCG CTCTACTAC CTGTGCTATT TGAAGGTCTC GCACCGAGAC ATTCTCGGCA ACCGGGACGT GCAGGTCAAA AGTGTGAGG TTTTGATCAG GATAATGATG CAGCTGGTCT CAGTGGCCAA GTCTTCGGAA GGAAGAAGC TGGAGTTCAT CCACAGCTTG CTGCAGAGGT GCAAAGTCA GGAGTTTGTC CTGCTCTCCC TGTCGGCGTC CATGTACACG AGCCAGAAGC GCTACGGGCT GGCCACCGCC CACCACGGCA GGGCCCTGCC AGAGGACAGC CTCTTGAGG AGAGTCTCAT TAACTTGGGT CAGGACCAGA TCTGGAGTGA GCACCCGCTG CAGATTGAGC TGCTGAAGCT GCTGCAGGTG CTGATTGTCT TGAACACCA CCTGGGTCGG GCCCATGAGG AGGCGGAAAA CCAGCCCGAC CTGTCCCGGG AGTGGCAGAG AGCCCTGAAC TTCCAGCAGG CCATCAGCGC CTTGCAGTAC GTGCAGCCCC ACCCCCTCAC CTCCAGGGT CTTCTGGTCT CTGCGGTGGT GAGGGGTCTG CAGCCCGCCT ACGGTTACGG CATGCATCCG GCCTGGGTGA GCTTGGTCAC GCATTCTTG CCCTACTTCG GAAAGTCCCT GGGCTGGACG GTGACACCCT TGTGTGTCCA GATTGTCAAA AACTTGGATG ACTTGGTCAA GCAGTATGAA AGCGAATCTG TGAAGCTCTC TGTCAGCACA ACCTCCAAGA GGGAAAACAT TTCTCCAGAT TATCCACTCA CCCTTCTAGA AGGTCTAACG ACCATTAGTC ATTTTGTCT TTTGGAACAA GCCAACCAAA ACAAAAAGAC CATGGCTGCA GGTGATCCTG CCAACTTGAG GAATGCCAGA AATGCCATT TGAAGAGCT GCCTCGAACT GTAAACACCA TGGCCCTTCT CTGAATGTT CTCAGAAAGG AGGAGACTCA AAAGAGACCT GTCGATCTCC TAGGGGCCAC GAAGGGATCC TCTTCCGTTT ACTTTAAAAC CACCAAAACC ATAAGACAAA AAATTTTGA CTTCTTAAAC CCCTTGACGG CCCATCTTGG GGTTCAGTIG ACAGCGGCTG TTGCGGCAGT GTGGAGCAGA AAGAAAGCCC AGCGTCACAG TAAGATGAAG ATTATCCCAA CGGCAAGTGC ATCCAGCTA ACCCTTGTG ACTTGGTGTG TGCACTCAGC ACCCTGCAGA CTGACACGCT GCTGCACCTG GTGAAGGAGG TGGTGAAGAG GCCACCCAA GTCAAAGGGG GTGATGAGAA ATCGCCCCTA GTGGACATT CTGTGTTGCA GTTTTGCTAT GCTTTTCTCC AAAGGCTCCC AGTACCAGCC TTGCAAGAGA ACTTTTCTT ACTGTTGGGA GTATTGAAAG AGTCTGTACA GTTGAATCTA GCCCCACCTG GGTATTTTCT GCTTCTCAGC ATGCTGAATG ACTTTGTAAC	
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[0147]

	AAGAACTCCC AACCTGGAAA ACAAGAAGGA CCAAAAAGAC CTGCAGGAAA TCACTCAGAA AATCCTAGAA GCTGTGGGA ACATTGCCGG CTCTTCTTG GAGCAAACCA GCTGGCTAAG CAGAAACCTG GAAGTGAAGG CCCAACCTCA GGCCTCTCTA GAAGAACTCTG ATGCTGAGGA GGACCTGTAT GATGCTGCTG CAGCTTCAGC AATGGTGTCT TCATCCGCC CGTCGGTGTA CAGCGTGCAA GCCCTCTCTC TCCTGGCAGA GGTACTGGCT TCCCTCCTGG ACATGGTTTA TCGAAGTGAT GAGAAGGAGA AAGCTGTGCC GTTAATCTCC CGTCTGCTTT ACTATGTTTT TCCATACTTA CGCAACCACA GTGCCTACAA TGCTCCCAGC TTCCGGGCTG GCGCTCAGCT GCTGAGCTCC CTGAGTGGCT ATGCCTACAC AAAGCGAGCC TGGAGGAAGG AGGTCCTGGA GCTGTTTCTC GACCCCGCTT TCTTTCAGAT GGATACTTCC TGTGTTTCATT GGAAGTCCAT TATTGACCAT CTTTGGACTC ATGAGAAAAAC AATGTTTAAAG GATTTAATGA ACATGCAGAG CAGTCTTTTG AAATATTCT CAAGTTTGA ACAGAAAGCC ATGCTGTAA AGCGCCAGGC TTTTGCTGTC TTCAGTGGAG AACTTGATCA ATACCACCTT TACCTCCAC TGATACAAGA ACGCTGACA GACAATCTCA GAGTTGGACA GACATCCATA GTTGCTGCTC AGATGTTTCT TTTTTCAGA GTTTTGCTGC TAAGAATATC TCCTCAACAT TTGACTTCAT TGTGGCCAAT AATGGTCTCT GAATTGATTC AGACATTCAC ACAGCTTGAA GAAGATCTAA AAGATGAAGA TGAGTCATTG AGAAGCACCA ACAAAGTAAA CAGAACGAAA GTTTCAGTCC CGGATGCAAA TGGACCCTCA GTGGGGGAGA TACCCAGAG TGAATCATC TTGATTTAT CAGCTTGCAA ATTCTTGAC ACAGCGCTTT CTTTTCCACC TGACAAGATG CCATTATTC AAATTATAG GTGGGCATTT ATTCCAGAAG TGGACACAGA GGGCCCTGCC TTCTGTCCG ATGTAGAGGA GAATCACCAA GAATGCAAAC CCCACACTGT CAGGATTCTA GAACCTCTAA AATTAAGTT TGGGGAAATC AGTAGCTCTG ATGAGATCAC CATGAAGAGT GAATCCCGC TTCTGCGCCA ACATTCTGTT TCCAGCATCA GGCAGTTGAT GCCATTCTTC ATGACTCTAA ATGGTGCAAT TAAGACCCAG AGACAGCTGC CTGCTGATAG CCCAGGAAT CCATTCTTG ACTTTCCTGT CACAGATAGC CCAAGGATCT TAAACAACCT GGAAGAATGC ATCGAATATG ATTTCTGGA ACATCCAGAA TGTTAACCAT GTGAGAGAGA ATATGTTTAA TCCATGTATT GGTACTTTAC TGAACCAG GTTATATTCT AAAGAAGAAA GAAGGCAGGA TAGTGCTTTT GAACAAGCCT ATTTCCATTT TGAAAGTAGA TTTCAGGCTA GGTGCGGTGG CTCACACCTG TAATCTCAGC ACTTTGGGAG GCCAAGGCAG GCAGATCACT TGAGGTCAGG AGTTCGAGAC CAGCCTGACC AACATGGTGA GACCTGTCT CTAATAAAA TACAAAAATT AGCTGGGTGT GGTGGCGGCG CCTGTAATCC CAGCTACTTG GGAGGCTAAG GCATGAGAAT TGCTTGAACC CAGGAGGTGG AGGCTGCAGT GAGCCGAGAT CACGACACTG CACTCCAGCT GTGTGACAGA ATGAGACCAT CTCAAAAAA AAAAAAAGT AGATTTCAGA TAATTTACTG TTCAGCAACA GGACACACCT	
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[0148]

		CCCTAAATGC CTTGTAATAT ATTTGAATCT GATTCTGCAT TTCTTCCTCA ATTTATGTAA TGAAAAATAA ATTAATATAT CATCTAACAG TAGCACAAAA TTTGTAATAT GAAGTAAAGT ATGAAGATAA TGAAGAAGTT GTTTTCTTTG TTGAAGCAGT TATATGGGTC TTTCTCAGTA TATTTCTCTT TTCTCTAAAA GTTTAAACTT ATTAAAAGAA TGTTATTTTT AACCTTTCAA AAAAAAAA	
NDUFB1 1	NM_0 19056. 6	GCTCTGGCCG GCCCGGGCGA TTGGTCACCG CCCGCTAGGG GACAGCCCTG GCCTCCTCTG ATTGGCAAGC GCTGGCCACC TCCCCACACC CTTGCGAAC GCTCCCCTAG TGGAGAAAAG GAGTAGCTAT TAGCCAATTC GGCAGGGCCC GCTTTTAGA AGCTTGATTT CTTTGAAGA TGAAAGACTA GCGGAAGCTC TGCTCTTTT CCCAGTGGG GAGGGAATC GGGGCGATTG GCTGGGAACT GTATCCACC AAATGTCACC GATTCTTCC TATGCAGGAA ATGAGCAGAC CCATCAATA GAAATTTCTC AGCCTGGCCG AAAATGGTTG GCCCCACGAA GCCACGACAA CTGGAGGCAA AGAGGGTTGC TCAACGCCCC GCCTATTGG AAAACCAAT CAGATCTGGG ACCTATATAG CGTGGCGGAG GCGGGGCGAT GATTGTGCG CTCGCACCCA CTGCAGCTGC GCACAGTCGC ATTTCTTCC CCGCCCCTGA GACCTGTCAG CACCATCTGT CATGGCGGCT GGGCTGTTT GTTTGAGCGC TCGCCGTCTT TTGGCGGCAG CGGCGACGCG AGGGCTCCCG GCCGCCGCG TCCGCTGGGA ATCTAGCTTC TCCAGGACTG TGGTCGCCCC GTCCGCTGTG GCGGGAAGC GGCCCCAGA ACCGACCACA CCGTGGCAA AGGACCCAGA ACCCGAGGAC GAAAACTTGT ATGAGAAGAA CCCAGACTCC CATGGTTATG ACAAGGACCC CGTTTGGAG GTCTGGAACA TGCGACTTGT CTTCTTCTTT GCGCTCTCCA TCATCCTGGT CCTTGGCAGC ACCTTGTGG CCTATCTGCC TGACTACAGG TGCACAGGGT GTCCAAGAGC GTGGGATGGG ATGAAAGAGT GGTCCCCCG CGAAGCTGAG AGGCTTGTGA AATACCGAGA GGCCAATGGC CTTCCCATCA TGGAATCCAA CTGCTTCGAC CCCAGCAAGA TCCAGCTGCC AGAGGATGAG TGACCAGTTG CTAAGTGGGG CTCAAGAAGC ACCGCCTTCC CCACCCCTG CCGCCATTC TGACCTCTTC TCAGAGCACC TAATTAAAGG GGCTGAAAGT CTGAAAAAAAA AAAAAAAAA	34
ND4	NC_01 2920.1	ATGCTAAAACTAATCGTCCCAACAATTATATTACTACCACTGAC ATGACTTTCCAAAAAACACATAATTGAAATCAACACAACCAACC ACAGCCTAATTATTAGCATCATCCCTCTACTATTTTAAACCAAA TCAACAACAACCTATTAGCTGTTCGCCAACCTTTTCTCCGACC CCCTAACAACCCCTCCTAATACTAATACTACCTGACTCCTACCC CTCACAATCATGGCAAGCCAACGCCACTTATCCAGTGAACCACT ATCAGAAAAAACTCTACCTCTCTATACTAATCTCCCTACAAA TCTCCTTAATTATAACATTACAGCCACAGAACTAATCATATTT TATATCTTCTTCGAAACCACACTTATCCCCACCTTGGCTATCATC ACCCGATGAGGCAACCAGCCAGAACGCCTGAACGCAGGCACAT ACTTCTATTCTACACCCTAGTAGGCTCCCTTCCCTACTCATCG CACTAATTTACACTACAACACCCTAGGCTCACTAAACATTCTA	35

[0149]

		CTACTCACTCTCACTGCCCAAGAACTATCAAACCTCCTGAGCCAA CAACTTAATATGACTAGCTTACACAATAGCTTTTATAGTAAAGA TACCTCTTTACGGACTCCACTTATGACTCCCTAAAGCCCCATGTC GAAGCCCCCATCGCTGGGTCAATAGTACTTGCCGCAGTACTCTT AAAAGCTAGGCGGCTATGGTATAATACGCCCTCACACTCATTCTCA ACCCCTGACAAAACACATAGCCTACCCCTTCCTTGTACTATCC CTATGAGGCATAATTATAACAAGCTCCATCTGCCTACGACAAAC AGACCTAAAAATCGCTCATTGCATCTCTTCAATCAGCCACATAG CCCTCGTAGTAACAGCCATTCTCATCCAAACCCCTGAAGCTTC ACCGGCGCAGTCATTCTCATAATCGCCACCGGCTTACATCCTC ATTACTATTCTGCCTAGCAAACCTCAAACCTACGAACGCACTCACA GTCGCATCATAATCCTCTCTCAAGGACTTCAAACCTACTCCAC TAATAGCTTTTGTAGTACTCTAGCAAGCCTCGCTAACCTCGCC TTACCCCCACTATTAACCTACTGGGAGAAGCTCTCTGTGCTAGT AACCACGTTCTCCTGATCAAATATCACTCTCCTACTTACAGGAC TCAACATACTAGTCACAGCCCTATACTCCCTCTACATATTTACC ACAACACAATGGGGCTCACTACCCACCACATTAACAACATAA AACCCCTATTACACAGAGAAAAACCCCTCATGTTTCATACACCTA TCCCCATTCTCCTATCCCTCAACCCCGACATCATTACCGGG TTTTCCTCTT	
MORF4L 1	NM_0 012656 03.1	CGGCGTGCCC TGGGGCGGCG CGGGCGCAGG GGCGCGTGCG CGGCGGGCTG TCGTTGGCTG GAGCAGCGGC TGCGCGGGTC GCGGTGCTGT GAGGTCTGCG GCGCTGGCA AATCCGGCCC AGGATGTAGA GCTGGCAGTG CCTGACGGCG CGTCTGACGC GGAGTTGGGT GGGGTAGAGA GTAGGGGGCG GTAGTCGGGG GTGGTGGGAG AAGGAGGAGG CGGCGAATCA CTTATAAATG GCGCCGAAGC AGGACCCGAA GCCTAAATTC CAGGAGGTTG GGATGAATGG GTTCCGGAGA GCAGAGTACT CAAATACGTG GACACCAATT TGCAGAAACA GCGAGAACTT CAAAAAGCCA ATCAGGAGCA GTATGCAGAG GGAAGATGA GAGGGGCTGC CCCAGGAAAG AAGACATCTG GTCTGCAACA GAAAAATGTT GAAGTGAAAA CGAAAAAGAA CAAACAGAAA ACACCTGGAA ATGGAGATGG TGGCAGTACC AGTGAGACCC CTCAGCCTCC TCGGAAGAAA AGGGCCCGGG TAGATCCTAC TGTGAAAAT GAGGAAACAT TCATGAACAG AGTTGAAAGTT AAAGTAAAGA TTCCTGAAGA GCTAAAACCG TGGCTTGTTG ATGACTGGGA CTTAATTACC AGGCAAAAAAC AGCTCTTTTA TCTTCCTGCC AAGAAGAATG TGGATTCCAT TCTTGAGGAT TATGCAAAAT ACAAGAAATC TCGTGGAAC ACAGATAATA AGGAGTATGC GGTTAATGAA GTTGTGGCAG GGATAAAGA ATACTTCAAC GTAATGTTGG GTACCCAGCT ACTCTATAAA TTGAGAGAC CACAGTATGC TGAATTTCTT GCAGATCATC CCGATGCACC CATGTCCAG GTGTATGGAG CGCCACATCT CCTGAGATTA TTTGTACGAA TTGGAGCAAT GTTGGCTTAT ACACCTCTGG ATGAGAAGAG CCTTGCTTTA TTAATCAATT ATCTTCACGA TTTCCTAAAG TACCTGGCAA AGAATTCTGC AACTTTGTTC AGTGCCAGCG ATTATGAAGT GGCTCCTCCT GAGTACCATC	36

[0150]

		GGAAAGCTGT GTGAGAGGCA CTCTCACTCA CTTATGTTTG GATCTCCGTA AACACATTTT TGTTCCTAGT CTATCTCTTG TACAAACGAT GTGCTTTGAA GATGTTAGTG TATAACAATT GATGTTTGT TTTCTGTTGA TTTTAAACAG AGAAAAATA AAAGGGGGTA ATAGCTCCTT TTTCTTCTT TCTTTTTT TTTCAATTCA AAATTGCTGC CAGTGTTTC AATGATGGAC AACAGAGGGA TATGCTGTAG AGTGTTTTAT TGCCTAGTTG ACAAAGCTGC TTTTGAATGC TGGTGGTTCT ATTCTTTGA CACTACGCAC TTTTATAATA CATGTAAATG CTATATGACA AAATGCTCTG ATTCTAGTG CCAAAGGTTT AATTCAGTGT ATATACTGA ACACACTCAT CCATTGTGC TTTTGTTTT TTTTATGGTG CTAAAGTAA AGAGCCCATC CTTTGCAAGT CATCCATGTT GTTACTTAGG CATTTTATCT TGGCTCAAAT TGTGAAGAA TGGTGGCTTG TTTTATGGTT TTTGTATTG TGTCTAATGC ACGTTTAAAC ATGATAGACG CAATGCATTG TGTAGCTAGT TTTCTGGAAA AGTCAATCTT TTAGGAATTG TTTTTCAGAT CTTCAATAAA TTTTTCTTT AAATTTCAA GAACAAAAAA AAAAAAAA	
MRPL19	NM_014763.3	GTAGTCTTGA CGTGAGCTAG CTGGCATGGC GGCCTGCATT GCAGCGGGG ACTGGGCTGC AATGGGCTTA GGCCGGAGTT TCCAAGCCGC CAGGACTCTG CTCCCCCGC CGGCCTCTAT CGCCTGCAGG GTCCACGCGG GGCCTGTCCG GCAGCAGAGC ACTGGGCTT CCGAGCCCGG TGCGTTCCAA CCGCCGCCGA AACCAGTCAT CGTGGACAAG CACCGCCCG TGAACCGGA ACGCAGGTTT TTAGTCTCTG AATTCATTCC TCGAAGGGGA AGAACAGATC CTCTGAAAT TCAAAAGATA AGAAAAGATA TGTTAGAAAG GAGAAAAGTA CTCCACATTC CAGAGTTCTA TGTGGGAAGT ATTCTTCGTG TTTACTACAGC TGACCCATAT GCCAGTGGAA AAATCAGCCA GTTCTGGGG ATTTCATTTC AGAGATCAGG AAGAGGACTT GGAGCTACTT TCATCCTTAG GAATGTTATC GAAGGACAAG GTGTCGAGAT TTGCTTTGAA CTTTATAATC CTCGGGTCCA GGAGATTCAG GTGGTCAAAT TAGAGAAACG GCTGGATGAT AGCTTGCTAT ACTTACGAGA TGCCCTTCTT GAATATAGCA CTTTGATGT GAATATGAAG CCAGTAGTAC AAGAGCCTAA CCAAAAAGTT CCGTTAATG AGCTGAAAGT AAAAATGAAG CCTAAGCCCT GGTCTAAACG CTGGGAACGT CCAAATTTTA ATATTAAAGG AATCAGATTT GATCTTTGTT TAACTGAACA GCAAATGAAA GAAGCTCAGA AGTGAATCA GCCATGGCTT GAATTTGATA TGATGAGGGA ATATGATACT TCAAAAATTG AAGCTGCAAT ATGGAAGGAA ATTGAAGCGT CGAAAAGGTC TTGATTCTGA GAATGAATTT GGTTAGTTGC AGAAGATACA TTGGCTCTAA GAGGATATAT TTTGAGACCA ATTTAATTC ATTTATAAGA ACATAGTAAT TAAGTGAATC AAGCATTTCAT TGTTTTATTA ATACTTTTTT TCTAAAATAA AACTTGTACA CCAGTTTATT ACTCTAAAAA GAGAATTACA CATGCCAAAT GGACCAATGT CCATTGCTT ATTGGAGGCA AAGCTACAAT AGAAGTCAGA GCATCACCAG AATGCTCTTT AATGAGCATG GAACCTGAGC AAAGGGAATA	37

[0151]

	GGTGGGATGA ATTTTTTTTT TAATTGTGAA ACAATTCATA AGCACAATAT GATTTACAGA ATAATAAACA TTCATGTACC CACTATCAGG TTAAGAAATA GAACATTAT TAATATGTAG GAATGTTAAG AAATAAAACA TTAAATAAGA TCTCAGAAGA CTCCAGTAAA TCTGCAATTG TATCTCTCTC CTTTTAAAT GTAAATATCA TCTTGACTTG TTAATTATTC CCTTGCAATT CTTTTAGTTT ACTGCCAACA CATATATTCT TCAACAATAT ATTTAATTTT GAAAAACCTG AAAAAAAAAA CCGTTAGCA AGTATAAAGG GGCAGTATTA CTATTATTGC ATGAAGGCTT CAAGGGAAAC GTTACAGTCT TTGGGTCATA GTCTGGCTTC AGCTTCCTCT GAGAGTTTAC AGAGGCCAAT TTTGAGCAAA TTCATGGCTA AGGTTATGAG TGAGTTCTGC TAAACAGAAG GCTCACCACA AGGTATCTGG CAGGATTATA CTGGGTAGCT GGATGTTGCA GAAATGTGGT TAGAGGAAGT AAACGTGTTT TTGATGCTCA CAGCATGATG AATCAAACTC TGTATCTTAG GATTAGGTTA AAACAATACC TTTGGTATGA TATGAGTGT GTTGCTGATC CATGCAGCAT GGATTGGAAA GCTGGGGTAT AAGCACACAT GCTAAAGAAA AACATGTAAT TTGGTCCATA CTCACCTGGA TATACTGTTT CTCAGGTAA AAAATACAGT ACTATCCTAA ATCTTGAAGG CAACTCTCAG CCTATCCATT GAGTTACCTT CAGATCTGCC CTCTGGTTCC TAGCTGTCTT GGGACTAACT TCTTCTCTGC GCTCAGCTGT TTTCTGGATT CCATGTTTTT CATTTTATTT AGTACTAACT TGTTTTGCTG CAGCACATCC TTGGTAGCT TCTAGAGGAA GTTTGTGTGG AGGTAAAATT TTTGAGACCT TGCATGTCTC ATGTTTGATT GATACTTTAT ACGTTTAGGT AGGAGGTAAT TTCTCTCAG GACTTTAAAA ATATTGTTGC TCCATTTTCT TTGTTTCTAT TGTGTATTG AGAAATCCAA TGCCATTTTG ATTTCCCAT CATAAATTTT ATGATGATGT GTCTTGGTGT GGGTCTATAT TTATCCATTG TATTGGGTTT TAGGTGAACC CTTCAGATA GTAACCTATT TCTGTCAATT CTGGGAAACA CTTAGCATTG GTTGATGATT TATTCTCTGC TGCTTTGTTT TCCCAACTAT TATTTGGATG TTGGATATCC AGCACTGGGT ATCTATTTTC TTACCTCCCT CCCTTGACCC CAGTCTCTGT TTTTAGCTC TTTAGCTCAA TCTTCCAAC CTCTGCTATT GTATTTTAAA ATCTTAAGAC CCCTTCTGA TTGTAGAAG TTCTTTTCT TACAACCAAA AAGCCTTTAT CTATGGATT GTTCACAGAT AAGGGGTATT CAATATAGTG TATTTTTTTT TCATTTAAAA TTGTTTGCAT ATCTATTTCC TCCAAATTTT TTTCTGTATT TATTTTTTGT TGTCTATATT TCAGACTTTT CCAGGATATC TGATAATCTT TGGCTGTCTT CTTATGGTTG AAAGAGGGAC TAAAAAGCTT GGAAAGCCTT TGGGTGTGTG GAAGGGGCTG TCTTTAGGAT TATCTGAATG GGCTTTTTTG GGAGTCCCCT CCTCCACATG AATATTTTGG TTTTGTGAGA TTCCCTAGAA TAGAGGCTTC CAATCTCCTT CCTGGAGGGG TCTGTCCAGG AAGGAGATTG TCTAGGGGTC TGTCAGACAG CAGCTTTCAG CTACTTCCTT GATCTTTTTC ACTAATGATT ATATAGTCAT CTAACTACTG TCAACAAGTA ATAGATATCC TATCCTTCAC	
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[0152]

	TTGTTTAGAT TATTTGCTGA GATAACCTCT CAAAAGAACC TCTCAAAATA AAAGGTTAAC AAGAGCCTAT ATCTTATATT TTTCTTCTCT TTATCTTGTT AGAAGATAGC TATTAACC TGTCTTTTT CTGTCTTGAT AAACACACTT CAATCTTGGT AGAATGGTAG ATGGGACAGT ATATTTTAGG ACCTAAAGCT CTGCAAAATGT ATGATCAGCT TGTAAGTACA GGTGCTCAAA AACATGTAAA CAATCATGCT TTTTACTCTG TAGGAATATC TTTAAAATTCT TGTGAATTT TCCCCAGAA GTAAAGCAAA TCTTCCCCCA GAAATAAAAT TAAATGTGCA TAATCTAAAG CTTTTTTTTT TTATTGTGGT AGGATATATA TATAAACAT AATTTGCCAT TGTAACATT TTAATTTAC AAGTCAGAGG CATTAAATTAC ATCACAATGT TGTGAAATTA TTAATACTAT TTCCAAAATT TTCTATCAC CCCAACTGA AACTCTGTAA CTGTTGAGCA ATAACCTCAT TCCTGTATCT CTCCCAACCC CAGGTAACCT CAAATCTTTC TTTTATCTT TGAGACAAGG TCTCATTCTA TCACTCAGGT AGGAGTGCAG TGGTGTGATC ATAGCTCAT GCAGCCTCAA AATCCTGGGC TCAAGCAATC CTCTTGAGT AGCTAAGACT ATAGGCACAC ATTAACCTGC CCTGGCTGAT TTTGTTTTT GTAGAGATGT GGTCTTGCTA TGTTCCTCAT GCTGGTCTG AGTTCCTGGC CTCAAGCAGT CCTTAAGATT CATCCATGTT GTGGCATGTG TCAGAATTTT ATTTGTTTT ATGACTAAAT AATATTCCAT TGTATGTATA TACATTTTGT TCATCCATCT TCTGATGAAC ACTGGGATAT GTCTACCTTT TGGCTATTGT GAATAATGCT GCAGTAAACA TTGACATAAC AAGTATGTAT TTGATTGCCT GTTCTAAGT TCTTTGGGT ATACATCTTG AGTAGAATTG CTAGATAATG TCATGTTTTA TTTCTTTGT GATTCTTCT TCGATCCCT GGTGAGTGT GTTAATTTCT ACATGTTTAT GAATTTCCCA CTGTTTTTT GTTATTGATT TCCAAGTTCA TTCCATTGTG ATTAGAGAAG TACTTAGTA TGATTTTAAT GTTTTGAGA ATTGGTGTGT GGCCTGATAG ATGGTCTGTC CTGGAGAATG TTCCTCATAC ACTTGAGCAA AATATTTATC ATGCTATTGT TGACTGTAGT TTCTATATG TCTCTAGGT CAAGGTGGTT TACAATGTGT TAAGGTTCTC TTTTTTAAA AAAATTTTTG CACAGAGTAT CTTTTCTAT GTGTTCCATG TATTTGTGTC TTTGGAGCTA TAGTCTCTG TAGACAGCAT ATCACTATCT TGTTTGTTT TGTTTTTCT GTCCATTCTG CCAATTTCTG CCTTTTGATT GGAAAATTTA ATCCATTGTC ATTTAAAGTA ATTAAGGAAG GACTTTCTT TACCATTIAA CACTTCTTCT ATATGTCATA TACTTTTTT GCCCTCATT TCCTCTTTAT GGCCTTCTTT TCTGTTTTT TGTAGTGAAC TAGTCTGATT CTCTTTCCAC TCCCCTTTGT GTATATTTGT TAGATGTTTT ATTTGTGGTT GCTATGGGGA TTATAGTTAA CATCTACAC TTAACAACAT CTAATTTAAA CTGATACCAA TTACCTTCA ATAGCATACA AAATCTCTAC TCCTGTAAAG CTCTGCCCT GCCCCCTTA TGTATTGAT GGCACAAAT GCCTAATAAA TAATTTATAG TTATTGTAT GAGTTTGTCT TTTAAATCAT TTAGGAAATA AAAAGTGGAG TTAGAAAACA GTATGATAGT	
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[0153]

	AATACTGACT TTTATATTTG TCAATATATT TATCTTATTT TGGATCCTTA TTTCATTATA TAGATTTGAG TTACTGTCTA GTGCCCTTCC ATTTCCGGCCC AAAGGATTCC CTTATGCATT TCTTGCAGGG CAAGTCTAAT TGTAATAAAC TCCCTCAGCT TTTGTTTTAT CTGAGAATGT CTTGATTCT CCCTTATTTT TGATGGATAA TTTTGCCAGA TACATGAATT TTTGGTAACA GTATTTTCTT TCCAGCACTT TAAATATGTC ATCCCACTAC CTTCTGACTT CATGGTTTCT CATGAGATAT TAGATGTTAT AAAAATTTGAG GATTCTCAT TCTTGATGAG TCAGTTCTGT CTTATTGCTT TTCGGATTG CTCAGCTTTT GTCTTTTGAC AGTTTGATTA TAACGCGGCT CAGTGTGGGT CTCTGAGTTT ATCCCACTTA GAGTTTGTG AGTTTCTTGG AGTCATAGAT TTATGTCTTT TATCAAATTT TGGACATATT TGGCTATTAT TTCTTCAATT TTTTTCACGT CTCTTTCTT TTCCTTCTGA AATATTCTTA ATGTATATGT TGGTCTGTTT GATGCTGTCT CACCAGTTTC TTAGGCTGTG TTCTCTTTTG TTCCTCAGAC TTGATTATTG CAGTTGCCCT TCTTTTTATT TTTTCAAGT TTGTGATTG TTCTCCCTGT TCAGATCAAC TGTGAACCTC CTCTAGTGAA TTTATTTTCAG TTAGTGTACT TTTAGCTCC AAGATTTATC TTGGTTCTT TTTTATAACG TCTGTGTCTT TATTGATATT CTCATTTTGT TCATATGTCT CTTTCTCTT TTAGTTCTTT GTCCATGTTT TCCTTTAGCT CTTTGGGCTT ATTTAAGACA ATTTGTTTAAA GTCTTTGCAT AGTAAAGTCCA ATGCTGTGTG TTCTTCAGGG ATGGTTTTC TATTTTGTG TTCAATGAGC CATACTTTC TGTGTCTTTG TATGCTGTCT TTTTGTGTG GAAAACTGTA TGTTTGAACA TCATAACGTG GTGGCCCTGA AAATCAGATA TTCCCCCTT CCGAGAGTT AGTTTTATTT TTATTATTGA AGATTGTAGC AGTCTATTGC TACATGTGCA GTCATTTCCA AACTATTTTT GCAAAGACTG TATTCCTTCT GTGTGTATC ACTGAAGTCT CTGTTCTTA GTTTGTGTTT AATAGTTTGA CATAGATTTC CTGAAAGGA GTTAAACTA GCAGAAAAAT CTCTCTCCCA GTCTTTCCAG TCTTTGTAGA TTGGTTCTGT GCTGGGCTTT TCCATTAATA CTTAGCCAGG CTGTACTGA GCCTAACAAAT CAGGCCCAAA AGCGTAGGGT CTTGCAGAT CTTGTCTGAG CATGCTTCTT GCTGTGTATG CACGTAGTTT TCTAAATCTC CCGTATGTG CTGTTGAATA TTCTAATTTT CCAAAGAAAC TCCTTTGCAG CTTTTCTCA CAGAACATAG ATGGTTTTTT GGATATCTTG ACCATAGTCT TTCGACCCAG GTGTTTGCGG TTGTTAGTTC ACCTTACACT TTTTCAAGC ATTGCCCTACT GCTTACGATG AGTGCTCTGT CAATCCTTTA AGTAGCCCCA GACAGGCTAC CAGAGACTTA AACAAGAATT TGTAAGTTCT GCTCAGCTTC CTCTAGAAAT GGGGATCAGG GTCCAAGACA GAATGCAGTT GCTGATTTC AAGCTGCTGC AACACCAGGG AGCTTGTGGG GGAAGGGCAA GCAGAAATGT CACAAAGCTT TCTTGCCATT TTAAAGTTGC CTGTTCTTGA CTCAGCATTT GCTTCATTGC TATAAACTTT TTAGTGTTTT TCAGAGTTCT GATAAAATTG GCTATGCCGT TTCTGTCTTT AAAAAATATA TATATATTTT	
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[0154]

		TTAGGGATTG GGGTCTCACT ATACTGACCA GGCTGGTCTT GAACCTCTGG CCTCAAGCCA TCCTCTCATT TCAGCTTCCC AAAGTGCTGC AATTACACGC GTGAACCACC ACACCCAGCC CCTGCTTGTT TTTCAATGTG CCTACTCCAC CATGTTGCTC AAGTATGTAT ATTTTCTAAA CTACCTTGTA GTGTTGTGAT GGGAAATAAA TCCCTGAGCC TTTTGAATAA CTCAGAGAGA TCAAAAACTT AGTTTATCCT ATTCGAAGGA TTAGAAAAAT GATATATCTT TCACTTTTTT AGGGATAGGC TCCTCATTAG AAGGCTCCTA TGTGCCGATG CTGTACAAGA CATTTTATTT CTCTTAATGT TTACAACAAG CTGTGTGCCA AGGCTGATCT TGAACCTCTG GCCTCAAACG ATCCTCCCAG CTCAGTCTCA CAAAGTGTTG GGATGTCTGG CCAACTAATG ACTATCTTAA CTCTTGIGTT TCAATGTTTA TGCCTTCTTT TATCTTGA GATTGTATGA CTATGTCTTC TAGAACAATG TTGAACAGAA ATGGTGAGAG CAGACATCCT TGCTTTAATA TTTCACCATT ATATATGATG TTAGGTATAG ATTTTCTCA CAGATGCCCT TTATCAGATT GAGGAATTTA TATTCCTACT TTGCCGAAAG GTTTTGTAG TATGAGGGGG TGCTGAATTT TGTCAAACAC TTTTTCGGTA ATAATTGAGA TGATTGGTTC TGCAGTCATC GAGATGTGGA TTTTCTCCTT TATTCGTGTC GTGAGTGATT ACACTGGTTG ACTAATGTTA AAACAACCTT ACTTTCCAGG AATAAACCTT ATTATCTTTT TTATACA	
PSMC4	NM_1 53001. 2	TGCGGGTACG GACAGCGCAT GAGCTTATGT TGAGGGCGGA GCCCAGACCA GCCCTTCGTC CTATCCTGCC CTTCCAGCAC CTCTCAGCCG TAACTTAAAC TACACTTCCC AGAAGCCTCC TCAGCCAGGG ACTTCCGTTG TCGTCAGCGG AAGCGGTGAC AGATCATCCC AGGCCACACA GAGGCCGGCT TGGTCACTAT GGAGGAGATA GGCATCTTGG TGGAGAAGGC TCAGGATGAG ATCCAGCAC TGTCCGTGTC CCGGCCCCAG ACCGGCCTGT CCTTCCTGGG CCTGAGCCT GAGGACCTGG AGGACCTGTA CAGCCGCTAC AAGGAGGAGG TGAAGCGAAT CCAAAGCATC CCGCTGGTCA TCGGACAATT TCTGGAGGCT GTGGATCAGA ATACAGCCAT CGTGGGCTCT ACCACAGGCT CCAACTATTA TGTGCGCATC CTGAGCACA TCGATCGGGA GCTGCTCAAG CCCAACGCCT CAGTGGCCCT CCACAAGCAC AGCAATGCAC TGGTGGACGT GCTGCCCCC GAAGCCGACA GCAGCATCAT GATGCTCACC TCAGACCAGA AGCCAGATGT GATGTACGCG GACATCGGAG GCATGGACAT CCAGAAGCAG GAGGTGCGGG AGGCCGTGGA GCTCCCGCTC ACGCATTTTC AGCTCTACAA GCAGATCGGC ATCGATCCCC CCCGAGGCGT CCTCATGTAT GGCCCACCTG GCTGTGGGAA GACCATGTTG GCAAAGGCGG TGGCACATCA CACAACAGCT GCATTTCATCC GGTCTGTGGG CTCGGAGTTT GTACAGAAAT ATCTGGGTGA GGGCCCCCGC ATGGTCCGGG ATGTGTTCCG CCTGGCCAAG GAGAATGCAC CTGCCATCAT CTTCATAGAC GAGATTGATG CCATCGCCAC CAAGAGATTG GATGCTCAGA CAGGGGCCGA CAGGGAGGTT	38

[0155]

		CAGAGGATCC TGCTGGAGCT GCTGAATCAG ATGGATGGAT TTGATCAGAA TGTCAATGTC AAGGTAATCA TGGCCACAAA CAGAGCAGAC ACCCTGGATC CGGCCCTGCT ACGGCCAGGA CGGCTGGACC GTAAAAATTGA ATTTCCACTT CTGACCGCC GCCAGAAGAG ATTGATTTTC TCCACTATCA CTAGCAAGAT GAACCTCTCT GAGGAGGTTG ACTTGAAGA CTATGTGGCC CGGCCAGATA AGATTTTCAGG AGCTGATATT AACTCCATCT GTCAGGAGAG TGGAAATGTTG GCTGTCCGTG AAAACCGCTA CATTTGCTCTG GCCAAGGACT TCGAGAAAGC ATACAAGACT GTCATCAAGA AGGACGAGCA GGAGCATGAG TTTTACAAGT GACCTTTCCC TTCCCTCCAC CACACCACTC AGGGGCTGGG GCTTCTCTCG CACCCCCAGC ACCTCTGTCC CAAAACCTCA TTCCTTTTT TCTTTACCCA GGATTGGTTT CTTCATAAA TAGATAAGAT CGAATCCATT TAATTTCTTC TTAGAAGTTT AACTCCTTTG GAGAATGTGG GCCTTGAATA GGATCCTCTG GGTCCCTCTT AATCTGACAG ATGAGCAGAC GAGGTGCATG GCCTGGGTTG CAGCTTGAGA GAACCAAAAT ATTCAAACCA GATGACTTCC AAAATGTGGG GAAAGGGATG GAAAATGAAC CTGAGATGGA GTCCTTAATC ACGGGATAAA GCCCTGTGCA TCTCCCTCAT TTCCTACAGG TAAAAGACAG TAAAGAAATT CAGGTCACAG GCCTTGGGAG TTCATAGGAA GGAGATGTCC AGTGCTGTCC AGTAGAACTT T	
SF3A1	NM_005877.5	GGTCCCGGAA GTGCGCCAGT CGTACCTTCG CGGCCGCAAC TCGCTCGGCC GCCGCCATCT TGCGAGCTCG TCGTACTGAC CGAGCGGGGA GGCTGTCTTG AGGCGGCACC GCTCACCGAC ACCGAGGCGG ACTGGCAGCC CTGAGCGTCG CAGTCATGCC GGCCGGACCC GTGCAGGCGG TGCCCCCGCC GCCGCCCGTG CCCACGGAGC CCAAACAGCC CACAGAAGAA GAAGCATCTT CAAAGGAGGA TTCTGCACCT TCTAAGCCAG TTGTGGGGAT TATTTACCCT CCTCCAGAGG TCAGAAATAT TGTTGACAAG ACTGCCAGCT TTGTGGCCAG AAACGGGCCT GAATTTGAAG CTAGGATCCG ACAGAACGAG ATCAACAACC CCAAGTTCAA CTTTCTGAAC CCAATGACC CTTACCATGC TACTACCGC CACAAGGTCA GCGAGTTCAA GGAAGGGAAG GCTCAGGAGC CGTCCGCCGC CATCCCCAAG GTCATGCAGC AGCAGCAGCA GACCACCCAG CAGCAGCTGC CCCAGAAGGT CCAAGCCCAA GTAATCCAAG AGACCATCGT GCCCAAAGAG CCTCCTCTG AGTTTGAGTT CATTGCTGAT CCTCCCTCTA TCTCAGCCTT CGACTTGGAT GTGGTGAAGC TGACGGCTCA GTTTGTGGCC AGGAATGGGC GCCAGTTTCT GACCCAGCTG ATGCAGAAAG AGCAGCGCAA CTACCAAGTTT GACTTTCTCC GCCACAGCA CAGCCTCTTC AACTACTTCA CGAAGCTAGT GGAACAGTAC ACCAAGATCT TGATTCCACC CAAAGGTTTA TTTTCAAAGC TCAAGAAAGA GGCTGAAAAC CCCCAGAGAAG TTTTGGATCA GGTGTGTTAC CGAGTGGAAT GGGCCAAATT CCAGGAACGT GAGAGGAAGA AGGAAGAAGA GGAGAAGGAG AAGGAGCGGG	39

[0156]

	TGGCCTATGC TCAGATCGAC TGGCATGATT TTGTGGTGGT GGAAACAGTG GACTTCCAAC CCAATGAGCA AGGGAAC TTC CCTCCCCCA CCACGCCAGA GGAGCTGGGG GCCCGAATCC TCATTGAGGA GCGCTATGAA AAGTTTGGGG AGAGTGAGGA AGTTGAGATG GAGGTGAGT CTGATGAGGA GGATGACAAA CAGGAGAAGG CGGAGGAGCC TCCTTCCAG CTGGACCAGG ACACCCAAGT ACAAGATATG GATGAGGGTT CAGATGATGA AGAAGAAGGG CAGAAAGTGC CCCCACCCCC AGAGACACCC ATGCCTCCAC CTCTGCCCC AACTCCAGAC CAAGTCATTG TCCGCAAGGA TTATGATCCC AAAGCCTCCA AGCCCTTGCC TCCAGCCCCT GCTCCAGATG AGTATCTTGT GTCCCCATT ACTGGGGAGA AGATCCCCGC CAGCAAAATG CAGGAACACA TGCGCATTGG ACTTCTTGAC CCTCGCTGGC TGGAGCAGCG GGATCGCTCC ATCCGTGAGA AGCAGAGCGA TGATGAGGTG TACGCACCAAG GTCTGGATAT TGAGAGCAGC TTGAAGCAGT TGGCTGAGCG GCGTACTGAC ATCTTCGGTG TAGAGGAAAC AGCCATTGGT AAGAAGATCG GTGAGGAGGA GATCCAGAAG CCAGAGGAAA AGGTGACCTG GGATGGCCAC TCAGGCAGCA TGGCCCGGAC CCAGCAGGCT GCCCAGGCCA ACATACCCT CCAGGAGCAG ATTGAGGCCA TTCACAAGGC CAAAGGCCTG GTGCCAGAGG ATGACACTAA AGAGAAGATT GGCCCCAGCA AGCCCAATGA AATCCCTCAA CAGCCACCGC CACCATCTTC AGCCACCAAC ATCCCCAGCT CGGCTCCACC CATCACTTCA GTGCCCGGAC CACCCACAAT GCCACCTCCA GTTCGTACTA CAGTTGTCTC CGCAGTACCC GTCATGCCCC GGCCCCCAAT GGCATCTGTG GTCCGGCTGC CCCCAGGCTC AGTGATCGCC CCCATGCCGC CCATCATCCA CGCGCCCAGA ATCAACGTGG TGCCCATGCC TCCCTCGGCC CTCCTATTA TGGCCCCCG CCCACCCCC ATGATTGTGC CAACAGCCTT TGTGCCTGCT CCACCTGTGG CACCTGTCCC AGCTCCAGCC CCAATGCCCC CTGTGCATCC CCCACCTCCC ATGGAAGATG AGCCACCTC CAAAAACTG AAGACAGAGG ACAGCCTCAT GCCAGAGGAG GAGTTCCTGC GCAGAAACAA GGGTCCAGTG TCCATCAAAG TCCAGGTGCC CAACATGCAG GATAAGACGG AATGGAACT GAATGGGCAG GTGCTGGTCT TCACCTCCC ACTCACGGAC CAGGTCTCTG TCATTAAGGT GAAGATTCTAT GAAGCCACAG GCATGCCTGC AGGGAAACAG AAGCTACAGT ATGAGGGTAT CTTCATCAA GATTCCAAC CACTGGCTTA CTACAACATG GCCAATGGCG CAGTCATCCA CCTGGCCCTC AAGGAGAGAG GCGGGAGGAA GAAGTAGACA AGAGGAACCT GCTGTCAAGT CCCTGCCATT TTGCCCTCC TGTCTCCAC CCCCTGCCCC AGACCCAGGA GCCCCCCTGA GGCTTTGCCT TGCCTGCATA TTTGTTCGC TCTTACTCAG TTGGGAATT CAAATGTCC TGCAGAGGTT CATTCCTCTG ACCCTTTCCC CACATTGGTA AGAGTAGCTG GGTTTCTAA GCCACTCTCT GGAATCTCTT TGTGTTAGGG TCTCGATTG AGGACATTCA TTTCTTCAGC AGCCATTAG CAACTGAGAG CCCAGGGATG TCCTACAGGA TAGTTTCATA GTGACAGGTG GCACTTGGCT AATAGAATAT	
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[0157]

	GGCTGATATT GTCATTAATC ATTTTGTACC TTGACATGGG TTGTCTAATA AAACCTCGGAC CCTTCTGTG AAATCAGTTA AATAAGACTT GTCTCGGTCA CCTGTGCCCT GTCCAGACTC GAGGCAGTGG TAACACTGCA CAGTGTATG TGGCTTCTCT TTGAGGATTT TTGGGTTTTG TAACTAAATT CTGCTGCCC TCATACTTTT TATGTATTAG AATCATATTC GTATTGCCCT TTTTAAACAT TGGGATCCTC CAAAGGCCCTG CCCCATGTAT TTAACAGTAA TACAGGAAGC ATGGCAGGCA CCATGCAAAAC CAAGGATGGA TGGTGCAGTC CCTGTGTCAG TGGGCGGTGG TTTCTGCTG GCCTGGAATC ACTCATCACC TGATTGATTG GCTCTGTGGT CCTGGGCAGG TGCCTCATAG GTGTGTGGAT ATGATGACGT TTCTTTAAAA TGTATGTATT TAACAAATAC TTAATTGTAT TAAGGTCATG TACCAAGGAT TTGATAAAGT TTAAATAATT TACTCTCTAC TTTTATCCAT TTTATCCATT TTAACTCATG TAATCCTCAT GTGAGTATTC CTGTTTAACA CTTGAGTAAA CTGAGGCACA GAGAACATAA GTTGATGACC ATAGTCACAC ACTGTGAAAG TGAAAAGAGA ATGTGTGCAA AACACGTAC AGTCCTGGTT TCTGAGTAAA GGCAGGCTGT TATCTTTAGA ATCAAGCTAT CACAGGGAGA TAGGCAATGC TGTGGGTGTT GGAGGAAGGT GAGAGCCTGT TGCTAACAAT TTCTTGTTTT TAAAGCTAAG GCTGATTTTA TTGGGAAGAT CTCATGTG TGTGGCCCT GAGAGTTCCC AGTGCCTTTT ATTTGCAGTC CTTCATTG GACCTCCTAG CTGCCCCATC AGGTCATCTC CAGGGCTCAG AGGGGTGAGA CCATTTCCTA AGGTCACAGA ACCAGCTCTC TAGTCACCAC CCTGCCTCTC CCTCTACCC AGAGTCAGTA CCAGTTTTAT GGCTTTATTA CAAACTGCTG GGTCCCTCCC ATTTTCAACT TGATTGATGG GATGTCATCC CTTATCCTGT CTGACATTTG CCTCTGGCCT GGTTGCTAGA AGTTTGCCCC AGGGGCAAGA GTTGAAATTT GGCTTCTGA GGTGGGCTTT GTGGTTTGGC TCCCTAAAGT GAGCCCACTA CTGGTTGCTT GTCCATGGCC AACACCAGAA ATCCCTGAG CACTACCTGG GTCTCATTCC AAGAAGGAAG AGGGTCAGGA GACCTGGGGA GTCTCATATT CCAAGTTCTT CTTTCTTTCT GGGAGCAGTG GGCAGTTCAT GGTGTTAGGG CACTACCCCC CACAGACTGG CAAACCCTGC AGGACTTCCG TGGCTGAGGC TGTGACCGGA GGCCAGGAAT GCCGTTGGGT GGATTGTGAG TGAATGGGCC CTTTGAGCTG CCCTCTAGAG AGCAAATCCA GTTTCCTGGA GCTCCTGAAT GAATATCTGT ACTGGCTCGC TCAGATGCAG AAGTCCATT GACCATGAGG CCTTGTGAAC ATCAGTGGCC ACAGGCCAG TGTGCTGCTT GGCACTGCAC TAGTTTAGGA CCTGCAGCAT GTAGGTAGCG TCCTAGTGTT TATAATACAA AGCTGCTCTG CACAGCTTTT CTGATTCCTC TTGCAATCTC CTGAGGATTA TCTGCCCCAT TTTTAAAACG AGGTGGAATA CCCAAGGTCA TGTAGCCAGT GAGTGCTCTG GAAAGCCAAA GCAGCTCATC CCTTCCTGGG GACCACACTG CTCTGCTCCA CCAGACCACA CTATGAAATA GGAATAAGTG CTCCTGTTGC AGGACTGCTG GGAAAAACAGG TGGTGTGGGA CTTAAGTCAC CATAATTTTG AAGACTTGCA	
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[0158]

		TGCAGAGGGC TCCAGGAATT GTAGACATTA AGGAATTTCA CTTTCAGTTC TACCCACTAC TTAAGTACTT GTCATGTACT CTTAGAGGAG GCCAGTAATG ATCAGAACCA TTTTACTTTA AAATTAATAA TATTGTATTA GAGAATATAT TAAATGGTTA TATTGGGGTTA TGTTAGGATA TATACTTGAA TGGAAATACA TGTAATTA GCAATCATAT TTTACTTTATC CCTGTAATTA GCAAGAAAG CATAATATAG CTCTACTCAT GGGTACACAT ACCAAGTGTAT AAGATTTTTTA GAAGTTTACT TTTTAAAAAT AAAAGCAAAA TGTAAGATCT TAAAAA AAAA	
PUM1	NM_010206 58.1	AGTGGGCGC CATGTTGTGC GAGTGAAAGG TAAGGGGGAG CGAGAGCGCC AGAGAGAGAA GATCGGGGGG CTGAAATCCA TCTTCATCCT ACCGCTCCGC CCGTGTGGT GGAATGAGCG TTGCATGTGT CTTGAAGAGA AAAGCAGTGC TTGGCAGGA CTCTTTCAGC CCCACCTGA AACATCACCC TCAAGAACCA GCTAATCCCA ACATGCCTGT TGTTTGGACA TCTGGAACAG GGTCGAAGC GCAGCCACAA CCAGCTGCAA ATCAGGCTCT TGCAGCTGGG ACTCACTCCA GCCCTGTCCC AGGATCTATA GGAGTTGAC GCGCTTTCCA GGACGACGCT ATGGTGGACT ACTTCTTTCA GAGGCAGCAT GGTGAGCAGC TTGGGGGAGG AGGAAGTGGG GGAGGGCGCT ATAATAATAG CAAACATCGA TGGCCTACTG GGGATAACAT TCATGCAGAA CATCAGGTGC GTCCATGGA TGAAGTGAAT CATGATTTTC AAGCACTTGC TCTGGAGGGA AGACTGAGTG GAGAGCAGCT CTTGCCAGGT AAAAAGTTTT GGGAAACAGA TGAATCCAGC AAAGATGGAC CAAAGGAAT ATTCTTGGGT CATCAATGGC GAGACAGTGC CTGGGGAACA TCAGATCATT GAGTTTCCCA GCCAATCATG GTGCAGAGAA GACCTGGTCA GAGTTTCCAT GTGAACAGTG AGGTCAATTC TGTAAGTCCC CCACGATCGG AGAGTGGGGG ACTAGGCGTT AGCATGGTGG AGTATGTGTT GAGCTCATCC CCGGGCGATT CCTGTCTAAG AAAAGGAGGA TTTGGCCCAA GGGATCGACA CAGTGTATGAA AAGCACAAGG GTGAAAAGAA GAACAAGGAT GCTTTGATG GAGATAAGCT AGGAGATTTG AAGGAGGAGG GTGATGTGAT GGACAAGACC AATGGTTTAC CAGTGCAGAA TGGGATTGAT GCAGACGTCA AAGATTTTAT CCGTACCCCT GGTAAITGCC AGAAGTCTGC TAATGAAGTG GATCTTCTGG GTCCAAACCA GAATGGTTCT GAGGGCTTAG CCACGCTGAC CAGCACCATT GGTGCCAAGC CTGTGGAGGA TTTCTCAAC ATGGAGTCCC AGAGTGTCCC CTGGACCCC ATGGAACATG TGGGCATGGA GCCTCTTCAG TTTGATTATT CAGGCACGCA GGTACTCTGT GACTCAGCAG CAGCAACTGT GGGACTTTTT GACTACAATT CTCACAACA GCTGTTCCAA AGACCTAATG CGTTTGTCTG CCAGCAGTTG ACAGTGCTC AGCAGCAGCA GTATGCATG GCAGCTGCTC ATCAGCCGCA CATCGGTGTA GCTCCCGCTG CGTTGTGCC CAATCCATAC ATCATCAGCG CTGCTCCCCC AGGGACGGAC CCTACACAG CTGGATTGGC TGCAGCAGCG ACATAGGGCC CAGCTGTGGT CCCTCACCAG TATTATGGAG TTACTCCCTG GGGAGTCTAC CCTGCCAGTG TTTTCCAGCA GCAAGCTGCC GCTGCCGCTG	40

	CAGCAACTAA TTCAGCTAAT CAACAGACCA CCCACAGGC TCAGCAAGGA CAGCAGCAGG TTCTCCGTGG AGGAGCCAGC CAACGTCTTT TGACCCCAAA CCAGAACCAG CAGGGACAGC AAACGGATCC CTTGTGGCA GCTGCAGCAG TGAATTCTGC CCTTGCATTT GGACAAGGTC TGGCAGCAGG CATGCCAGGT TATCCGGTGT TGGCTCCTGC TGCTTACTAT GACCAAATG GTGCCCTTGT AGTGAATGCA GCGCGAGAA ATGGTCTTGG AGCTCCTGTT CGACTTGTAG CTCCTGCCCC AGTCATCATT AGTTCTCTCAG CTGCACAAAGC AGCTGTGCA GCAGCCGCAG CTTCAGCAA TGGAGCAGCT GGTGGTCTTG CTGGAACAAC AAATGGACCA TTTCGCCCTT TAGGAACACA GCAGCCTCAG CCCCAGCCCC AGCAGCAGCC CAATAACAAC CTGGCATCCA GTTCTTTCTA CGGCAACAAC TCTCTGAACA GCAATTCACA GAGCAGCTCC CTCTTCTCC AGGGCTCTGC CCAGCCTGCC AACACATCCT TGGGATTTCG AAGTAGCAGT TCTCTCGCG CCACCCTGGG ATCCGCCCTT GGAGGGTTTG GAACAGCAGT TGCAAACTCC AACACTGGCA GTGGCTCCCG CCGTGACTCC CTGACTGGCA GCAGTGACCT TTATAAGAGG ACATCGAGCA GCTTGACCCC CATTGGACAC AGTTTTTATA ACGGCCCTAG CTTTCTCTCC TCTCTGGAC CCGTGGGCAT GCCTCTCCCT AGTCAGGGAC CAGGACATT ACAGACACCA CCTCCTTCCC TCTCTTACA TGGATCCTCT TCAAGCTTAA ACCTGGGAGG ACTCACGAAT GGCAGTGGAA GATACATCTC TGCTGCTCCA GGCGTGAA CCAAGTACCG CAGTGCAAGC AGCGCCTCCA GCCTTTCAG CCGAGCAGC ACTCTTTTCT CTTCCTCTCG TTTGGGATAT GGAATGTCTG ATGTATGCC TTCTGGCAGG AGCAGGCTTT TGGAAGATT TCGAAACAAC CGGTACCCCA ATTTACAAC TCGGGAGATT GCTGGACATA TAATGGAATT TTCCCAAGAC CAGCATGGGT CCAGATTCTT TCAGCTGAAA CTGGAGCGTG CCACACCAGC TGAGCGCCAG CTTGTCTTCA ATGAAATCCT CCAGGCTGCC TACCAACTCA TGGTGGATGT GTTTGGTAAT TACGTCTTTC AGAAGTTCTT TGAATTGGC AGTCTGAAAC AGAAGCTGGC TTTGGCAGAA CGGATTTCAG GCCACGTCCT GTCATTGGCA CTACAGATGT ATGGCTGCCG TGTTATCCAG AAAGCTCTTG AGTTTATTCC TTCAGACCAG CAGGTAATTA ATGAGATGGT TCGGGAAC TAATGGCCATG TCTTGAAGTG TGTGAAAGAT CAGAATGGCA ATCAGTGTT TCAGAAATGC ATTGAATGTG TACAGCCCCA GTCTTTGCAA TTTATCATCG ATGCGTTTAA GGGACAGGTA TTTGCCTTAT CCACACATCC TTATGGCTGC CGAGTGATT AGAGAATCCT GGAGCACTGT CTCCCTGACC AGACACTCCC TATTTTAGAG GAGCTTCACC AGCACACAGA GCAGCTTGTA CAGGATCAAT ATGGAATTA TGTAATCCAA CATGTACTGG AGCACGGTGC TCCTGAGGAT AAAAGCAAAA TTGTAGCAGA AATCCGAGGC AATGTACTTG TATTGAGTCA GCACAAATTT GCAAGCAATG TTGTGGAGAA GTGTGTTACT CACGCCTCAC GTACGGAGCG CGCTGTGCTC ATCGATGAGG TGTGCACCAT GAACGACGGT CCCCACAGTG CCTTATACAC CATGATGAAG GACCAGTATG	
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[0160]

		CCAACTACGT GGTCCAGAAG ATGATTGACG TGGCGGAGCC AGGCCAGCGG AAGATCGTCA TGCATAAGAT CCGGCCCCAC ATCGCAAATC TTCGTAAGTA CACCTATGGC AAGCACATTC TGGCCAAGCT GGAGAAGTAC TACATGAAGA ACGGTGTTGA CTTAGGGCCC ATCTGTGGCC CCCCTAATGG TATCATCTGA GGCAGTGTCA CCCGCTGTTT CCTCATTCCC GCTGACCTCA CTGGCCCACT GGCAAAATCCA ACCAGCAACC AGAAATGTTT TAGTGTAGAG TCTGAGACGG GCAAGTGGTT GCTCCAGGAT TACTCCCTCC TCCAAAAAAG GAATCAAATC CACGAGTGGA AAAGCCTTTG TAAATTTAAT TTTATTACAC ATAACATGTA CTATTTTTTT TAATTGACTA ATTGCCCTGC TGTTTTACTG GTGTATAGGA TACTTGTACA TAGGTAACCA ATGTACATGG GAGGCCACAT ATTTTGTTC CTGTTGTATC TATATTTTAC ATGTGGAAAC TTTGAGGGTG GTTGGTTTAA CAAAAAATAA AAGCTTTAAA AAAAAAAGAA AAAAAAGGAAA AGGTTTTTAT CTCATTGGCC TGGCCGGCAA GTTTTGCAAA TAGCTCTTCC CCACCTCCTC ATTTTAGTAA AAAACAAACA AAAACAAAAA AACCTGAGAA GTTTGAATTG TAGTTAAATG ACCCAAACT GGCATTTAAC ACTGTTTATA AAAAATATAT ATATATATAT ATATATATAT AATGAAAAAG GTTTCAGAGT TGCTAAAGCT TCAGTTTGTG ACATTAAGTT TATGAAATTC TAAAAAATGC CTTTTTGGG GACTATATTA TGCTGAAGAA GGCTGTTTCT GAGGAGGAGA TGCGAGCACC CAGAACGTCT TTTGAGGCTG GGCGGGTGTG ATTGTTTACT GCCTACTGGA TTTTTTCTA TTAACATTGA AAGGTAAAAAT CTGATTATTT AGCATGAGAA AAAAAAATCC AACTCTGCTT TTGGTCTTGC TTCTATAAAT ATATAGTGTA TACTTGGTGT AGACTTIGCA TATATACAAA TTTGTAGTAT TTTCTGTTT TGATGTCTAA TCTGTATCTA TAATGTACCC TAGTAGTCGA ACATACTTTT GATTGTACAA TTGTACATTT GTATACCTGT AATGTAAATG TGGAGAAGTT TGAATCAACA TAAACACGTT TTTTGGTAAG AAAAGAGAAT TAGCCAGCCC TGTGCATTCA GTGTATATTC TCACCTTTTA TGGTCGTAGC ATATAGTGTT GTATATTGTA AATTGTAATT TCAACCAGAA GTAAATTTTT TTCTTTTGAA GGAATAAATG TTCTTTATAC AGCCTAGTTA ATGTTTAAAA AGAAAAAAT AGCTTGGTTT TATTTGTCAT CTAGTCTCAA GTATAGCGAG ATCTTTCTA AATGTTATTC AAGATTGAGT TCTCACTAGT GTTTTTTAA TCCTAAAAAA GTAATGTTTT GATTTTGTGA CAGTCAAAAG GACGTGCAAA AGTCTAGCCT TGCCCGAGCT TTCCTTACAA TCAGAGCCCC TCTACCTTG TAAAGTGTGA ATCGCCCTTC CTTTTGTAC AGAAGATGAA CTGTATTTTG CATTTTGTCT ACTTGTAAAGT GAATGTAACA TACTGTCAAT TTTCTTGTG TGAATATAGA ATTGTAACAC TACACGGTGT ACATTCCAG AGCCTTGTGT ATATTTCCAA TGAACTTTTT TGCAAGCACA CTTGTAACCA TATGTGTATA ATTAACAAAC CTGTGTATGC TTATGCCTGG GCAACTATTT TTTGTAACCT TTGTGTAGAT TGTCTCTAAA CAATGTGTGA TCTTTATTTT GAAAAATACA GAACCTTIGGA ATCTGAAAAA AAAAAAATAA	
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[0161]

		AAAAAAAAAA AAAAAA	
	NM_0 01101. 4	GAGTGAGCGG CGCGGGGCCA ATCAGCGTGC GCCGTTCCGA AAGTTGCCTT TTATGGCTCG AGCGGCCGCG GCGGCGCCCT ATAAAACCCA GCGGCGCGAC GCGCCACCAC CGCCGAGACC GCGTCCGCCC CGCGAGCACA GAGCCTCGCC TTGCCGATC CGCCGCCCGT CCACACCCGC CGCCAGCTCA CCATGGATGA TGATATCGCC GCGCTCGTCG TCGACAACGG CTCCGGCATG TGCAAGGCCG GCTTCGCGGG CGACGATGCC CCCCAGGCCG TCTTCCCCTC CATCGTGGGG CGCCCCAGGC ACCAGGGCGT GATGGTGGGC ATGGGTCAGA AGGATTCTTA TGTGGGCGAC GAGGCCCAGA GCAAGAGAGG CATCTCACC CTGAAGTACC CCATCGAGCA CGGCATCGTC ACCAACTGGG ACGACATGGA GAAAACTTGG CACCACACCT TCTACAATGA GCTGCGTGTG GCTCCCGAGG AGCACCCCGT GCTGCTGACC GAGGCCCCCC TGAACCCCAA GGCCAACCGC GAGAAGATGA CCCAGATCAT GTTTGAGACC TTCAACACCC CAGCCATGTA CGTTGTATC CAGGCTGTGC TATCCCTGTA CGCCTCTGGC CGTACCACTG GCATCGTGAT GGACTCCGGT GACGGGGTCA CCCACACTGT GCCCATCTAC GAGGGGTATG CCCTCCCCCA TGCCATCCTG CGTCTGGACC TGGCTGGCCG GGACCTGACT GACTACCTCA TGAAGATCCT CACCGAGCGC GGCTACAGCT TCACCACCAC GGCCGAGCGG GAAATCGTGC GTGACATTAA GGAGAAGCTG TGCTACGTCG CCCTGGACTT CGAGCAAGAG ATGGCCACGG CTGCTTCCAG CTCCTCCCTG GAGAAGAGCT ACGAGCTGCC TGACGGCCAG GTCATCACCA TTGGCAATGA GCGGTTCCGC TGCCCTGAGG CACTCTTCCA GCCTTCCTTC CTGGGCATGG AGTCCTGTGG CATCCACGAA ACTACCTTCA ACTCCATCAT GAAGTGTGAC GTGGACATCC GCAAAGACCT GTACGCCAAC ACAGTGCTGT CTGGCGGCAC CACCATGTAC CCTGGCATTG CCGACAGGAT GCAGAAGGAG ATCACTGCCC TGGCACCCAG CACAATGAAG ATCAAGATCA TTGCTCCTCC TGAGCGCAAG TACTCCGTGT GGATCGGCGG CTCATCCTG GCCTCGCTGT CCACCTTCCA GCAGATGTGG ATCAGCAAGC AGGAGTATGA CGAGTCCGGC CCCTCCATCG TCCACCGCAA ATGCTTCTAG GCGGACTATG ACTTAGTTGC GTTACACCCT TTCTTGACAA AACCTAACTT GCGCAGAAAA CAAGATGAGA TTGGCATGGC TTTATTGTGTT TTTTTGTGTT TGTTTTGGTT TTTTTTTTTT TTTTGGCTTG ACTCAGGATT TAAAACTGG AACGGTGAAG GTGACAGCAG TCGGTTGGAG CGAGCATCCC CCAAAGTTCA CAATGTGGCC GAGGACTTTG ATTGCACATT GTTGTTTTTT TAATAGTCAT TCCAAATATG AGATGCGTTG TTACAGGAAG TCCCTTGCCA TCCTAAAAGC CACCCCACTT CTCTCTAAGG AGAATGGCCC AGTCCTCTCC CAAGTCCACA CAGGGGAGGT GATAGCATTG CTTTCGTGTA AATTATGTAA TGCAAAATTT TTTTAATCTT CGCCTTAATA CTTTTTATT TTGTTTATT TTGAATGATG AGCCTTCGTG CCCCCCTTC CCCCTTTTTT	41

ACTB

		GTCCCCAAC TTGAGATGTA TGAAGGCTTT TGGTCTCCCT GGGAGTGGGT GGAGGCAGCC AGGGCTTACC TGTACACTGA CTTGAGACCA GTTGAATAAA AGTGCACACC TAAAAATGA GGAAAAA AAAA	
<i>GAPD</i>	NM_0 02046. 6	GCTCTCTGCT CCTCCTGTTT GACAGTCAGC CGCATCTTCT TTTGGCGTCG CAGCCGAGCC ACATCGCTCA GACACCATGG GGAAGGTGAA GGTCCGAGTC AACGGATTG GTCGTATTGG GCGCCTGGTC ACCAGGGCTG CTTTAACTC TGGTAAAGTG GATATTGTTG CCATCAATGA CCCCTTCATT GACCTCAACT ACATGGTTTA CATGTTCAA TATGATTCCA CCCATGGCAA ATTCCATGGC ACCGTCAAGG CTGAGAACGG GAAGCTTGTC ATCAATGGAA ATCCCATCAC CATCTTCCAG GAGCGAGATC CCTCCAAAAT CAAGTGGGGC GATGCTGGCG CTGAGTACGT CGTGGAGTCC ACTGGCGTCT TCACCACCAT GGAGAAGGCT GGGGCTCATT TGCAGGGGGG AGCCAAAAGG GTCATCATCT CTGCCCCCTC TGCTGATGCC CCCATGTTCT TCATGGGTGT GAACCATGAG AAGTATGACA ACAGCCTCAA GATCATCAGC AATGCTTCT GCACCACCA CTGCTTAGCA CCCCTGGCCA AGGTCATCCA TGACAACCTT GGTATCGTGG AAGGACTCAT GACCACAGTC CATGCCATCA CTGCCACCA GAAGACTGTG GATGGCCCCC CCGGAAACT GTGGCGTGAT GGCGCGGGG CTCTCCAGAA CATCATCCCT GCCTCTACTG GCGCTGCCAA GGCTGTGGGC AAGGTCATCC CTGAGCTGAA CGGGAAGCTC ACTGGCATGG CTTCCGTGT CCCCCTGCC AACGTGTCAG TGGTGGACCT GACCTGCCGT CTAGAAAAAC CTGCCAAATA TGATGACATC AAGAAGGTGG TGAAGCAGGC GTCGGAGGGC CCCCCAAGG GCATCCTGGG CTACACTGAG CACCAGGTGG TCTCCTCTGA CTCAACAGC GACACCCACT CCTCCACCTT TGACGCTGGG GCTGGCATTG CCTCAACGA CCACTTTGTC AAGTCATTT CCTGGTATGA CAACGAATTT GGCTACAGCA ACAGGGTGGT GGACCTCATG GCCCACATGG CCTCCAAGGA GTAAGACCCC TGGACCACCA GCCCCAGCA GAGCACAAGA GGAAGAGAGA GACCCTCACT GCTGGGGAGT CCCTGCCACA CTCAGTCCCC CACCACACTG AATCTCCCCT CTCACAGTT GCCATGTAGA CCCCTTGAAG AGGGGAGGGG CCTAGGGAGC CGCACCTTGT CATGTACCAT CAATAAAGTA CCCTGTGCTC AACCAGTTAA AAAAAA	42
<i>GUSB</i>	NM_0 00181. 3	GTCCTCAACC AAGATGGGCG GGATGGCTTC AGGCGCATCA CGACACCGGC GCGTACGCG ACCCGCCCTA CCGGCACCTC CCGCGTTTT CTAGCGCCG CAGACGGTGG CCGAGCGGGG GACCGGGAAG CATGGCCCGG GGGTCGGCGG TTGCCTGGGC GGCGCTCGGG CCGTTGTTGT GGGGCTGCGC GCTGGGGCTG CAGGGCGGGA TGCTGTACCC CCAGGAGAGC CCGTCGCGGG AGTGCAAGGA GCTGGACGGC CTCTGGAGCT TCCGCGCCGA CTTCTCTGAC AACCGACGCC GGGGCTTCGA GGAGCAGTGG TACCGCGGCG CGCTGTGGGA GTCAGGCCCC ACCGTGGACA	43

[0163]

	TGCCAGTTCC CTCCAGCTTC AATGACATCA GCCAGGACTG GCGTCTGCGG CATTTTGTCTG GCTGGGTGTG GTACGAACGG GAGGTGATCC TGCCGGAGCG ATGGACCAG GACCTGCGCA CAAGAGTGGT GCTGAGGATT GGCAGTGCCC ATTCCTATGC CATCGTGTGG GTGAATGGGG TCGACACGCT AGAGCATGAG GGGGGCTACC TCCCCTTCGA GGCCGACATC AGCAACCTGG TCCAGGTGGG GCCCCTGCCC TCCCGGCTCC GAATCACTAT CGCCATCAAC AACACACTCA CCCCCACCAC CCTGCCACCA GGGACCATCC AATACCTGAC TGACACCTCC AAGTATCCCA AGGGTTACTT TGTCCAGAAC ACATATTTTG ACTTTTTCAA CTACGCTGGA CTGCAGCGGT CTGTACTTCT GTACACGACA CCCACCACCT ACATCGATGA CATCACCGTC ACCACCAGCG TGGAGCAAGA CAGTGGGCTG GTGAATTACC AGATCTCTGT CAAGGGCAGT AACCTGTTCA AGTTGGAAGT GCGTCTTTTG GATGCAGAAA ACAAAGTCGT GGCGAATGGG ACTGGGACCC AGGGCCAAC TAAGGTGCCA GGTGTACGCC TCTGGTGCC GTACCTGATG CACGAACGCC CTGCCTATCT GTATTCTTG GAGGTGCAGC TGAAGTGCAC GACGTCACTG GGGCCTGTGT CTGACTTCTA CACACTCCCT GTGGGGATCC GCACTGTGGC TGTCACCAAG AGCCAGTTCC TCATCAATGG GAAACCTTTC TATTTCCACG GTGTCAACAA GCATGAGGAT GCGGACATCC GAGGGAAGGG CTTGACTGG CCGCTGCTGG TGAAGGACTT CAACCTGCTT CGCTGGCTTG GTGCCAACGC TTTCCTTACC AGCCACTACC CCTATGCAGA GGAAGTGATG CAGATGTGTG ACCGCTATGG GATTGTGGTC ATCGATGAGT GTCCCGGCGT GGGCCGTGGC CTGCCGAGT TCTTCAACAA CGTTTCTCTG CATCACCACA TGCAGGTGAT GGAAGAAGTG GTGCGTAGGG ACAAGAACCA CCCCAGGCTC GTGATGTGGT CTGTGGCCAA CGAGCCTGCG TCCCACCTAG AATCTGCTGG CTACTACTTG AAGATGGTGA TCGCTCACAC CAAATCCTTG GACCCCTCCC GGCCTGTGAC CTTTGTGAGC AACTCTAACT ATGCAGCAGA CAAGGGGGCT CCGTATGTGG ATGTGATCTG TTGAACAGC TACTACTCTT GGTATCACGA CTACGGGCAC CTGGAGTTGA TTCAGCTGCA GCTGGCCACC CAGTTTGAGA ACTGGTATAA GAAGTATCAG AAGCCATTA TTCAGAGCGA GTATGGAGCA GAAACGATTG CAGGGTTTCA CCAGGATCCA CCTCTGATGT TCACTGAAGA GTACCAGAAA AGTCTGCTAG AGCAGTACCA TCTGGGTCTG GATCAAAAAC GCAGAAAATA CGTGGTTGGA GAGCTCATTT GGAATTTTGC CGATTTCTATG ACTGAACAGT CACCGACGAG AGTGCTGGGG AATAAAAAGG GGATCTTCAC TCGGCAGAGA CAACCAAAAA GTGCAGCGTT CCTTTGCGA GAGAGATACT GGAAGATTGC CAATGAAACC AGGTATCCCC ACTCAGTAGC CAAGTCACAA TGTTTGGAAA ACAGCCTGTT TACTTGAGCA AGACTGATAC CACCTGCGTG TCCCTTCCTC CCCGAGTCAG GCGGACTTCC ACAGCAGCAG AACAAGTGCC TCCTGGACTG TTCACGGCAG ACCAGAACGT TTCTGGCCTG GGTTTGTGG TCATCTATTG TAGCAGGGAA CACTAAAGGT GGAAATAAAA GATTTTCTAT TATGAAAATA AAGAGTTGGC	
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[0164]

		ATGAAAGTGG CTA CTGAAAA AAAAAAAAAA AAAAAAAAAA A	
	NM_001002.3	GTCTGACGGG CGATGGCGCA GCCAATAGAC AGGAGCGCTA TCCGCGGTTT CTGATTGGCT ACTTTGTTTCG CATTATAAAA GGCACGCGCG GGC GCGAGGC CCTTCTCTCG CCAGGCGTCC TCGTGAAGT GACATCGTCT TTAACCCCTG CGTGGCAATC CCTGACGCAC CGCCGTGATG CCCAGGGAAG ACAGGGCGAC CTGGAAGTCC AACTACTTCC TTAAGATCAT CCAACTATTG GATGATTATC CGAAATGTTT CATTGTGGGA GCAGACAATG TGGGCTCCAA GCAGATGCAG CAGATCCGCA TGTCCCTCG CGGGAAGGCT GTGGTGCTGA TGGGCAAGAA CACCATGATG CGCAAGGCCA TCCGAGGGCA CCTGGAAGAA AACCCAGCTC TGGAGAAACT GCTGCCTCAT ATCCGGGGGA ATGTGGGCTT TGTGTTTACC AAGGAGGACC TCACTGAGAT CAGGGACATG TTGCTGGCCA ATAAGGTGCC AGCTGCTGCC CGTGCTGGTG CCATTGCCCC ATGTGAAGTC ACTGTGCCAG CCCAGAACAC TGGTCTCGGG CCCGAGAAGA CCTCCTTTTT CCAGGCTTTA GGTATCACCA CTAAATCTC CAGGGGCACC ATTGAAATCC ATGTGATGT GCAGCTGATC AAGACTGGAG ACAAGTGGG AGCCAGCGAA GCCACGCTGC TGAACATGCT CAACATCTCC CCCTTCTCCT TTGGGCTGGT CATCCAGCAG GTGTTTCGACA ATGGCAGCAT CTACAACCT GAAGTGCTTG ATATCACAGA GGAAACTCTG CATTCTCGCT TCCTGGAGGG TGTCCGCAAT GTTGCCAGTG TCTGTCTGCA GATTGGCTAC CCAACTGTTG CATCAGTACC CCATTCTATC ATCAACGGGT ACAACGAGT CCTGGCCTTG TCTGTGGAGA CGGATTACAC CTTCCCACTT GCTGAAAAGG TCAAGGCCTT CTGGGCTGAT CCATCTGCCT TTGTGGCTGC TGCCCTGTG GCTGCTGCCA CCACAGCTGC TCCTGCTGCT GCTGCAGCCC CAGCTAAGGT TGAAGCCAAG GAAGAGTCGG AGGAGTCGGA CGAGGATATG GGATTTGGTC TCTTTGACTA ATCACCAGAA AGCAACCAAC TTAGCCAGTT TTATTTGCAA AACAAGGAAA TAAAGGCTTA CTTCTTTAAA AAGTAAAAAA AAAAAAAAAA AAAAAAAAAA	44
RPLP0			
	NM_003234.3	AGAGCGTCGG GATATCGGGT GCGGGCTCGG GACGGAGGAC GCGCTAGTGT GAGTGCGGGC TTCTAGAACT ACACCGACCC TCGTGTCTC CTTTCATCCT GCGGGGCTGG CTGGAGCGGC CGCTCCGGTG CTGTCCAGCA GCCATAGGGA GCCGCACGGG GAGCGGGAAA GCGGTGCGGG CCCAGGCGG GCGGCGCGGG ATGGAGCGGG GCCGCGAGCC TGTGGGGAAG GGGCTGTGGC GCGCCTCGA GCGGTGCGAG GTTCTTCTGT GTGGCAGTTC AGAATGATGG ATCAAGCTAG ATCAGCATTC TCTAACTTGT TTGGTGGAGA ACCATTGTCA TATACCCGGT TCAGCCTGGC TCGGCAAGTA GATGGCGATA ACAGTCATGT GGAGATGAAA CTTGCTGTAG ATGAAGAAGA AAATGCTGAC AATAACACAA AGGCCAATGT CACAAAACCA AAAAGGTGTA GTGGAAGTAT CTGCTATGGG ACTATTGCTG TGATCGTCTT TTTCTTGATT GGATTTATGA TTGGCTACTT GGGCTATTGT AAAGGGGTAG AACCAAAAAA TGAGTGTGAG AGACTGGCAG GAACCGAGTC	45
TFRC			

[0165]

	TCCAGTGAGG GAGGAGCCAG GAGAGGACTT CCCTGCAGCA CGTCGCTTAT ATTGGGATGA CCTGAAGAGA AAGTTGTGG AGAAACTGGA CAGCACAGAC TTCACCGGCA CCATCAAGCT GCTGAATGAA AATTCATATG TCCCTCGTGA GGCTGGATCT CAAAAAGATG AAAATCTTGC GTTGATGTT GAAAATCAAT TTCGTGAATT TAAACTCAGC AAAGTCTGGC GTGATCAACA TTTTGTAAAG ATTCAGGTCA AAGACAGCGC TCAAACTCG GTGATCATAAG TTGATAAGAA CGGTAGACTT GTTACCTGG TGGAGAATCC TGGGGGTTAT GTGGCGTATA GTAAGGCTGC AACAGTTACT GGTAAACTGG TCCATGCTAA TTTTGGTACT AAAAAAGATT TTGAGGATTT ATACACTCCT GTGAATGGAT CTATAGTGAT TGTGAGAGCA GGGAAAATCA CCTTTGCAGA AAAGGTGCA AATGCTGAAA GCTTAAATGC AATTGGTGTG TTGATATACA TGGACCAGAC TAAATTTCCC ATTGTTAACG CAGAACTTTC ATCTTTGGA CATGCTCATC TGGGGACAGG TGACCCTTAC ACACCTGGAT TCCCTTCCTT CAATCACACT CAGTTTCCAC CATCTCGGTC ATCAGGATTG CCTAATATAC CTGTCCAGAC AATCTCCAGA GCTGCTGCAG AAAAGCTGTT TGGGAATATG GAAGGAGACT GTCCCTCTGA CTGAAAAACA GACTCTACAT GTAGGATGGT AACCTCAGAA AGCAAGAATG TGAAGCTCAC GTGAGCAAT GTGCTGAAAG AGATAAAAAAT TCTTAACATC TTTGGAGTTA TTAAGGCTT TGTAGAACCA GATCACTATG TTGTAGTTGG GGCCAGAGA GATGCATGGG GCCCTGGAGC TGCAAAATCC GGTGTAGGCA CAGCTCTCCT ATTGAAACTT GCCCAGATGT TCTCAGATAT GGTCTTAAAA GATGGGTTTC AGCCAGCAG AAGCATTATC TTTGCCAGTT GGAGTGCTGG AGACTTTGGA TCGGTTGGTG CCACTGAATG GCTAGAGGGA TACCTTTCGT CCCTGCATTT AAAGGCTTTC ACTTATATTA ATCTGGATAA AGCGGTTCTT GGTACCAGCA ACTTCAAGGT TTCTGCCAGC CACTGTTGT ATACGCTTAT TGAGAAAAACA ATGCAAAATG TGAAGCATCC GGTTACTGGG CAATTTCTAT ATCAGGACAG CAACTGGGCC AGCAAAAGTTG AGAAACTCAC TTAGACAAT GCTGCTTTCC CTTTCCTTGC ATATTCTGGA ATCCCAGCAG TTTCTTTCTG TTTTIGCGAG GACACAGATT ATCCTTATTT GGGTACCACC ATGGACACCT ATAAGGAACT GATTGAGAGG ATTCTGAGT TGAACAAAGT GGCAGGAGCA GCTGCAGAGG TCGCTGGTCA GTTCGTGATT AAACTAACCC ATGATGTTGA ATTGAACCTG GACTATGAGA GGTACAACAG CCAACTGCTT TCATTGTGA GGGATCTGAA CCAATACAGA GCAGACATAA AGGAAATGGG CCTGAGTTTA CAGTGGCTGT ATTCTGCTCG TGGAGACTTC TTCCGTGCTA CTTCCAGACT AACAACAGAT TTCGGGAATG CTGAGAAAAC AGACAGATTT GTCATGAAGA AACTCAATGA TCGTGTCAATG AGAGTGGAGT ATCACTTCCT CTCTCCCTAC GTATCTCCAA AAGAGTCTCC TTTCCGACAT GTCTTCTGGG GCTCCGGCTC TCACACGCTG CCAGCTTTAC TGGAGAACTT GAAACTGCGT AAACAAAATA ACGGTGCTTT TAATGAAACG CTGTTCAAGAA ACCAGTTGGC TCTAGCTACT TGGACTATTC AGGGAGCTGC	
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[0166]

	AAATGCCCTC TCTGGTGACG TTTGGGACAT TGACAATGAG TTTTAAATGT GATACCCATA GCTTCCATGA GAACAGCAGG GTAGTCTGGT TTCTAGACTT GTGCTGATCG TGCTAAATTT TCAGTAGGGC TACAAAACCT GATGTTAAAA TTCCATCCCA TCATCTTGGT ACTACTAGAT GTCCTTAGGC AGCAGCTTTT AATACAGGGT AGATAACCTG TACTTCAAGT TAAAGTGAAT AACCACCTAA AAAATGTCCA TGATGGAATA TTCCCTATC TCTAGAATTT TAAGTGCTTT GTAATGGGAA CTGCCCTTTT CCTGTTGTTG TTAATGAAAA TGTCAGAAAC CAGTTATGTG AATGATCTCT CTGAATCCTA AGGGCTGGTC TCTGCTGAAG GTTGTAAGTG GTCGCTTACT TTGAGTGATC CTCCAACCTC ATTTGATGCT AAATAGGAGA TACCAGGTIG AAAGACCTTC TCCAAATGAG ATCTAAGCCT TTCCATAAGG AATGTAGCTG GTTTCCTCAT TCCTGAAAGA AACAGTTAAC TTTCAGAAAG GATGGGCTTG TTTCTTGCC AATGAGGTCT GAAATGGAGG TCCTTCTGCT GGATAAAATG AGGTTCAACT GTTGATTGCA GGAATAAGGC CTTAATATGT TAACCTCAGT GTCATTTATG AAAAGAGGGG ACCAGAAGCC AAAGACTTAG TATATTTTCT TTTCTCTGT CCCTTCCCC ATAAGCCTCC ATTTAGTTCT TGTATTATTT TGTTCCTTCC AAAGCACATT GAAAGAGAAC CAGTTTCAGG TGTTTAGTTG CAGACTCAGT TTGTCAGACT TTAAAGAATA ATATGCTGCC AAATTTGGC CAAAGTGTTA ATCTTAGGGG AGAGCTTTCT GTCCTTTTGG CACTGAGATA TTTATTGTTT ATTTATCAGT GACAGAGTTC ACTATAAATG GTGTTTTTTT AATAGAATAT AATTATCGGA AGCAGTGCCT TCCATAATTA TGACAGTTAT ACTGTCGGTT TTTTAAAT AAAAGCAGCA TCTGCTAATA AAACCCAACA GATACTGGAA GTTTTGCATT TATGGTCAAC ACTTAAGGGT TTTAGAAAAC AGCCGTCAGC CAAATGTAAT TGAATAAAGT TGAAGCTAAG ATTTAGAGAT GAATTAAAT TAAATTAGGGG TTGCTAAGAA GCGAGCACTG ACCAGATAAG AATGCTGGTT TTCCTAAATG CAGTGAATTG TGACCAAGTT ATAAATCAAT GTCACCTAAA GGCTGTGGTA GTACTCCTGC AAAATTTTAT AGCTCAGTTT ATCCAAGGTG TAACTCTAAT TCCCATTTTG CAAAATTTCC AGTACCTTTG TCACAATCCT AACACATTAT CGGGAGCAGT GTCTTCCATA ATGTATAAAG AACAAGGTAG TTTTACCTA CCACAGTGTC TGTATCGGAG ACAGTGATCT CCATATGTTA CACTAAGGGT GTAAGTAAT ATCGGGAACA GTGTTTCCCA TAATTTTCTT CATGCAATGA CATCTTCAA GCTTGAAGAT CGTTAGTATC TAACATGTAT CCCAACTCCT ATAATTCCT ATCTTTTAGT TTTAGTTGCA GAAACATTTT GTGGTCATTA AGCATTGGGT GGGTAAATTC AACCACTGTA AAATGAAATT ACTACAAAAT TTGAAATTTA GCTTGGGTTT TTGTTACCTT TATGGTTTCT CCAGGTCCTC TACTTAATGA GATAGTAGCA TACATTTATA ATGTTTGCTA TTGACAAGTC ATTTTAACTT TATCACATTA TTGTCATGTT ACCTCCTATA AACTTAGTGC GGACAAGTTT TAATCCAGAA TTGACCTTTT GACTTAAAGC AGAGGGACTT TGTATAGAAG GTTTGGGGGC TGTGGGAAG	
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[0167]

		GAGAGTCCCC TGAAGGTCTG ACACGTCTGC CTACCCATTC GTGGTGATCA ATTAAATGTA GGTATGAATA AGTTCGAAGC TCCGTGAGTG AACCATCATT ATAAACGTGA TGATCAGCTG TTTGTCATAG GGCAGTTGGA AACGGCCTCC TAGGGAAAAA TTCATAGGGT CTCTTCAGGT TCTTAGTGTC ACTTACCTAG ATTTACAGCC TCACITGAAT GTGTCACTAC TCACAGTCTC TTTAATCTTC AGTTTATCT TTAATCTCCT CTTTATCTT GGACTGACAT TTAGCGTAGC TAAGTGAAAA GGTATAGCT GAGATTCTTG GTTCGGGTGT TACGCACACG TACTTAAATG AAAGCATGTG GCATGTTTAT CGTATAACAC AATATGAATA CAGGGCATGC ATTTTGACAG AGTGAGTCTC TTCAGAAAAC CCTTTTCTAC AGTTAGGGTT GAGTTACTTC CTATCAAGCC AGTACGTGCT AACAGGCTCA ATATTCCTGA ATGAAATATC AGACTAGTGA CAAGCTCCTG GTCTTGAGAT GTCTTCTCGT TAAGGAGATG GGCCTTTTGG AGGTAAAGGA TAAATGAAT GAGTTCTGTC ATGATTCACT ATTCTAGAAC TTGCATGACC TTTACTGTGT TAGCTCTTG AATGTTCTTG AAATTTTAGA CTTCTTTGT AAACAAATGA TATGTCCTTA TCATTGTATA AAAGCTGTTA TGTGCAACAG TGTGGAGATT CCTGTCTGA TTTAATAAAA TACTTAAACA CTGAAAAAAA AAAA	
185	X0320 5.1	TACCTGGTTG ATCCTGCCAG TAGCATATGC TTGTCTCAAA GATTAAGCCA TGCATGTCTA AGTACGCACG GCCGGTACAG TGAAACTGCG AATGGCTCAT TAAATCAGTT ATGGTTCCTT TGGTCGCTCG CTCCTCTCCC ACTTGGATAA CTGTGGTAAT TCTAGAGCTA ATACATGCCG ACGGGCGCTG ACCCCCTTCG CGGGGGGGAT GCGTGCATTT ATCAGATCAA AACCAACCCG GTCAGCCCCT CTCGGCCCC GCGCGGGGGG CGGGCGCCGG CGGCTTTGGT GACTCTAGAT AACCTCGGGC CGATCGCACG CCCCCGTGG CGGCGACGAC CCATTCGAAC GTCTGCCCTA TCAACTTTCG ATGGTAGTCG CCGTGCCTAC CATGGTGACC ACGGGTGACG GGAATCAGG GTTCGATTCC GGAGAGGGAG CCTGAGAAAC GGCTACCACA TCCAAGGAAG GCAGCAGGCG CGCAAATTAC CCACTCCGA CCCGGGGAGG TAGTGACGAA AAATAACAAT ACAGGACTCT TTCGAGGCC TGTAATTGGA ATGAGTCCAC TTAAATCCT TTAACGAGGA TCCATTGGAG GGCAAGTCTG GTGCCAGCAG CCGCGTAAT TCCAGCTCCA ATAGCGTATA TTAAGTTGC TGCAGTTAAA AAGCTCGTAG TTGGATCTTG GGAGCGGGCG GCGGTCCGC CGCGAGGCGA GCCACCGCCC GTCCCCGCC CTTGCCTCTC GCGCCCCCT CGATGCTCTT AGCTGAGTGT CCCGCGGGGC CCGAAGCGTT TACTTTGAAA AAATTAGAGT GTTCAAAGCA GGCCCGAGCC GCCTGGATAC CGCAGCTAGG AATAATGGAA TAGGACCGCG GTTCTATTTT GTTGGTTTT GGAACAGAG CCATGATTAA GAGGGACGGC CGGGGCGATT CGTATTGCGC CGCTAGAGGT GAAATTCTTG GACCGGCGCA AGACGGACCA GAGCGAAAGC ATTTGCCAAG AATGTTTCA TTAATCAAGA ACGAAAGTCG GAGGTTCGAA GACGATCAGA TACCGTCGTA GTTCCGACCA	46

[0168]

		TAAACGATGC CGACCGGCGA TGCGGCGGCG TTATTCCCAT GACCCGCCGG GCAGCTTCCG GGAAACCAAA GTCTTTGGGT TCCGGGGGGA GTATGGTTGC AAAGCTGAAA CTAAAGGAA TTGACGGAAG GGCACCACCA GGAGTGGAGC CTGCGGCTTA ATTTGACTCA ACACGGGAAA CCTCACCCGG CCGGACACG GACAGGATTG ACAGATTGAT AGCTCTTTCT CGATTCCGTG GGTGTGGTG CATGGCCGTT CTTAGTTGGT GGAGCGATTT GTCTGGTTAA TTCCGATAAC GAACGAGACT CTGGCATGCT AACTAGTTAC GCGACCCCG AGCGGTGGC GTCCCCAAC TTCTTAGAGG GACAAGTGGC GTTCAGCCAC CCGAGATTGA GCAATAACAG GTCTGTGATG CCCTTAGATG TCCGGGGCTG CACGCGGCT AACTGACTG GCTCAGCGTG TGCCTACCCT ACGCCGGCAG GCGCGGGTAA CCCGTTGAAC CCCATTCTGT ATGGGGATCG GGGATTGCAA TTATTCCCA TGAACGAGGA ATTCCAGTA AGTGCGGGTC ATAAGCTTGC GTTGATTAAG TCCCTGCCCT TTGTACACAC CGCCCGTCGC TACTACCGAT TGGATGGTTT AGTGAGGCC TCGGATCGG CCGCCGGGG TCGGCCACG GCCCTGGCGG AGCGCTGAGA AGACGGTCGA ACTTGACTAT CTAGAGGAAG TAAAAGTCGT AACAAGGTTT CCGTAGGTGA ACCTGCGGAA GGATCATTA	
PPIA	NM_0 21130. 4	GGGGCCGAAC GTGGTATAAA AGGGGCGGGA GGCCAGGCTC GTGCCGTTTT GCAGACGCCA CCGCCGAGGA AAACCGTGTA CTATTAGCCA TGGTCAACCC CACCGTGTTT TTCGACATTG CCGTCGACGG CGAGCCCTTG GGCCGCGTCT CTTTGTAGCT GTTTGCAGAC AAGGTCCCAA AGACAGCAGA AAATTTTCGT GCTCTGAGCA CTGGAGAGAA AGGATTGGT TATAAGGGTT CCTGCTTTCA CAGAATTATT CCAGGGTTTA TGTGTCAGG TGGTGACTTC ACACGCCATA ATGGCACTGG TGGCAAGTCC ATCTATGGGG AGAAATTGA AGATGAGAAC TTCATCCTAA AGCATACGGG TCCTGGCATC TTGTCCATGG CAAATGCTGG ACCCAACACA AATGGTTCCC AGTTTTCAT CTGCACTGCC AAGACTGAGT GGTGGATGG CAAGCATGTG GTGTTTGCA AAGTGAAAGA AGGCATGAAT ATTGTGGAGG CCATGGAGCG CTTTGGGTCC AGGAATGGCA AGACCAGCAA GAAGATCACC ATTGCTGACT GTGGACAAC CGAATAAGTT TGACTTGTGT TTTATCTTAA CCACCAGATC ATTCCTTCTG TAGCTCAGGA GAGCACCCCT CCACCCATT TGCTCGCAGT ATCCTAGAAT CTTTGTGCTC TCGCTGCAGT TCCCTTGGG TTCCATGTTT TCCTTGTTCC CTCCCATGCC TAGCTGGATT GCAGAGTTAA GTTTATGATT ATGAAATAAA AACTAAATAA CAATTGTCCT CGTTTGAGTT AAGAGTGTG ATGTAGGCTT TATTTAAGC AGTAATGGGT TACTTCTGAA ACATCATTG TTTGCTTAAT TCTACACAGT ACTTAGATTT TTTTACTTT CCAGTCCCAG GAAGTGCAA TGTGTTGA GTGGAATATT GAAAATGTAG GCAGCAACTG GGCATGGTGG CTCAGTGTCT GTAATGTATT ACCTGAGGCA GAAGACCACC TGAGGGTAGG AGTCAAGATC AGCCTGGGCA ACATAGTGAG ACGCTGTCTC TACAAAAAAT	47

[0169]

		AATTAGCCTG GCCTGGTGGT GCATGCCTAG TCCTAGCTGA TCTGGAGGCT GACGTGGGAG GATTGCTTGA GCCTAGAGTG AGCTATTATC ATGCCACTGT ACAGCCTGGG TGTTCACAGA TCTTGTGTCT CAAAGGTAGG CAGAGGCAGG AAAAGCAAGG AGCCAGAATT AAGAGGTTGG GTCAGTCTGC AGTGAGTTCA TGCATTTAGA GGTGTTCTTC AAGATGACTA ATGTCAAAAA TTGAGACATC TGTTCGGT TTTTTTTTTT TTTTTCCCC TGGAATGCAG TGGCGTGATC TCAGCTCACT GCAGCCTCCG CCTCCTGGGT TCAAGTGATT CTAGTGCCCT AGCCTCCTGA GTAGCTGGGA TAATGGGCGT GTGCCACCAT GCCCAGCTAA TTTTTGATT TTTAGTATAG ATGGGGTTTC ATCATTTTGA CCAGGCTGGT CTCAAACCTCT TGACCTCAGC TGATGCGCCT GCCTTGGCCT CCCAAACTGC TGAGATTACA GATGTGAGCC ACCGCACCTC ACCTCATTTT CTGTAACAAA GCTAAGCTTG AACACTGTTG ATGTTCTTGA GGGAAGCATA TTGGGCTTTA GGCTGTAGGT CAAGTTTATA CATCTTAATT ATGGTGGAAT TCCTATGTAG AGTCTAAAAA GCCAGGTACT TGGTGCTACA GTCAGTCTCC CTGCAGAGGG TTAAGGCGCA GACTACCTGC AGTGAGGAGG TACTGCTTGT AGCATATAGA GCCTCTCCCT AGCTTTGGTT ATGGAGGCTT TGAGGTTTGA CAAACCTGAC CAATTTAAGC CATAAGATCT GGTCAAAGGG ATACCCTTCC CACTAAGGAC TTGGTTTCTC AGGAAATTAT ATGTACAGTG CTTGCTGGCA GTTAGATGTC AGGACAATCT AAGCTGAGAA AACCCTTCT CTGCCCACCT TAACAGACCT CTAGGGTTCT TAACCCAGCA ATCAAGTTTG CCTATCCTAG AGGTGGCGGA TTTGATCATT TGGTGTGTTG GGCAATTTTT GTTTTACTGT CTGGTTCCTT CTGCGTGAAT TACCACCACC ACCACTTGTG CATCTCAGTC TTGTGTGTTG TCTGGTTACG TATTCCTGG GTGATACCAT TCAATGTCTT AATGTACTTG TGGCTCAGAC CTGAGTGCAA GGTGGAAATA AACATCAAAC ATCTTTTCAT TATCCCTA	
PGK1	NM_002913	GAGAGCAGCG GCCGGGAAGG GGCGGTGCGG GAGGCGGGT GTGGGGCGGT AGTGTTGGCC CTGTTCTG CCGCGCGGTG TTCCGCATTC TGCAAGCCTC CGGAGCGCAC GTCGGCAGTC GGCTCCCTCG TTGACCGAAT CACCGACCTC TCTCCCAGC TGTATTTCCA AAATGTCGCT TTCTAACAAG CTGACGCTGG ACAAGCTGGA CGTTAAAGGG AAGCGGGTCG TTATGAGAGT CGACTTCAAT GTTCCTATGA AGAACAACCA GATAACAAAC AACCAGAGGA TTAAGGCTGC TGTCCCAAGC ATCAAATTCT GCTTGGACAA TGGAGCCAAG TCGGTAGTCC TTATGAGCCA CCTAGGCCGG CTGATGGTG TGCCCATGCC TGACAAGTAC TCCTTAGAGC CAGTTGCTGT AGAACTCAAA TCTCTGCTGG GCAAGGATGT TCTGTTCTTG AAGGACTGTG TAGGCCCAGA AGTGGAGAAA GCCTGTGCCA ACCCAGCTGC TGGGTCTGTC ATCTGCTGG AGAACCTCCG CTTTCATGTG GAGGAAGAAG GGAAGGGAAA AGATGCTTCT GGAACAAGG TTAAAGCCGA	48

[0170]

	GCCAGCCAAA ATAGAAGCTT TCCGAGCTTC ACTTTC AAG CTAGGGGATG TCTATGTCAA TGATGCTTTT GGCAC TGCTC ACAGAGCCCA CAGCTCCATG GTAGGAGTCA ATCTGCCACA GAAGGCTGGT GGGTTTTTGA TGAAGAAGGA GCTGAACTAC TTTGCAAAGG CCTTGGAGAG CCCAGAGCGA CCCTTCCTGG CCATCCTGGG CGGAGCTAAA GTTGCAGACA AGATCCAGCT CATCAATAAT ATGCTGGACA AAGTCAATGA GATGATTATT GGTGGTGGAA TGGCTTTTAC CTTCTTAAAG GTGCTCAACA ACATGGAGAT TGGCACTTCT CTGTTTGATG AAGAGGGAGC CAAGATTGTC AAAGACCTAA TGTCCAAAGC TGAGAAGAAT GGTGTGAAGA TTACCTTGCC TGTTGACTTT GTCAC TGCTG ACAAGTTTGA TGAGAATGCC AAGACTGGCC AAGCCACTGT GGCTTCTGGC ATACCTGCTG GCTGGATGGG CTGGACTGT GGTCCTGAAA GCAGCAAGAA GTATGCTGAG GCTGCACTC GGGCTAAGCA GATTGTGTGG AATGGTCTG TGGGGGTATT TGAATGGGAA GCTTTTGCCC GGGGAACCAA AGCTCTCATG GATGAGGTGG TGAAAGCCAC TTCTAGGGGC TGCATCACC TCATAGGTGG TGGAGACACT GCCACTTGCT GTGCCAAATG GAACACGGAG GATAAAGTCA GCCATGTGAG CACTGGGGGT GGTGCCAGTT TGGAGCTCCT GGAAGGTA AAA GTCCTTCCTG GGGTGGATGC TCTCAGCAAT ATTTAGTACT TTCTGCTT TTAGTTCTCT TGCACAGCCC CTAAGTCAAC TTAGCATTTT CTGCATCTCC ACTTGGCATT AGCTAAAACC TTCCATGTCA AGATTCAAGT AGTGGCCAAG AGATGCAGTG CCAGGAACCC TTAAACAGTT GCACAGCATC TCAGCTCATC TTCACTGCAC CCTGGATTTG CATACATTCT TCAAGATCCC ATTTGAATTT TTTAGTGACT AAACCATTTG GCATTCTAGA GTGCATATAT TTATATTTTG CCTGTAAAA AGAAAGTGAG CAGTGTTAGC TTAGTTCTCT TTGATGTAG GTTATTATGA TTAGCTTTGT CACTGTTTCA CTA CTCAGCA TGGAAACAAG ATGAAATTCC ATTTGTAGGT AGTGAGACAA AATTGATGAT CCATTAAGTA AACAATAAAA GTGTCCATTG AAACCGTGAT TTTTTTTTT TTCCTGTCAT ACTTTGTTAG GAAGGGTGAG AATAGAATCT TGAGGAACGG ATCAGATGTC TATATTGCTG AATGCAAGAA GTGGGGCAGC AGCAGTGGAG AGATGGGACA ATTAGATAAA TGTCCATTCT TTATCAAGGG CTA CTTTAT GGCAGACATT GTGCTAGTGC TTTTATTCTA ACTTTTATTT TTATCAGTTA CACATGATCA TAATTTAAAA AGTCAAGGCT TATAACAAAA AAGCCCCAGC CCATTCTCC CATTCAAGAT TCCCACTCCC CAGAGGTGAC CACTTTCAAC TCTTGAGTTT TTCAGGTATA TACCTCCATG TTTCTAAGTA ATATGCTTAT ATTGTTCACT TCTTTTTTTT TTATTTTTTA AAGAAATCTA TTTCATACCA TGGAGGAAGG CTCTGTTCCA CATATATTTT CACTTCTTCA TTCTCTCGGT ATAGTTTGT CACAATTATA GATTAGATCA AAAGTCTACA TAACTAATAC AGCTGAGCTA TGTAGTATGC TATGATTAAA TTTACTTATG TAAAAA AAAA	
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[0171]

RPL13A	NM_012423.3	CACTTCTGCC GCCCTGTTT CAAGGGATAA GAAACCCTGC GACAAAACCT CCTCCTTTTC CAAGCGGCTG CCGAAGATGG CGGAGGTGCA GGTCTTGGTG CTTGATGGTC GAGGCCATCT CCTGGGCCGC CTGGCGGCCA TCGTGGCTAA ACAGGTA CTGGGCCGGA AGGTGGTGGT CGTACGCTGT GAAGGCATCA ACATTTCTGG CAATTTCTAC AGAAACAAGT TGAAGTACCT GGCTTTCTCT CGCAAGCGGA TGAACACCAA CCCTTCCCGA GGCCCTACC ACTTCCGGGC CCCCAGCCGC ATCTTCTGGC GGACCGTGCG AGGTATGCTG CCCCACAAAA CCAAGCGAGG CCAGGCCGCT CTGGACCGTC TCAAGGTGTT TGACGGCATC CCACGCCCT ACGACAAGAA AAAGCGGATG GTGGTTCTCTG CTGCCCTCAA GGTCTGTGCT CTGAAGCCTA CAAGAAAGTT TGCCTATCTG GGGCGCCTGG CTCACGAGGT TGGCTGGAAG TACCAGGCAG TGACAGCCAC CCTGGAGGAG AAGAGGAAAG AGAAAGCCAA GATCCACTAC CGGAAGAAGA AACAGCTCAT GAGGCTACGG AAACAGGCCG AGAAGAAGT GGAGAAGAAA ATTGACAAAT ACACAGAGGT CCTCAAGACC CACGGACTCC TGGTCTGAGC CCAATAAAGA CTGTTAATTC CTCATGCGTT GCCTGCCCTT CCTCCATIGT TGCCCTGGAA TGTACGGGAC CCAGGGGCAG CAGCAGTCCA GGTGCCACAG GCAGCCCTGG GACATAGGAA GCTGGGAGCA AGGAAAGGGT CTTAGTCACT GCCTCCCGAA GTTGCTTGAA AGCACTCGGA GAATTGTGCA GGTGTCATTT ATCTATGACC AATAGGAAGA GCAACCAATT ACTATGAGTG AAAGGGAGCC AGAAGACTGA TTGGAGGGCC CTATCTTG TG AGTGGGGCAT CTGTTGGACT TTCCACCTGG TCATATACTC TGCAGCTGTT AGAATGTGCA AGCACTTGGG GACAGCATGA GCTTGCTGTT GTACACAGGG TATTTCTAGA AGCAGAAATA GACTGGGAAG ATGCACAACC AAGGGGTTAC AGGCATCGCC CATGCTCCTC ACCTGTATTT TGTAATCAGA AATAAATTGC TTTTAAAGAA AAAAAAAAAA AAAAAA	49
B2M	NM_004048.2	AATATAAGTG GAGGCGTCGC GCTGGCGGGC ATTCCTGAAG CTGACAGCAT TCGGGCCGAG ATGTCTCGCT CCGTGGCCTT AGCTGTGCTC GCGCTACTCT CTCTTTCTGG CCTGGAGGCT ATCCAGCGTA CTCCAAAGAT TCAGGTTTAC TCACGTCATC CAGCAGAGAA TGGAAAGTCA AATTTCTGA ATTGCTATGT GTCTGGGTTT CATCCATCCG ACATTGAAGT TGACTTACTG AAGAATGGAG AGAGAATTGA AAAAGTGGAG CATTAGACT TGCTTTTCTAG CAAGGACTGG TCTTTCTATC TCTTGTA CACTGAATTC ACCCCCACTG AAAAAGATGA GTATGCCTGC CGTGTAACC ATGTGACTTT GTCACAGCCC AAGATAGTTA AGTGGGATCG AGACATGTAA GCAGCATCAT GGAGGTTTGA AGATGCCGCA TTTGGATTGG ATGAATTCCA AATTCTGCTT GCTTGCTTTT TAATATTGAT ATGCTTATAC ACTTACACTT TATGCACAAA ATGTAGGGTT ATAATAATGT TAACATGGAC ATGATCTTCT TTATAATTCT ACTTTGAGTG CTGCTCCAT GTTTGATGTA TCTGAGCAGG TTGCTCCACA GGTAGCTCTA GGAGGGCTGG CAACTTAGAG GTGGGGAGCA GAGAATTCTC TTATCCAACA TCAACATCTT GGTGAGATT GAACCTTCA	50

[0172]

		ATCTCTTGCA CTCAAAGCTT GTTAAGATAG TTAAGCGTGC ATAAGTTAAC TTCCAATTTA CATACTCTGC TTAGAAATTTG GGGGAAAATT TAGAAATATA ATTGACAGGA TTATTGGA TTTGTATATA TGAATGAAAC ATTTTGTAT ATAAGATTCA TATTTACTTC TTATACATTT GATAAAGTAA GGCATGGTTG TGGTTAATCT GGTTTATTTT TGTTCACAA GTTAAATAAA TCATAAAACT TGATGTGTTA TCCTTAA	
FWHAZ	NM_0 03406. 3	CTTCTCTCTT CCCCTTCTTC CGGGCTCCCG TCCC TCACCCGGCC TGTGGCCAC TCCACCGCC AGCTGGAACC CTGGGACTA CGACGTCCCT CAAACCTTGC TTCTAGGAGA TAAAAAGAAC ATCCAGTCAT GGATAAAAT GAGCTGGTTC AGAAGGCCAA ACTGGCCGAG CAGGCTGAGC GATATGATGA CATGGCAGCC TGCATGAACT CTGTAAGTGA GCAAGGAGCT GAATTATCCA ATGAGGAGAG GAATCTTCTC TCAGTTGCTT ATAAAAATGT TGTAGGAGCC CGTAGGTCAT CTGGAGGGT CGTCTCAAGT ATTGAACAAA AGACGGAAGG TGCTGAGAAA AAACAGCAGA TGGCTCGAGA ATACAGAGAG AAAATTGAGA CGGAGCTAAG AGATATCTGC AATGATGTAC TGTCTCTTTT GGAAAAGTTC TTGATCCCCA ATGCTTCACA AGCAGAGAGC AAAGTCTTCT ATTTGAAAAT GAAAGGAGAT TACTACCGTT ACTTGGCTGA GGTGCGCGCT GGTGATGACA AGAAAGGGAT TGTGATCAG TCACAACAAG CATAACCAAGA AGCTTTTGAA ATCAGCAAAA AGGAAATGCA ACCAACACAT CCTATCAGAC TGGGTCTGGC CCTTAACCTC TCTGTGTCT ATTATGAGAT TCTGAACCTC CCAGAGAAAAG CCTGCTCTCT TGCAAAGACA GCTTTTGATG AAGCCATTGC TGAACCTGAT ACATTAAAGTG AAGAGTCATA CAAAGACAGC ACGCTAATAA TGCAATTACT GAGAGACAAC TTGACATTGT GGACATCGGA TACCAAGGA GACGAAGCTG AAGCAGGAGA AGGAGGGGAA AATTAACCGG CCTTCCAAC TTTGTCTGCC TCATTCTAAA ATTACACAG TAGACCATTG GTCATCCATG CTGTCCACA AATAGTTTTT TGTTTACGAT TTATGACAGG TTTATGTTAC TTCTATTTGA ATTTCTATAT TTCCATGTG GTTTTATGT TTAATATTAG GGGAGTAGAG CCAGTTAACA TTTAGGGAGT TATCTGTTTT CATCTTGAGG TGGCCAATAT GGGGATGTGG AATTTTTATA CAAGTTATAA GTGTTTGGCA TAGTACTTTT GGTACATTGT GGCTTCAAAA GGGCCAGTGT AAAACTGCTT CCATGTCTAA GCAAAGAAAA CTGCTACAT ACTGGTTTGT CCTGGCGGGG AATAAAAGGG ATCATTGGTT CCAGTCACAG GTGTAGTAAT TGTGGGTACT TTAAGGTTTG GAGCACTTAC AAGGCTGTGG TAGAATCATA CCCCATGGAT ACCACATATT AAACCATGTA TATCTGTGGA ATACTCAATG TGTACACCTT TGAATACAGC TGCAGAAGTG TTCCTTTAGA CAAAGTTGTG ACCCATTTTA CTCTGGATAA GGGCAGAAAC GGTTTCACATT CCATTATTTG TAAAGTTACC TGCTGTAGC TTTCAATTATT TTTGTACAC TCATTTTATT TGTATTTAAA TGTTTTAGGC AACCTAAGAA	51

[0173]

		CAAAATGTAAA AGTAAAGATG CAGGAAAAAT GAATTGCTTG GTATTCATTA CTTCATGTAT ATCAAGCACA GCAGTAAAAAC AAAAACCCAT GTATTTAACT TTTTITTAGG ATTTITGCTT TGTGATTTT TTTTITTTTG ATACTIGCCT AACATGCATG TGCTGTAAAA ATAGTTAACA GGGAAATAAC TTGAGATGAT GGCTAGCTTT GTTAAATGTC TTATGAAATT TTCATGAACA ATCCAAGCAT AATTGTTAAG AACACGTGTA TTAATTCAT GTAAGTGGAA TAAAAAGTTT ATGAATGGAC TTTCAACTA CTTCTCTAC AGCTTTTCAT GTAAATTAGT CTTGGTTCTG AAACTTCTCT AAAGGAAATT GTACATTTT TGAAATTTAT TCCITATTCC CTCTGGCAG CTAATGGGCT CTTACCAAGT TTAAACACAA AATTATCAT AACAAAAATA CTACTAATAT AACTACTGTT TCCATGTCCC ATGATCCCCT CTCTTCCTCC CCACCCTGAA AAAAATGAGT TCCTATTTTT TCTGGGAGAG GGGGGGATTG ATTAGAAAAA AATGTAGTGT GTTCCATTTA AAATTTTGGC ATATGGCATT TTCTAACTTA GGAAGCCACA ATGTTCTTGG CCCATCATGA CATTGGGTAG CATTAACTGT AAGTTTGTG CTTCCAAATC ACTTTTGGT TTITAAGAAAT TTCTTGATAC TCTTATAGCC TGCCTTCAAT TTGATCCTT TATTCTTCT ATTTGTCAGG TGCACAAGAT TACCTTCCTG TTTTAGCCTT CTGCTTGTG ACCAACCAT CTTACTTGGT GGCCATGTAC TTGGAAAAAG GCCGCATGAT CTTCTGGCT CCACTCAGTG TCTAAGGCAC CCTGCTTCCT TTGCTTGCAT CCACAGACT ATTTCCCTCA TCCTATTAC TGCAGCAAAAT CTCTCCTTAG TTGATGAGAC TGTGTTTATC TCCCTTFAAA ACCTTACCTA TCTGAATGG TCTGTCAATG TCTGCCTTA AAATCCTTCC TCTTCTTCC TCCTCTATT CTTAAATAAT GATGGGGCTA AGTTATACCC AAAGCTCACT TTACAAAATA TTTCTCAGT ACTTTCGAGA AAACACCAAA CAAAAATGCC ATTTTAAAAA AGGTGTATT TTTCTTTTAG AATGTAAGCT CCTCAAGAGC AGGGACAATG TTTTCTGTAT GTTCTATTGT GCCTAGTACA CTGTAATGC TCAATAAATA TTGATGATGG GAGGCAGTGA GTCTTGATGA TAAGGGTGAG AAAGTAAAT CCCAACACT GTTTGTGTC TTGTTTTATT ATGACCTCAG ATTAAATTGG GAAATATTGG CCCTTTTGAA TAATTGTCCC AAATATTACA TTCAAATAAA AGTGCAATGG AGAAAAAAA AAA	
SDHA	NM_004168.3	ACTGCAGCCC CGCTCGACTC CGGCGTGGTG CGCAGGCGCG GTATCCCCC TCCCCGCCA GCTCGACCCC GGTGTGGTGC GCAGGCGCAG TCTGCGCAGG GACTGGCGGG ACTGCGCGGC GGCAACAGCA GACATGTCGG GGGTCCGGGG CCTGTCGCGG CTGCTGAGCG CTCGGCGCCT GGCCTGGCC AAGGCGTGGC CAACAGTGTT GCAACAGGA ACCCGAGGTT TTCACTTAC TGTTGATGGG AACAAGAGGG CATCTGCTAA AGTTTCAGAT TCCATTTCTG CTCAGTATCC AGTAGTGGAT CATGAATTTG ATGCAGTGGT GGTAGGCGCT GGAGGGGCAG GCTTGCAGC	52

[0174]

	TGCATTGGCC CTTTCTGAGG CAGGGTTTAA TACAGCATGT GTTACCAAGC TGTTTCCTAC CAGGTCACAC ACTGTTGCAG CACAGGGAGG AATCAATGCT GCTCTGGGGA ACATGGAGGA GGACAACCTGG AGGTGGCATT TCTACGACAC CGTGAAGGGC TCCGACTGGC TGGGGGACCA GGATGCCATC CACTACATGA CGGAGCAGGC CCCC GCCGCC GTGGTCGAGC TAGAAAATTA TGGCATGCGG TTAGCAGAA CTGAAGATGG GAAGATTTAT CAGCGTGCAT TTGGTGGACA GAGCCTCAAG TTGGAAAAGG GCGGGCAGGC CCATCGGTGC TGCTGTGTGG CTGATCGGAC TGGCCACTCG CTATTGCACA CCTTATATGG AAGGTCTCTG CGATATGATA CCAGCTATTT TGTGGAGTAT TTGCTTGG ATCTCTGAT GGAGAATGGG GAGTGCCGTG GTGTCATCGC ACTGTGCATA GAGGACGGGT CCATCCATCG CATAAGAGCA AAGAACACTG TTGTGGCCAC AGGAGGCTAC GGGCGCACCT ACTTCAGCTG CACGTCTGCC CACACCAGCA CTGGCGACGG CACGGCCATG ATCACCAGGG CAGGCCTTCC TTGCCAGGAC CTAGAGTTTG TTCAGTTCCA CCCTACAGGC ATATATGGTG CTGGTTGTCT CATTACGGAA GGATGTCTGT GAGAGGGAGG CATTCTCATT AACAGTCAAG GCGAAAAGTT TATGGAGCGA TACGCCCTG TCGGAAGGA CCTGGCGTCT AGAGATGTGG TGTCTCGGTG CATGACTCTG GAGATCCGAG AAGGAAGAGG CTGTGCCCTG GAGAAAGATC ACGTCTACCT GCAGCTGCAC CACCTACCTC CAGAGCAGCT GGCCACGCGC CTGCCTGGCA TTTCAGAGAC AGCCATGATC TTCGCTGGCG TGGACGTCAC GAAGGAGCCG ATCCTGTGCT TCCCCACCGT GCATTATAAC ATGGGCGGCA TTCCCACCAA CTACAAGGGG CAGGTCTGTA GGCACGTGAA TGGCCAGGAT CAGATTGTGC CCGGCTGTGA CGCCTGTGGG GAGGCCGCT GTGCCTCGGT ACATGGTGCC AACCCTCTG GGGCAAACTC GCTCTTGGAC CTGGTTGTCT TTGGTCGGGC ATGTGCCCTG AGCATCGAAG AGTCATGCAG GCCTGGAGAT AAAGTCCCTC CAATTAAACC AAACGCTGGG GAAGAATCTG TCATGAATCT TGACAAATTG AGATTTGCTG ATGGAAGCAT AAGAACATCG GAACTGCGAC TCAGCATGCA GAAGTCAATG CAAAATCATG CTGCCGTGTT CCGTGTGGGA AGCGTGTTC AAGAAGGTTG TGGGAAAATC AGCAAGCTCT ATGGAGACCT AAAGCACCTG AAGACGTTG ACCGGGGAAT GGTCTGGAAC ACGGACCTGG TGGAGACCCT GGAGCTGCAG AACCTGATGC TGTGTGCGCT GCAGACCATC TACGGAGCAG AGGCACGGAA GGAGTCACGG GCGCGCATG CCAGGGAAGA CTACAAGGTG CGGATTGATG AGTACGATTA CTCCAAGCCC ATCCAGGGGC AACAGAAGAA GCCCTTTGAG GAGCACTGGA GGAAGCACAC CCTGTCCTAT GTGGACGTTG GCACTGGGAA GGTCACTCTG GAATATAGAC CCGTGATCGA CAAAACCTTG AACGAGGCTG ACTGTGCCAC CGTCCCGCCA GCCATTGCT CCTACTGATG AGACAAGATG TGGTGATGAC AGAATCAGCT TTTGTAATTA TGTATAATAG CTCATGCATG TGTCCATGTC ATAACTGTCT TCATACGCTT CTGCACTCTG GGAAGAAGG AGTACATGTA AGGGAGATTG GCACCTAGTG GCTGGGAGCT	
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[0175]

		TGCCAGGAAC CCAGTGGCCA GGGAGCGTGG CACTTACCTT TGTCCCTTGC TTCAATCTTG TGAGATGATA AAACCTGGGCA CAGCTCTTAA ATAAATATA AATGAACAAA CTTTCTTTTA TTTCCAAATC CATTTGAAAT ATTTTACTGT TGTGACTTTA GTCATATTTG TTGACCTAAA AATCAAAATGT AATCTTTGTA TTGTGTTACA TCAAAATCCA GATATTTTGT ATAGTTTCTT TTTTCTTTTT CTTTCTTTTT TTTTTTTTGA GACAGGATCG GTGCAGTAGT ACAATCACAG CTCACTGCAG CCTCAAACTC CTGGGCAGCT CAGGTGATCT TCCTGACTCA GCCTTCTGAG TAGTTGGGGC TACAGGTGTG CACCACCATG CCCAGCTCAT TTATTTTGTA ATTGTAGGGA CAGGGTCTCA CTGTGTTGCC TAGGCTGGTC TCAAGTGATC CTCCTCCTT GGCCTCCCAA GGTGCTGGAA TTATAGGTGT GAACAAACCA AAAAAAAAAA AAA	
HPRT1	NM_00194.2	GGCGGGGCTT GCTTCTCTC AGCTTCAGGC GGCTGCGACG AGCCCTCAGG CGAACCTCTC GGCTTTCCTG CGCGGCGCCG CCTCTTGCTG CGCCTCCGCC TCCTCTCTG CTCCGCCACC GGCTTCCTCC TCCTGAGCAG TCAGCCCGCG CGCCGGCCGG CTCCGTTATG GCGACCCGCA GCCCTGGCGT CGTGATTAGT GATGATGAAC CAGGTATGA CCTTGATTTA TTTTGCATAC CTAATCATTG TGCTGAGGAT TTGGAAAGGG TGTTATTCC TCATGGACTA ATTATGGACA GGAAGTGAACG TCTTGCTCGA GATGTGATGA AGGAGATGGG AGGCCATCAC ATTGTAGCCC TCTGTGTGCT CAAGGGGGGC TATAAATCTT TTGCTGACCT GCTGGATTAC ATCAAAGCAC TGAATAGAAA TAGTGATAGA TCCATTCTTA TGAAGTGA TTTATCAGA CTGAAGAGCT ATTGTAATGA CCAGTCAACA GGGGACATAA AAGTAATTGG TGGAGATGAT CTCTCAACTT TAACTGGAAA GAATGTCTTG ATTGTGGAAG ATATAATTGA CACTGGCAAA ACAATGCAGA CTTTGCTTTC CTGGGTCAGG CAGTATAATC CAAAGATGGT CAAGGTCGCA AGCTTGCTGG TGAAAAGGAC CCCACGAAAT GTTGGATATA AGCCAGACTT TGTTGGATTT GAAATTCCAG ACAAGTTTGT TGTAGGATAT GCCCTTGACT ATAATGAATA CTTCAGGGAT TTGAATCATG TTTGTGTCAT TAGTGAACT GGAAAAGCAA AATACAAAGC CTAAGATGAG AGTTCAAGTT GAGTTTGGA ACATCTGGAG TCCTATTGAC ATCGCCAGTA AAATTATCAA TGTCTTAGTT CTGTGGCCAT CTGCTTAGTA GAGCTTTTTG CATGTATCTT CTAAGAATTT TATCTGTTTT GTACTTTAGA AATGTGAGTT GCTGCATTCC TAAACTGTTT ATTGCACTA TGAGCCTATA GACTATCAGT TCCCTTTGGG CGGATTGTTG TTTAACTTGT AAATGAAAAA ATTCTCTTAA ACCACAGCAC TATTGAGTGA AACATTGAAC TCATATCTGT AAGAAATAAA GAGAAGATAT ATTAGTTTTT TAATTGGTAT TTTAAATTTT ATATATGCAG GAAAGAATAG AAGTGATTGA ATATTGTTAA TTATACCACC GTGTGTTAGA AAAGTAAGAA GCAGTCAATT TTCACATCAA AGACAGCATC TAAGAAGTTT TGTCTGTCC TGGAATTATT TTAGTAGTGT TTCAGTAATG	53

[0176]

		TTGACTGTAT TTTCCAACCTT GTTCAAATTA TTACCAAGTGA ATCTTTGTCA GCAGTTCCCT TTTAAATGCA AATCAATAAA TTCCCAAAAA TTTAAAAAAA AAAAAAAAAA AAAAA	
TOX4	NM_0 013035 23.1	AGCAGAGAGA ACACACGTCC TTGCGGAAGT GACGGCAGTT CCGAGTCCAG TGGGGGCGGT GGGAGCGATG AGGGTCTGAG ACGGTGGGAG CGGTTGTGTG AAGATGGAGA CATTCCATAC ACCAAGCTTG GGTGATGAGG AATTTGAAAT CCCACCTATC TCCTTGGATT CTGATCCCTC ATTGGCTGTC TCAGATGTGG TTGGCCACTT TGATGACCTG GCAGACCCTT CCTCTTCACA GGATGGCAGT TTTTCAGCCC AGTATGGGGT CCAGACATTG GACATGCCTG TGGGCATGAC CCATGGCTTG ATGGAGCAGG GCGGGGGGCT CTTGAGTGGG GGCTTGACCA TGGACTTGGA CCACTCTATA GGAACCTCAGT ATAGTGCCAA CCCACCTGTT ACAATTGATG TACCAATGAC AGACATGACA TCTGGCTTGA TGGGGCATAG CCAGTTGACC ACCATTGATC AGTCAGAAGT GAGTTCCAG CTGGGTTTGA GCCTAGGGGG TGGACCATC CTGCCACCTG CCCAGTCACC TGAAGATCGT CTTCAACCA CCCCCTCACC TACTAGTTCA CTTACAGAGG ATGGTGTGTA GGATTTCGG AGGCAACTTC CCAGCCAGAA GACAGTCGTG GTGGAAGCAG GGAAAAAGCA GAAGGCCCA AAGAAGAGAA AAAAGAAAGA TCCTAATGAA CCTCAGAAAC CAGTTTCAGC ATATGCTTTA TTCTTTCGTG ATACACAGG TGCCATCAAG GGACAGAATC CTAATGCCAC TTTTGTGTAG GTTCAAAAA TTGTGGCCTC CATGTGGGAT AGTCTGGAG AGGAGCAAAA ACAGGTATAT AAGAGGAAAA CTGAGGCTGC CAAGAAAGAG TATCTGAAGG CACTGGCTGC TTACAAAGAC AACCAGGAGT GTCAGGCCAC TGTGGAAACA GTGGAATTGG ATCCAGCACC ACCATCAGAA ACTCCTTCTC CACCTCCTAT GGCTACTGTT GACCCAGCAT CTCCAGCACC AGCTTCAATA GAGCCCCCTG CCCTGTCCCC ATCCATTGTT GTTAACTCCA CCCTTTCATC CTATGTGGCA AACCAGGCAT CTTCTGGAGC TGGGGGTGAG CCCAATATCA CCAAGTTGAT TATTACCAA CAAATGTTGC CCTCTTCTAT TACTATGTCT CAAGGAGGGA TGGTTACTGT TATCCAGCC ACAGTGGTGA CCTCCGGGG GCTCCAATA GGCCAAACCA GTACAGCTAC TATCCAGCCC AGTCAACAAG CCCAGATTGT CACTCGGTCA GTGTTGCAGG CAGCAGCAGC TGCTGCTGCT GCTGCTTCTA TGCAACTGCC TCCACCCCGA CTACAGCCCC CTCCATTACA ACAGATGCCA CAGCCCCCGA CTCAGCAGCA AGTTACCATT CTGCAGCAGC CTCCTCCACT CCAGGCCATG CAACAGCCTC CACCTCAGAA AGTTCGAATC AATTTACAGC AACAGCCTCC TCCTCTGCAG ATCAAGAGTG TGCCTCTACC CACTTTGAAA ATGCAGACTA CCTAGTCCC ACCAACTGTG GAAAGTAGTC CTGAGCGGCC TATGAACAAC AGCCCTGAGG CCCATACAGT GGAGGCACCT TCTCTGAGA CTATCTGTGA GATGATCACA GATGTAGTTC CTGAGGTTGA GTCTCCTTCT CAGATGGATG TTGAATTGGT GAGTGGGTCT CCTGTGGCAC TCTACCCCA GCCTCGATGT GTGAGGTCTG GTTGTGAGAA CCCTCCCATG GTGAGTAAGG ACTGGGACAA	54

[0177]

	TGAATACTGC AGCAATGAGT GTGTGGTGAA GCACTGCAGG GATGTATTCT TGGCCTGGGT AGCCTCTAGA AATTCAAACA CAGTGGTGTT TGTGAAATAG TCCTTCCTGT TCTCCAAGCC AGTGAAGAGT TATCTGCTGG GAAAGTGTCC AAGAGCCTGT TTTTGAAACA CAAGCTGGGC TTCTGGTAGT GCCTCATCAC AACCATGAT GGCTGTTTAT GTTTCACCCC TTTTCTTCCT TCAGCAGAGG CCAGGCTATG GAGCAGGGCC ACTGAATTTG CTGTAATCTG GAGATGCTTT TTACTTTCAA CCATAAGCGG TAATAGCAGA GGAAAGGGTG AAGGGAGTCT GGGCAAGCAA AGCATAGAGA TGGTGGGGTG GTGGTGGGGT TGAAGAACT TGTTGGTATA ATTGTACATAG GACTTGCCCTA AAATATTATT AAAATTACGG GAGTGTACTC AGCTTTGAGC CTAGGAGAAA ATGCCACTGT GTGCATCCAT TTTAAAGGGT TCCCTCATAA AAAAATGTTA TCCCCATTA TCACATCAGT ACACTGCTTT GAAAACAAAA CTTTTCACCA TGGGCATACT GGGCTACATG GAAAATGACA TCACCCAGGA GTGATTTCTC TTTATATATA TTATTTCTGC AGTTACCATC CTTATCTGAG TTATCACAGT TCATGAATCT AAGAGGGCGA ACTCTACATC ATTAGTAAGA GGTTCACCA AAGTCTAAAG TTGTATTAC TTGTGTTGA TGAATATCT TTAAGAGACC ATAGGTCTAT CATTATTTCT TAGACATAAT CTAAGAAAAA ACAGACTAGA GAAGCCACCT GGTTGTAACA GAATAAGCAG AAGTTTACAG CATGATAGTC CAAGTGGTGA TAACTTTAAA TAAACTCAA ATTTTACTG TTGTAGACA GGAATGCTGT CCTAGAGAAC CTCTCCTCA ACCAGCTACG TACATAGTTT TATCCTATGC ATTCCTGTTT TCTGTGTGTT TTTTGTGTTT TTTTGTGTTT TTTTGTGTTT AGACAGAGTC TCGCTCTGTC ACCCAGGCTG GAGTGCAGTG GTGCGACCTC AGCTCACTGA AACCTCTGCC TCCCGGGTTC AAGCGATTCT CCTGCATCAG CCTCCCGAGT AGCTAGGATT ACAGGCGCCC GCCACTACGC CCAGCTAATT TGTGGTATT TTAGTAGAGA CAGGGTTTCA CCATGTTGGC CAGGCTGGTC TCGAACTCCT GACCTCATGA TCCGCCCGCC TTGACCTCCC AAAGTGCTGG GATTACAGGC ATGAGCCACC GCACCCAGCC TGCTTCTCTG TTTTGTGTTT GGTGTTGGAG GGTAGCAGTA GAGATGGGGT CTCACTATGT TGCCAGTCT AGTCTTGAAC TCCTGGGCTA CAGTTACCCT CCTACCTCGG CTTCCCAAAG TGCTCGGATT ACAGGTGTGA GCCACTGTGC CTAGCCTATA ATGATCATT TAAATGTTCC CATGCACTCA TTTAGTTTGA ACCTTCACAG CAACCCAATG AGGTAATACT CCCATTTCAC ATATAATACT GAGAGATGAG TTGCAACAAGA TTATACACTG TTAAGTAGCA GAGCCAGAAT GGACTTCAGA ATCCCACTA CAATACAAAT GTTTATTTAA ATAAAGAAGA AAGCTATTGT ACAAATATCA CTCTTCAGGT TTAGCTTACA GAGCCATGGC TATGGATTCT TAGCTCTGTA AGGAAGTGCT TCTATAAATT CTTAGGTTTA GAGATGATC CATCTGGGTA CCTTTGCTTG AACCCTGCAA CCACATCTGG GTCTAGTAGG TGGATCCCAT CCAGTTGGTT TCCAAGGGTG ATCCTGAAAC AGTGTAAGAG GAGGGGCAAA CCAGAAATCC TGAATTAGA GGGTTAATA	
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[0178]

	TTGTTAAAAA ATGCATACCA AATGAAGACT GCCTATCATC ATATCAAATA TGCCAATTCT AAAAAGAGCT TAACATTAGA ATAGTATATG GTAGAATTAC TAGTTCAGAA TTGGCATAGA TTCTGGTGTT AAAATAGACT GGATCTGTAT TATCTGAGGG TTAGTAACTA ATGCTTAGCC AGGCCTGCTT CACAGAGTTG CTACCAGGGA GTATTCTTTG GATAAGCAAA ATGCTAGCAG CATGTGTTTT AAGCTCTGTT AAGGGGTGAA AGATGTAATT ATTGACAGAT TAAATAGATA ACTTCGTAAC CACCAGGGGG CAGATTCAAT ACATCACAGA ATGGCTGAGG AAGATCCTTG GGTTGTGAAG AGAGTAGAAA CCCTAGGGAG CAGTGCTTTT GGGTCTAGA ACCTGTTGAG TTTCTAATGA ATATTTGTAG AATCTCATAA AACAGTTTAA ATACAAGCTT AAGTGGCTTA TGAATCTGT GAAAGCTATT TATGGACTAG TGTAAACAA TGTAAGCTC TACTAAGTTC TGTCTTAAT CATAAATAAT AGCCCCTTGA GGAAGAGCCT GTTCTCTGGT CACCTTACCA GTTGGGTTGC ACATTGTGTG GTCTGCCAAA TAACTCAATC TTGCGAGTGC CAGGAGATAG TCTTCAATC ATGCCATAGA TTTCATCTGG TTTATGACTG GTGGAACGAA CCTAGGAAAT AAAAACTAGC TGCTTTTAA GTTACACAAG AAAAAA	
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[0179]

[0180]

정의

[0181]

관사 "a" 및 "an"은 상기 관사의 하나 또는 둘 이상(즉, 적어도 하나)의 문법적 대상을 지칭하기 위해 본 개시 내용에 사용된다. 예로서, "요소"는 하나의 요소 또는 둘 이상의 요소를 의미한다.

[0182]

용어 "및/또는"은 달리 나타내지 않는 한 "및" 또는 "또는" 중 어느 하나를 의미하기 위해 본 개시내용에 사용된다.

[0183]

본원에 사용된 바와 같이, 용어 "폴리뉴클레오타이드" 및 "핵산 분자"는 리보뉴클레오타이드 또는 데옥시뉴클레오타이드 또는 어느 하나의 유형의 뉴클레오타이드의 변형된 형태인 적어도 10개의 염기 또는 염기쌍 길이의 뉴

클레오타이드의 중합체 형태를 의미하기 위해 상호교환적으로 사용되며, DNA의 단일 및 이중 가닥 형태를 포함하는 것을 의미한다. 본원에 사용된 바와 같이, 마이크로어레이 분석에서 프로브로서 역할을 하는 핵산 분자 또는 핵산 서열은 바람직하게는 뉴클레오타이드의 사슬, 보다 바람직하게는 DNA 및/또는 RNA를 포함한다. 다른 구현예에서, 핵산 분자 또는 핵산 서열은 다른 종류의 핵산 구조, 예를 들어 DNA/RNA 나선, 펩타이드 핵산(PNA), 잠금 핵산(LNA) 및/또는 리보자임을 포함한다. 따라서, 본원에 사용된 바와 같이 용어 "핵산 분자"는 또한 천연 뉴클레오타이드와 동일한 기능을 나타내는 비천연 뉴클레오타이드, 변형된 뉴클레오타이드 및/또는 비뉴클레오타이드 빌딩 블록을 포함하는 사슬도 포함한다.

[0184] 본원에 사용된 바와 같이, 폴리뉴클레오타이드의 맥락에서 사용되는 용어 "혼성화하다," "혼성화하는" 등은 통상적인 혼성화 조건, 예컨대 혼성화 온도가 섭씨 37도 초과이고 0.1 XSSC/0.1% SDS에서의 세척 온도가 섭씨 55도 초과인 50% 포름아미드/6XSSC/0.1% SDS/100 μ g/ml ssDNA에서의 혼성화, 및 바람직하게는 엄격한 혼성화 조건을 지칭하는 것을 의미한다.

[0185] 본원에 사용된 바와 같이, 용어 "정규화" 또는 "정규화하다"는 샘플에서의 바이오마커 농도의 생물학적 변화보다는 샘플 취급, 샘플 제조, 및 측정 방법으로 인한 기술적 변화로부터 발생하는 효과를 조정하기 위해 표준 값의 측면에서 차등 값의 표현을 지칭한다. 예를 들어, 상이하게 발현된 단백질의 발현을 측정할 때, 단백질의 발현에 대한 절대 값은 발현이 실질적으로 일정한 표준 단백질의 발현에 대한 절대 값의 측면에서 표현될 수 있다. 일부 구현예에서, 유전자의 발현 수준을 하우스키핑 유전자의 발현 수준으로 정규화하는 것은 유전자의 발현 수준을 하우스키핑 유전자의 발현 수준으로 나누는 것을 의미한다.

[0186] 용어 "진단(diagnosis, diagnostics)"은 또한 용어 "예후(prognosis, prognostics)"뿐만 아니라 시간 경과에 따라 진단 및/또는 예후를 모니터링하기 위해 둘 이상의 시점 동안 이러한 절차를 적용하는 것, 및 이에 기초한 통계학적 모델링을 포함한다. 또한, 용어 진단은 a. 예측(환자가 공격적인 질환(과다증식성/침습성)이 발생할 가능성이 있는지 결정하는 것), b. 예후(환자가 미래의 미리 선택된 시점에 더 나은 또는 더 나쁜 결과를 가질 가능성이 있는지 예측하는 것), c. 요법 선택, d. 치료 약물 모니터링, 및 e. 재발 모니터링을 포함한다.

[0187] 생물학적 샘플과 관련하여 본원에 사용된 바와 같이 용어 "제공하는"은 대상으로부터 생물학적 샘플을 직접 또는 간접적으로 수득하는 것을 지칭한다. 예를 들어, "제공하는"은 대상으로부터 생물학적 샘플을 직접 수득하는 행위(예컨대, 채혈, 조직 생검, 세척 등에 의해)를 지칭할 수 있다. 마찬가지로, "제공하는"은 생물학적 샘플을 간접적으로 수득하는 행위를 지칭할 수 있다. 예를 들어, 제공은 샘플을 직접 수득한 제3자로부터 샘플을 받는 실험실의 행위, 또는 보관소(archive)에서 샘플을 수득하는 행위를 지칭할 수 있다.

[0188] "정확도"는 측정되거나 계산된 양(시험 보고된 값)의 그의 실제(또는 진정한) 값에 대한 일치도를 지칭한다. 임상 정확도는 진정한 결과의 비율(진양성(TP) 또는 진음성(TN)) 대 잘못 분류된 결과(위양성(FP) 또는 위음성(FN))에 관한 것이며, 다른 측정값 중에서도 민감도, 특이성, 양성 예측값(PPV) 또는 음성 예측값(NPV)으로서, 또는 가능성, 승산비로서 표시될 수 있다.

[0189] 본원에 사용된 바와 같이 용어 "생물학적 샘플"은 잠재적으로 하나 이상의 바이오마커를 함유하는 생물학적 기원의 임의의 샘플을 지칭한다. 생물학적 샘플의 예는 조직, 장기, 또는 체액, 예컨대 전혈, 혈장, 혈청, 조직, 세척액 또는 질환의 검출에 사용된 임의의 다른 표본을 포함한다.

[0190] 본원에 사용된 바와 같이 용어 "대상"은 포유동물, 바람직하게는 인간을 지칭한다.

[0191] 상태와 관련하여 본원에 사용된 바와 같이 "치료하는" 또는 "치료"는 상태를 예방하는 것, 상태의 발병 또는 발생 속도를 늦추는 것, 상태를 발생시킬 위험을 감소시키는 것, 상태와 관련된 증상의 발생을 예방하거나 지연시키는 것, 상태와 관련된 증상을 감소시키거나 종료시키는 것, 상태의 완전한 또는 부분적인 퇴행을 생성하는 것, 또는 이의 일부 조합을 지칭할 수 있다.

[0192] 바이오마커 수준은 질환의 치료로 인해 변화할 수 있다. 바이오마커 수준의 변화는 본 개시내용에 의해 측정될 수 있다. 바이오마커 수준의 변화는 질환 또는 요법의 진행을 모니터링하는데 사용될 수 있다.

[0193] "변경된", "변화된" 또는 "유의하게 상이한"은 합리적으로 대등한 상태, 프로파일, 측정 등으로부터의 검출가능한 변화 또는 차이를 지칭한다. 이러한 변화는 전부이거나 없을 수 있다. 이들은 증분적일 수 있으며 선형일 필요는 없다. 이들은 규모에 따라 다를 수 있다. 변화는 1%, 5%, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, 95%, 99%, 100% 이상, 또는 0% 및 100% 사이의 임의의 값의 증가 또는 감소일 수 있다. 대안적으로, 변화는 1배, 1.5배, 2배, 3배, 4배, 5배 이상, 또는 1배 및 5배 사이의 임의의 값일 수 있다. 변화는 0.1, 0.05,

0.001, 또는 0.0001의 p 값으로 통계학적으로 유의할 수 있다.

[0194] 용어 "안정한 질환"은 형질 세포 질환의 존재의 진단을 가리키지만, 영상 데이터 및/또는 최상의 임상 판단에 의해 결정된 바와 같이, 골수종은 치료되었고 안정한 상태, 즉 진행성이 아닌 상태를 유지한다.

[0195] 용어 "진행성 질환"은 매우 활성 상태의 형질 세포 질환의 존재의 진단을 가리키며, 영상 데이터 및/또는 최상의 임상 판단에 의해 결정된 바와 같이, 치료되지 않았고 안정하지 않거나 치료되었고 요법에 반응하지 않았거나, 또는 치료되었고 활성 질환을 유지한다.

[0196] **실시예**

[0197] 본 개시내용은 하기 실시예에 의해 추가로 예시되며, 이는 본 개시내용을 범주 또는 사상 면에서 본원에 기재된 특정 절차로 제한하는 것으로 해석되지 않아야 한다. 실시예는 특정 구현예를 예시하기 위해 제공되며, 본 개시내용의 범주에 제한하고자 하는 것이 아닌 것으로 이해되어야 한다. 본 개시내용의 사상 및/또는 첨부된 청구범위의 범주를 벗어나지 않으면서 당업자에게 제시될 수 있는 다양한 다른 구현예, 변형, 및 이의 등가물을 사용할 수 있음이 추가로 이해되어야 한다.

[0198] 실시예 1. 32-마커 유전자 패널의 유도

[0199] GSE7116의 전사 프로파일을 사용하여 대조군 및 다발성 골수종을 가장 잘 구별한 유전자를 확인하기 위해, $n = 15$ 말초 혈액 단핵 세포 샘플의 원시 프로브 강도($n = 1,354,896$ 특징)를 사용하였다. 이상치(outlier)를 제거한 후, 총 31개의 표적 전사체(26개의 유전자, 5개의 스플라이스 변이체) 및 1개의 하우스-키팅 유전자가 비편향 방식으로 골수종의 잠재적인 마커로서 확인되었다(표 2; 도 1). 이들 유전자는 다발성 골수종 세포주, IM-9(정상 이배체 핵형) 및 MM1R(텍사메타손 내성)에서 발현되는 것으로 입증되었고, 이는 이들이 형질전환된 B-림프모세포에 의해 생산된다는 것을 확인하였다.

[0200] 그리고 나서, 대조군($n=45$), 반응자/안정($n=24$: 안정한 질환), 및 새롭게 진단된/재발($n=66$: 진행성 질환) 샘플의 전혈에서 이들 31개의 마커의 정규화된 유전자 발현(하우스키팅 유전자, *TPT1*으로 정규화됨)을 사용하여 골수종 질환 동역학의 인공 지능 모델을 제작하였다. 데이터 세트를 각각 모델 생성 및 검증을 위해 훈련 및 시험 파티션으로 무작위로 나누었다. 12개의 알고리즘을 0.7-0.85의 정확도로 평가하였다(XGB, RF, glmnet, cforest, CART, treebag, knn, nnet, SVM-방사형, SVM-선형, NB 및 mlp). 상위 성능 알고리즘(XGB - "그래디언트 부스팅(gradient boosting)")이 훈련 데이터를 가장 잘 예측하였다. 시험 세트에서, XGB는 샘플을 예측한 확률 스코어를 생성하였다. 각 확률 스코어는 미지의 샘플이 "안정한 질환" 또는 "진행성" 부류에 속하는지에 관한 알고리즘의 "확실성"을 반영한다. 예를 들어, 미지의 샘플 S1은 하기의 확률 벡터를 가질 수 있다[대조군 = 0.2, 진행성 = 0.8]. 0.8의 스코어가 주어지면, 이 샘플은 진행성 질환을 나타낸 골수종 샘플로 간주될 것이다. 샘플이 MRD 환자 또는 치료 중인 환자로부터 유래된 경우, 스코어는 그들이 진행성 질환을 나타내고 있거나(재발할 것이거나) 요법에 실패하고 있다는 것을 확인할 것이다. >0.2 MyelomX 스코어는 샘플이 골수종 환자로부터 유래된 것을 나타내는 것으로 간주된다.

표 2.

다발성 골수종 바이오마커 또는 하위스킴 유형자		NCBI 액세스 위치	UniGene ID	RefSeq	엠펙리온 길이	엑손 경계	분석 위치
기호	명칭						
<i>ASXL1</i>	additional sex combs like 1, transcriptional regulator	Chr.20: 32369062 - 32439319	Hs_374043	NM_001164603.1	95	1-2	484
<i>BHLHE40</i>	Basic helix-loop-helix family, member 40	Chr.3: 4979412 - 4986181	Hs_744866	NM_003670.2	66	4-5	683
<i>BTG2</i>	BTG anti-proliferation factor 2	Chr.1: 203305636 - 203309602	Hs_519162	NM_006763.2	86	1-2	215
<i>COPA</i>	coatamer protein complex, subunit alpha	Chr.1: 160288667 - 160343664	Hs_162121	NM_001096396.1	82	6-7	892
<i>FBXW7</i>	F-box and WD repeat domain containing 7, E3 ubiquitin protein ligase	Chr.4: 152321258 - 152536096	Hs_561245	NM_001013415.1	76	3-4	548
<i>GNAI3</i>	Guanine nucleotide binding protein (G protein), alpha 13	Chr.17: 66009289 - 66066802	Hs_515018	NM_006672.5	70	1-2	496
<i>IL8</i>	Interleukin 8	Chr.4: 74606223 - 74609433	Hs_624	NM_000584.3	101	1-2	222
<i>JMJD1C</i>	Jumonji domain containing 1C	Chr.10: 63167221 - 63522075	Hs_413416	NM_001282946.1	115	21 - 22	7309
<i>LARS2</i>	leucyl-tRNA synthetase 2, mitochondrial	Chr.3: 45388661 - 45548842	Hs_526975	NM_015340.3	83	2-3	164
<i>MLL4T1</i>	metastasis associated lung adenocarcinoma transcript 1 (non-protein coding)	Chr.11: 65497679 - 65504494	Hs_621695	NR_002819.2	117	1-1	4952
<i>MSK1</i>	muscleblind-like splicing regulator	Chr.3: 152243666 - 152466780	Hs_201868	NM_001314057.1	55	4 - 5	981
<i>NCL1</i>	neuroblast cell leukemia sequence 1 (BCL2-related)	Chr.1: 150574551 - 150679738	Hs_632486	NM_001197320.1	89	3-4	682
<i>NFE2L2</i>	nuclear factor of kappa light polypeptide gene enhancer in B-cells inhibitor, zeta	Chr.3: 101827990 - 101861025	Hs_319171	NM_001005474.2	62 및 86	6-7 및 12-13	1322 및 2087

[0201]

[0202]

NR4A1	nuclear receptor subfamily 4, group A, member 1	Chr. 12: 52022682 - 52059607	Hs.524430	NM_001202238.1	79 및 87	3-4 및 7-8	1107 및 1767
PDE4B	phosphodiesterase 4B, cAMP-specific	Chr. 1: 65792610 - 66374579	Hs.198072	NM_001037339.2	72	8-9	1429
PIAS2	protein inhibitor of activated STAT, 2	Chr. 18: 46803224 - 46920167	Hs.57769	NM_001324046.1	72	12 - 13	1716
PRK41	protein kinase, AMP-activated, alpha 1 catalytic subunit	Chr. 5: 40758379 - 40798195	Hs.43222	NM_006251.5	93 및 75	2-3 및 5-6	275 및 606
SCYL2	SCYL-like 2 (S. cerevisiae)	Chr. 12: 100267137 - 100341724	Hs.506481	NM_001317784.1	161 및 67	2-3 및 8-9	463 및 1381
SUARD2	SH1/SNF related, matrix associated, actin dependent regulator of chromatin, subfamily d, member 2	Chr. 17: 63832081 - 63842991	Hs.250581	NM_001098426.1	63	4-5	885
SP1	Sp1 transcription factor	Chr. 12: 53380195 - 53416446	Hs.620764	NM_001251825.1	62 및 72	3-4 및 5-6	1631 및 2002
SRSF5	serine/arginine-rich splicing factor 5	Chr. 14: 69767087 - 69772005	Hs.632326	NM_001039465.1	102	5-6	661
TAGAP	T-cell activation RhoGTPase activating protein	Chr. 6: 159034468 - 159045152	Hs.529984	NM_001278733.1	99	3-4	652
TANK	TRAF family member-associated NFkB activator	Chr. 2: 161138965 - 161286176	Hs.132257	NM_001199135.1	89	2-3	210
TLE4	transducin-like enhancer of split 4 (TSP1) homolog, Drosophila	Chr. 9: 79571773 - 79728882	Hs.444213	NM_001282748.1	89	2-3	1162
TPST1(하위 스카핑 유전자)	tumor protein, translationally-controlled 1	Chr. 13: 45333471 - 45341284	Hs.374596	NM_001286272.1	131	3-3	377
TSC2203	TSC22 domain family, member 3	Chr. X: 107713221 - 107777329	Hs.522074	NM_001015881.1	77	2-3	220
UBE2J1	Ubiquitin-conjugating enzyme E2, J1	Chr. 6: 83236626 - 83352917	Hs.163776	NM_016021.2	61	3-4	568

실시예 2. 진단: 골수종으로서 샘플의 확인

시험 세트 1에서, 활성 골수종 질환을 갖는 환자($n=57$)를 대조군($n=23$)과 구별하는 시험의 유용성에 대한 데이터가 표 3에 포함되어 있다. 수신자 작동 곡선 분석 및 지표가 도 2B에 포함되어 있다. 스코어는 0.99의 곡선하 면적(AUC)을 나타내었다. 지표는 민감도 >95%, 특이성 100%, PPV 100%, NPV 88.5%이다. 전체 정확도는 96%이다. 따라서, 도구는 대조군과 공격적이고 안정한 골수종 질환을 구별할 수 있다.

MGUS의 특정 평가는 이 형질 세포 질환($n=18$; MyelomX = 39 ± 9) 및 대조군($n=155$, 12 ± 8 , $p<0.0001$) 사이의 유의한 차이를 확인하였다(도 3A). MGUS를 대조군과 구별하기 위한 AUC는 0.97이었다(도 3B).

다발성 골수종 하위그룹의 특정 평가는 새롭게 진단된 환자($n=53$; MyelomX = 75 ± 25), 임상적으로 안정한 질환($n=56$, 31 ± 20 , $p<0.0001$) 및 불응성 질환($n=26$, 92 ± 17) 사이의 유의한 차이를 확인하였다(도 4A). 안정한 질환을 불응성 질환과 구별하기 위한 AUC는 0.97이었다(도 4B).

시험을 155명의 건강한 대조군 및 81명의 골수종 환자를 포함한 제2 시험 세트(시험 세트 2)에서 평가하였고,

이들 대다수는 MRD 환자를 포함하여 안정한 질환을 나타내었다. 평균 MyelomX 스코어는 골수종 군에서 47 ± 14 대 대조군에서 12 ± 8 이었다(도 5A). 수신자 작동 곡선 분석은 스코어가 0.97의 곡선하 면적(AUC)을 나타내었고(도 5B), 지표가 89-99%이었음을 입증하였다(도 5C).

표 3. 샘플이 혈액 샘플에서 골수종 또는 대조군인지 여부를 결정하는 XGB-알고리즘의 분류 정확도를 나타내는 혼동 행렬(confusion matrix)

예측됨/참조	골수종	대조군
대조군	3	20
골수종	55	2
민감도	96%	
특이성	87%	
양성 예측값	95%	
음성 예측값	81%	
정확도	94%	

실시예 3. 최소 잔존 질환의 확인

효과적인 요법($n=40$)은 스코어를 59 ± 14 에서 35 ± 12 로 감소시켰고, 이는 완전한 차도와 관련되었다(도 6). MRD 군의 평가는 조기(1년 이내)에 재발한 높은 스코어(≥ 40)를 갖는 10명의 환자 모두를 확인하였다. 따라서, MyelomX 스코어는 생화학적으로 MRD를 정의하고 진행성 질환을 갖고 조기에 재발할 사람들을 확인할 수 있다.

실시예 4. 치료 반응자와 불응성 질환의 구별

요법 시리즈($n=23$)에서, 3개월 간의 보르테오믹스(프로테아좀 억제제 - PI) 치료는 치료 반응자에서 MyelomX 스코어를 64 ± 9 에서 23 ± 12 ($p < 0.0001$)로 유의하게 감소시켰지만 PI 치료에 불응성인 사람들에게서는 변화가 없었다(60 ± 9 , $p = NS$)(도 7). 이것은 MyelomX 스코어가 골수종에서 프로테아좀 억제제 요법의 효능을 측정하는데 사용될 수 있다는 것과, 스코어의 감소가 치료적 개입에 대한 반응과 상관관계가 있고 비반응자가 정확하게 확인될 수 있다는 것을 나타낸다.

실시예 5. 골수종을 진단하고, MRD를 입증하며 요법 반응을 정의하기 위한 MyelomX 스코어의 용도

두 데이터 세트에서 MyelomX 스코어의 정확도를 확인하는 혼동 행렬이 표 4에 포함되어 있다. 진단으로서, 스코어는 활성 질환을 확인하는데 97% 정확하다. MRD 결정에 대해, 그것은 전체적으로 75% 정확하지만, 1년 이내에 재발하지 않는 사람들에게는 100% 정확하다. 치료 반응자에 대해, 스코어는 반응자를 확인하는데 87% 정확하고 요법에 실패하거나 불응성인 사람들에게는 97%이다.

표 4. XGB-모델 알고리즘의 분류 정확도 및 혈액 샘플에서 골수종 질환의 동적 상태를 정의하기 위한 스코어 컷 오프를 나타내는 혼동 행렬

예측됨/참조	대조군 (MMx 스코어 ≤20)	중간 MMx 스코어 21 내지 39	MMx 스코어 ≥40	정확도
대조군(<i>n</i> = 47)	45	2	0	96%
다발성 골수종(MRD 없음)(<i>n</i> = 65)	2	13	50	97%
새롭게 진단됨 (<i>n</i> = 31)	1	1	29	97%
MRD(<i>n</i> = 24)	2	16	6	75%
치료 반응자(<i>n</i> = 39)	26	8	5	87%
불응성 질환(<i>n</i> = 34)	1	0	33	97%

[0218]

[0219]

본 발명자들은 환자의 상이한 골수종 세포주 및 FAC 분류된 다발성 골수종 종양에서 발현을 평가함으로써 골수종이 혈액 기반 유전자 발현 분석을 위한 공급원임을 확인하였다.

[0220]

32개의 모든 유전자는 3개의 모든 골수종 세포주에서 고도로 발현되었다. 스코어는 86 ± 9 (RPMI-8226) 내지 76 ± 10 (IM9) 내지 60 ± 9 (MM-1R)의 범위였다(도 8A).

[0221]

이들 3개의 세포주 및 정상 전혈을 사용한 스파이크 인 실험은 1개 정도의 적은 세포가 1 ml의 혈액에 첨가(spike)될 때 유전자 발현 스코어가 검출되었음을 입증하였다. 하나의 단일 골수종 세포가 검출될 수 있었다. 스코어는 30 ± 7 (RPMI-8226) 내지 41 ± 7 (IM9) 내지 21 ± 3 (MM-1R)의 범위였다(도 8B). 스코어는 대조군 혈액과 비교하여 유의하게 상승되었다(스파이크-인 없음; $p < 0.0001$).

[0222]

이후, 본 발명자들은 종양 조직(FAC 분류된 CD138+ 세포)에서 유전자 발현을 평가하였다. 32개의 모든 유전자(및 변이체)는 골수종에서 높게 발현되었고, 스코어는 전혈 샘플의 값과 일치하였다(도 9A). 본 발명자들은 또한 종양 조직에서 유전자 발현을 비교하였고, 동일한 환자로부터의 전혈을 일치시켰다. 유전자 발현은 매우 일치하였고(Pearson r : 0.87 - 0.95, 중앙값: 0.92), 종양 조직 및 혈액에서의 유전자 발현이 일치하였음을 확인하였다(도 9B).

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[0227]

[0228]

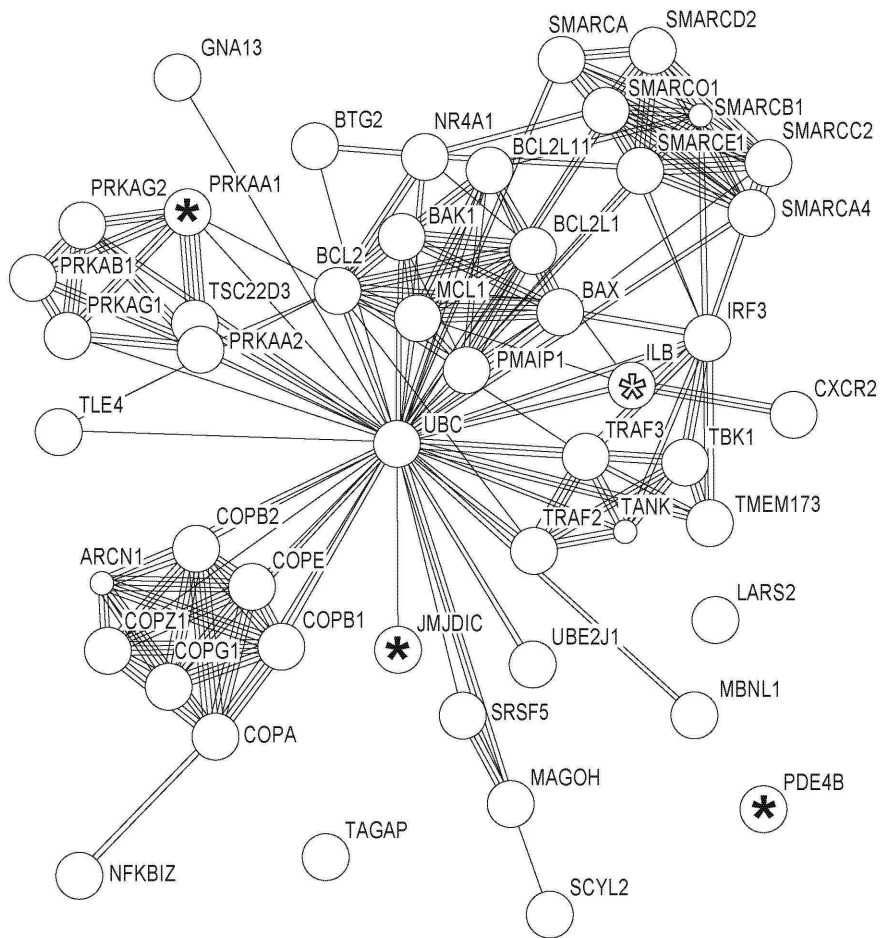
[0229]

등가물

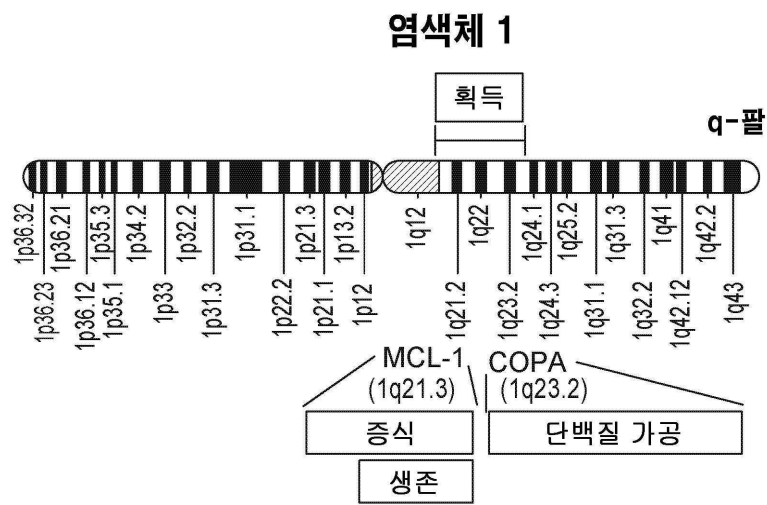
본 발명은 상기 제시된 특정 구현예와 관련하여 설명되었지만, 많은 대안, 변형 및 이의 다른 변화가 당업자에 게 명백할 것이다. 모든 이러한 대안, 변형 및 변화는 본 발명의 사상 및 범주에 속하는 것으로 의도된다.

도면

도면1a



도면1b

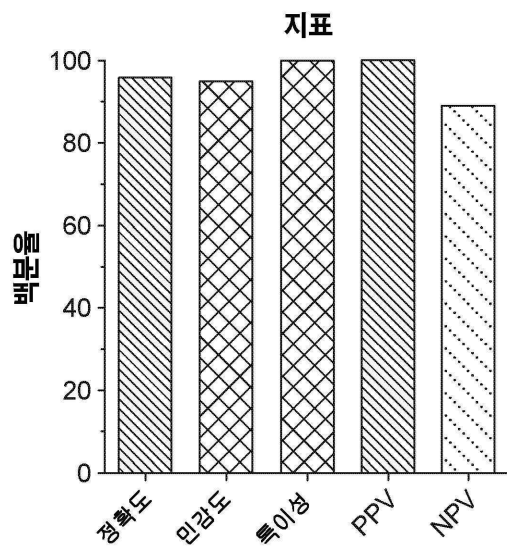


- ✱ 잠재적인 약물 표적
- PRKAA1 (AMPK)
 - PDE4B (AKT/mTOR)
 - JMJD1C (백혈병)
- ✧ 약물 표적 마커
- IL-8 (MM에서 멜팔란 내성)

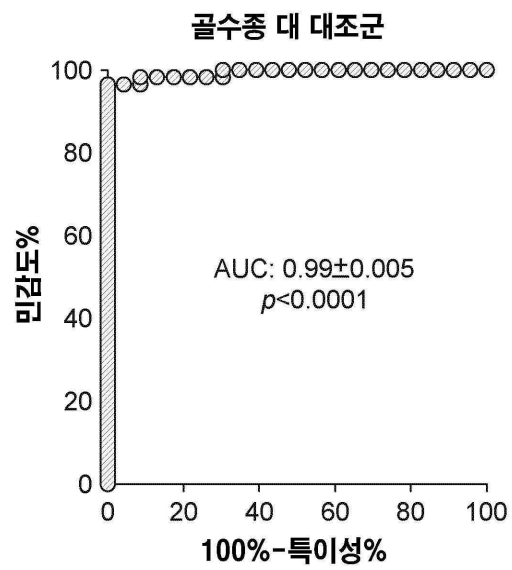
MALAT1 종양유전자
긴 비코딩 RNA

기능적 역할							
혈관신생	세포자멸사	면역 반응	표현형	단백질 가공	증식	RNA 가공	생존
IL-8	BTG2	LARS2	NR4A1	COPA1	GNA13	MBNL-1	MCL-1
	NFKBIZ	NFKBIZ	SCYL2	LARS2	JMJD1C	SRSF5	NFKBIZ
		NR4A1	SMARCD2	SCYL2	MALAT1		PDE4B
		TAGAP	TLE4	UBE2J1	MCL-1		PRKAA1
		TANK			PDE4B		TSC22D3
		TLE4					UBE2J1
		TSC22D3					

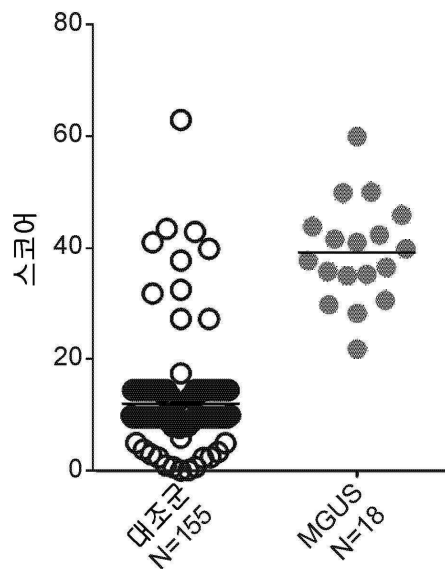
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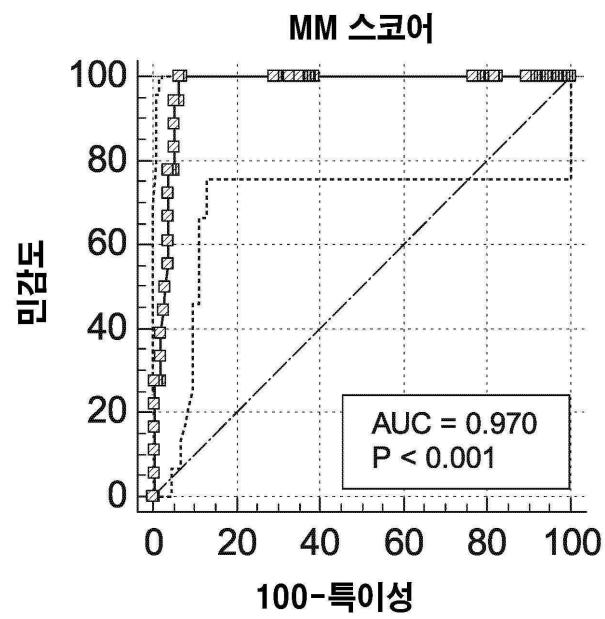
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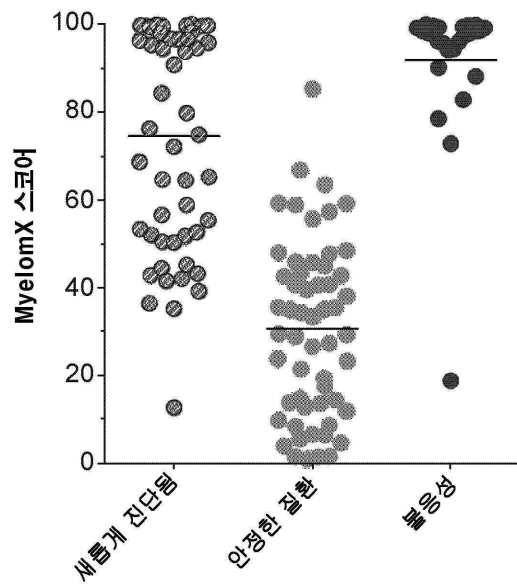
도면3a



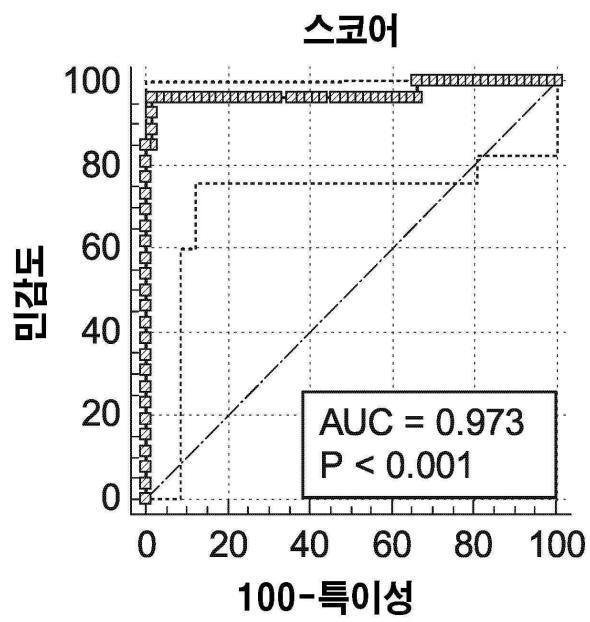
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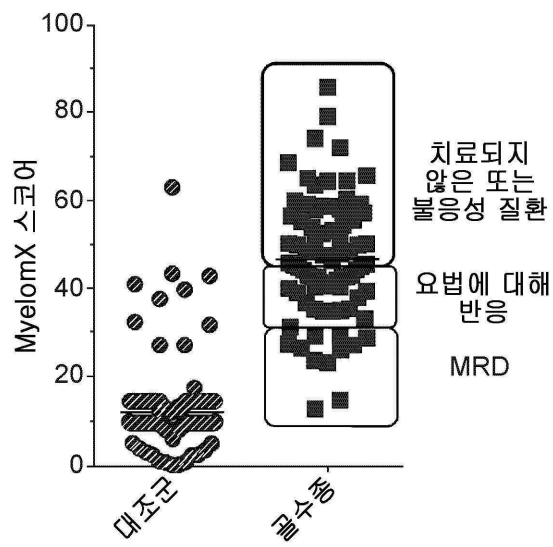
도면4a



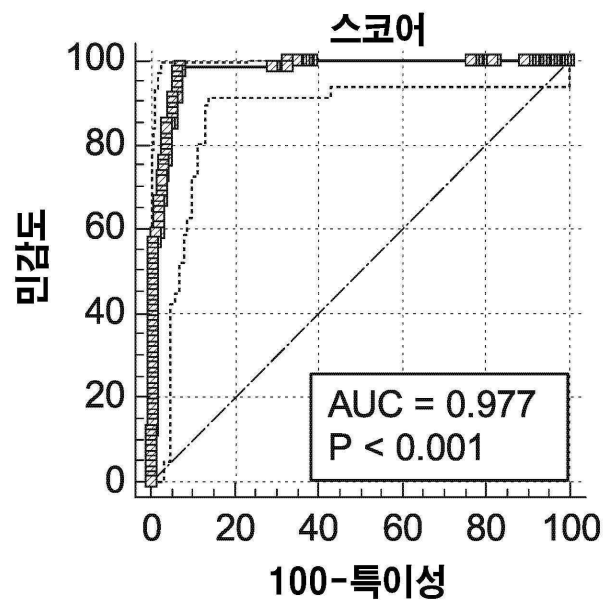
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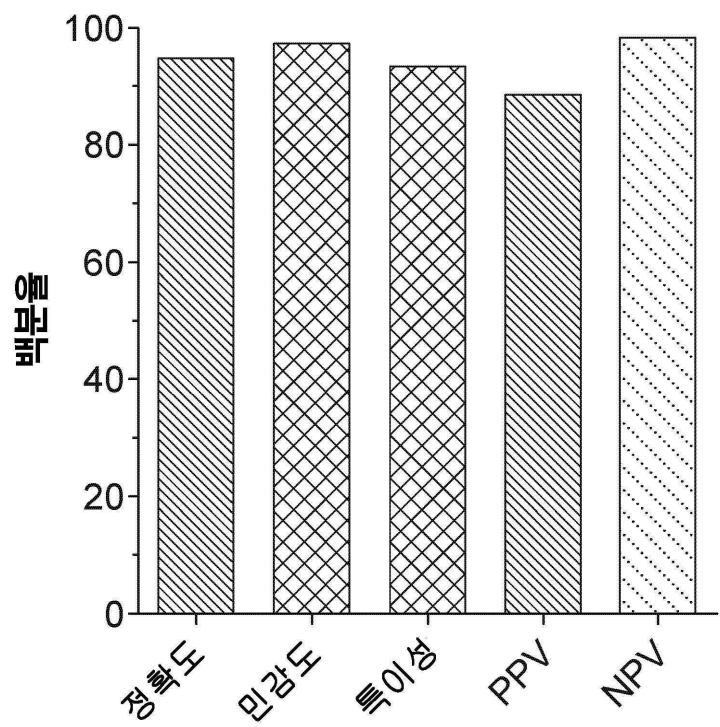
도면5a



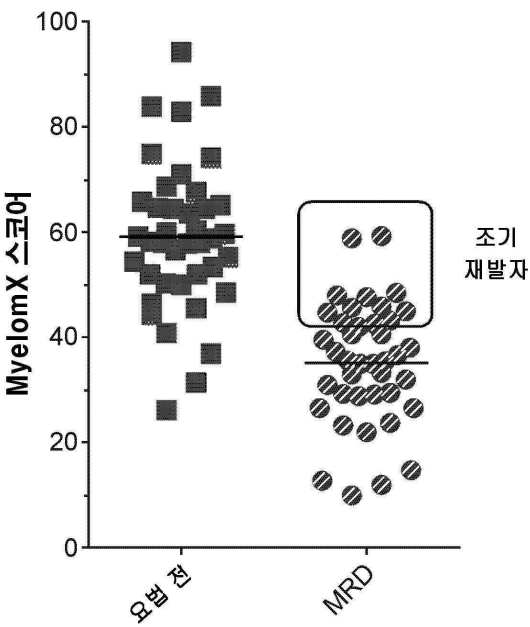
도면5b



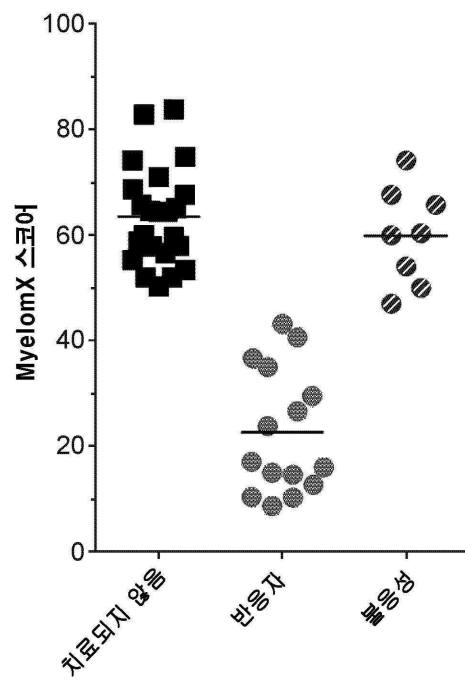
도면5c



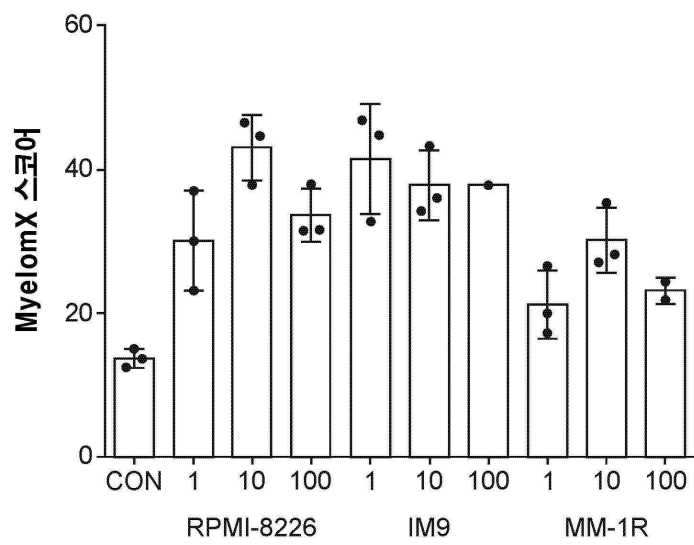
도면6



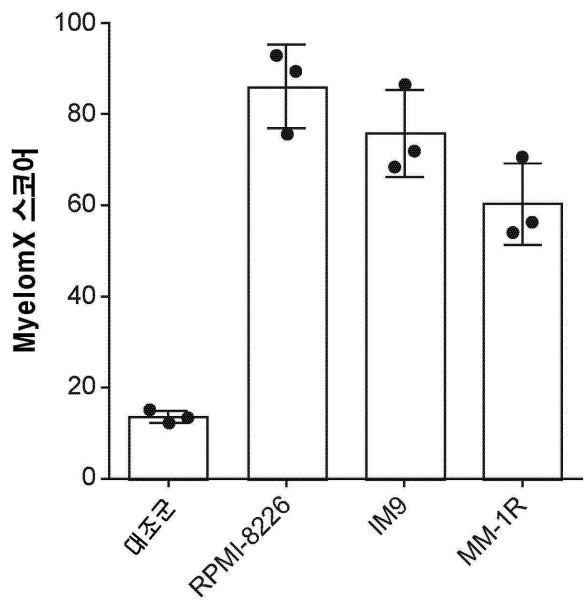
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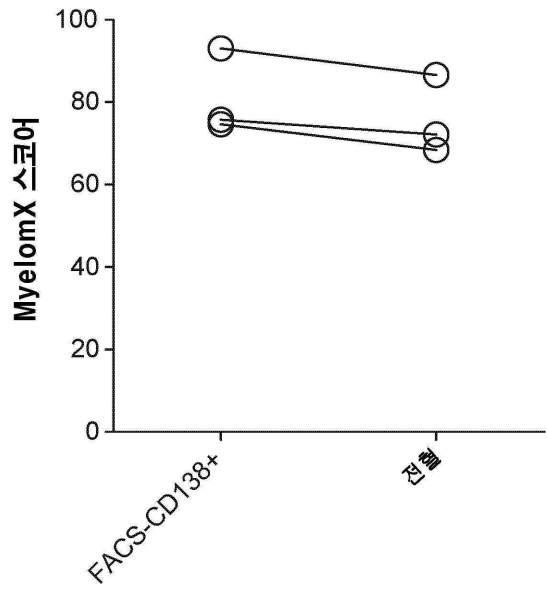
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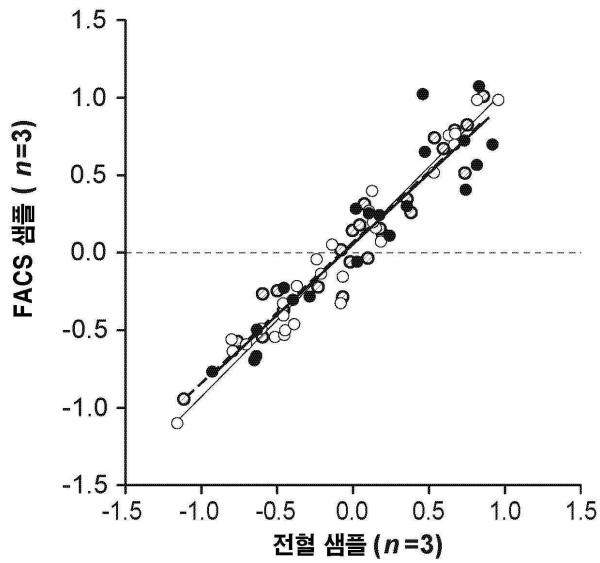
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