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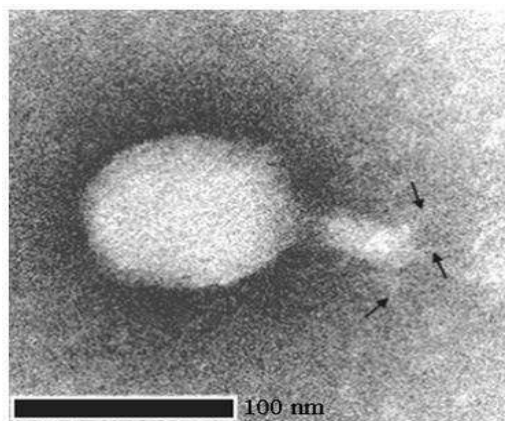
전체 청구항 수 : 총 10 항

(54) 이질균에 특이적 사멸능을 갖는 박테리오파지

(57) 요약

본 발명은 이질균에 특이적 사멸능을 갖는 박테리오파지에 관한 것으로 구체적으로 본 발명은 기탁번호 KCTC 11432BP를 가지는 이질균에 특이적 사멸능을 갖는 박테리오파지, 상기 박테리오파지 또는 이의 배양물을 유효성분으로 함유하는 항균제, 이질균에 의해 유발되는 질환의 예방 또는 치료용 약학적 조성물, 사료첨가제 또는 식품첨가제에 관한 것이다. 본 발명의 박테리오파지는 이질균을 특이적으로 사멸시킬 수 있어, 상기 박테리오파지 또는 이의 배양물은 항균제, 이질균에 의해 유발되는 질환의 예방 또는 치료용 약학적 조성물, 사료첨가제 또는 식품첨가제로 효과적으로 사용될 수 있다.

대표도 - 도1



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연구과제명 국내 담수호 바이러스 메타게놈 (virome) 자원 확보 및 유해세균 파지 테라피(phage therapy)기술 개발

기여율

주관기관 경희대학교 산학 협력단

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특허청구의 범위

청구항 1

이질균에 특이적 사멸능을 갖는 박테리오파지 (기탁번호 KCTC 11432BP).

청구항 2

제1항에 있어서, 상기 박테리오파지는 서열번호 1의 염기서열로 표시되는 유전체를 갖는 박테리오파지.

청구항 3

제1항에 있어서, 상기 이질균은 시겔라소네이(*Shigella sonnei*) 균인 박테리오파지.

청구항 4

제1항의 박테리오파지 또는 이의 배양물을 유효성분으로 함유하는 항균제.

청구항 5

제4항에 있어서, 상기 항균제는 이질균을 사멸시키는 것인 항균제.

청구항 6

제5항에 있어서, 상기 이질균은 시겔라소네이(*Shigella sonnei*) 균인 항균제.

청구항 7

제1항의 박테리오파지 또는 이의 배양물을 유효성분으로 함유하는 이질균에 의해 유발되는 질환의 예방 또는 치료용 약학적 조성물.

청구항 8

제7항에 있어서, 상기 이질균에 의해 유발되는 질환은 세균성 이질인 약학적 조성물.

청구항 9

제1항의 박테리오파지 또는 이의 배양물을 포함하는 사료첨가제.

청구항 10

제1항의 박테리오파지 또는 이의 배양물을 포함하는 식품첨가제.

명세서

발명의 상세한 설명

기술 분야

[0001] 본 발명은 이질균에 특이적 사멸능을 갖는 박테리오파지에 관한 것으로 구체적으로 본 발명은 기탁번호 KCTC 11432BP를 가지는 이질균에 특이적 사멸능을 갖는 박테리오파지, 상기 박테리오파지 또는 이의 배양물을 유효성분으로 함유하는 항균제, 이질균에 의해 유발되는 질환의 예방 또는 치료용 약학적 조성물, 사료첨가제 또는 식품첨가제에 관한 것이다.

배경 기술

[0002] 이질균은 시겔라(*Shigella*)속에 속하는 균으로 장내세균과에 속하는 세균이다. 이질균은 운동성이 없고 혐박도 없으며 아포도 형성하지 않는 그람음성 세균으로 *S.flexneri*, *S.sonnei*, *S.doydii*, *S.dysenteriae*의 4종으로 나뉜다. 상기 균들은 세균성 이질을 발생시키는 데, 상기 질환은 감염력이 강해 매개체 내의 증식없이도 환자나 보균자의 손에 묻어있는 세균만으로도 전파가 가능하며, 점측감염증이 시겔라 감염증의 주된 전파 방법이다. 세계적으로 매년 2억명의 발병을 보이고 있으며 그중 65만명이 사망하고 있는 실정이다. 우리나라에서 세균성 이

질의 발병은 감소추세를 보이다 1998년이후 전국적으로 집단 발병하는등 발병이 현격히 증가하여 사회문제화 되고 있다. 또한 1998년 이후 분리된 이질균의 경우 테트라사이클린, 스트렙토마이신등 항생제에 대하여 내성을 보이는 등 항균제에 대한 내성이 심각한 수준으로 대두되고 있다.

[0003] 상기 이질균에 감염된 경우 치료를 위하여 주로 항생제를 사용한다. 하지만 항생제가 남용되는 경우 항생제 내성 미생물들이 발생하여 부작용이 발생할 수 있다. 구체적으로 항생제가 남용되는 경우 미생물들은 항생제에 대한 내성을 획득하게 되었고 내성을 지닌 미생물들은 다른 미생물에게 내성을 전달하여 확산 속도가 빠르게 퍼져 나갔다. 따라서 상기 항생제가 아닌 다른 방법으로 이질균을 사멸시킬 수 있는 방법이 필요한 실정이다.

[0004] 한편, 박테리오파지(bacteriophage)는 세균에 특이적으로 침투하여 용균하는 바이러스로 유전물질 (single DNA, double DNA, RNA)을 단백질 외피가 싸고 있는 유기체다. 상기 박테리오파지는 자연에 존재하는 모든 생물체를 감염시킬 수 있으며, 생물이 존재하는 거의 모든 곳에 함께 존재할 수 있다. 뿐만 아니라 그 수와 다양성도 엄청난 것으로 밝혀지고 있고, 실제로 해양이나 토양의 경우 박테리아의 수보다 많이 존재하는 것으로 추정되고 있으며 그 다양성도 어마어마한 것으로 알려지고 있다. 이들을 이용한 파지 치료법 (phage therapy)은 인간뿐만 아니라 식물, 동물, 음식 등 그 응용분야가 매우 다양할 뿐 아니라 잠재적 응용성도 많다고 할 수 있으며 나아가 항생제보다 보다 특이적인 치료가 가능하다.

발명의 내용

해결 하고자하는 과제

[0005] 이에 본 발명자들은 이질균에 특이적 사멸능을 갖는 박테리오파지에 대하여 연구하던 중, 하수로부터 신규한 박테리오파지를 분리하고 상기 박테리오파지가 이질균에 특이적 사멸능이 있음을 밝혀 본 발명을 완성하였다.

[0006] 따라서 본 발명은 이질균에 특이적 사멸능을 갖는 박테리오파지 (기탁번호 KCTC 11432BP)를 제공하는 것을 목적으로 한다.

[0007] 또한 본 발명은 상기 박테리오파지 또는 이의 배양물을 유효성분으로 함유하는 항균제를 제공하는 것을 목적으로 한다.

[0008] 또한 본 발명은 상기 박테리오파지 또는 이의 배양물을 유효성분으로 함유하는 이질균에 의해 유발되는 질환의 예방 또는 치료용 약학적 조성물을 제공하는 것을 목적으로 한다.

[0009] 또한 본 발명은 상기 박테리오파지 또는 이의 배양물을 포함하는 사료첨가제를 제공하는 것을 목적으로 한다.

[0010] 또한 본 발명은 상기 박테리오파지 또는 이의 배양물을 포함하는 식품첨가제를 제공하는 것을 목적으로 한다.

과제 해결수단

[0011] 상기 과제를 해결하기 위하여, 본 발명은 이질균에 특이적 사멸능을 갖는 박테리오파지 (기탁번호 KCTC 11432BP)를 제공한다.

[0012] 또한 본 발명은 상기 박테리오파지 또는 이의 배양물을 유효성분으로 함유하는 항균제를 제공한다.

[0013] 또한 본 발명은 상기 박테리오파지 또는 이의 배양물을 유효성분으로 함유하는 이질균에 의해 유발되는 질환의 예방 또는 치료용 약학적 조성물을 제공한다.

[0014] 또한 본 발명은 상기 박테리오파지 또는 이의 배양물을 포함하는 사료첨가제를 제공한다.

[0015] 또한 본 발명은 상기 박테리오파지 또는 이의 배양물을 포함하는 식품첨가제를 제공한다.

[0016] 이하 본 발명을 보다 상세히 설명한다.

[0017] 본 발명에서 항균제는 미생물의 성장을 억제할 뿐 아니라 미생물을 파괴 또는 무력화하는 제제를 의미한다.

[0018] 본 발명에서 배양물은 본 발명의 박테리오파지의 배양액, 상기 배양액의 농축액, 상기 배양액 또는 농축액의 건조물을 포함한다. 상기 배양물은 본 발명의 박테리오파지를 당업계에 공지된 박테리오파지 배양용 배지에 본 발명의 박테리오파지를 접종하여 제조될 수 있으며, 상기 배지는 이에 한정되지 않지만 TSA(Tryptic Soy Agar)일

수 있다.

- [0019] 본 발명의 박테리오파지는 이질균이 서식하는 곳에서 당업계에 공지된 방법에 따라 분리될 수 있다. 이에 한정되지 않지만 바람직하게는 박테리아는 여과하지만 박테리오파지는 통과시킬 수 있는 구멍크기의 필터로, 이질균이 서식하는 곳에서 채취한 시료를 여과시킨 다음, 원심분리하여 상등액을 회수하고 상기 상등액을 이용하여 용균반 분석(plaque assay)을 함으로써 이질균을 특이적으로 사멸시킬 수 있는 본 발명의 박테리오파지를 분리할 수 있다 (<실시예 1-1> 참조).
- [0020] 본 발명의 박테리오파지는 형태학적 분류상 미오비리대 (Myoviridae) 및 T4 유사 파지에 속하며, 본 발명에서 상기 박테리오파지를 ‘bacteriophage SP18’ 로 명명하고 2008년 11월 21일자로 생명공학연구소 유전자은행 (korean collection for type cultures, KCTC)에 기탁번호 KCTC 11432BP로 기탁하였다 (<실시예 1-2> 참조).
- [0021] 본 발명의 박테리오파지는 30분 정도의 잠복기를 가지는 성장 특성이 있다 (<실시예 1-3> 참조).
- [0022] 본 발명의 박테리오파지는 서열번호 1의 염기서열로 표시되는 유전체를 가지며, 상기 염기서열은 gDNA 서열이다. 또한 본 발명의 박테리오파지의 외피 단백질 중의 하나인 g23 단백질 아미노산 서열(서열번호 2)을 다른 박테리오파지와 비교한 결과, 본 발명의 박테리오파지는 다른 박테리오파지와 동일하지 않으며 신규한 것이다 (<실시예 1-4> 참조).
- [0023] 본 발명의 박테리오파지는 이질균에 특이적 사멸능을 가지는 것을 특징으로 한다. 상기 시겔라속 균은 이에 한정되지 않지만 바람직하게는 시겔라소네이(Shigella sonnei) 균일 수 있다. 구체적으로 본 발명의 박테리오파지는 이질균에 대해서 특이적인 사멸효과가 있으며, 에스케리키아 (Escherichia) 및 살모넬라 속 균에 대해서는 사멸효과가 없다 (<실시예 2> 참조).
- [0024] 한편, 본 발명의 항균제는 박테리오파지 또는 이의 배양물을 유효성분으로 함유하는 것을 특징으로 한다.
- [0025] 상기 박테리오파지 또는 이의 배양물은 상기 기재한 바와 같이 이질균에 특이적 사멸능이 있어, 상기 성분을 함유하는 항균제는 이질균을 사멸시킬 수 있는 특성이 있다. 상기 시겔라속 균은 이에 한정되지 않지만 바람직하게는 시겔라소네이(Shigella sonnei) 균일 수 있다.
- [0026] 상기 이질균은 주로 식품 또는 화장품을 오염시킬 있다. 식품은 미생물의 탄소원 및 질소원 등 수 많은 유기물, 무기물을 함유하고 있으며, 화장품은 기름이나 물을 주성분으로 하며, 미생물의 탄소원이 되는 글리세린이나 솔비톨 등과 질소원이 되는 아미노산 유도체, 단백질 등이 배합된 것이 많아, 상기 이질균이 번식하기 용이하기 때문이다. 따라서 본 발명의 항균제는 상기 식품이나 화장품에 첨가되어 사용될 수 있다.
- [0027] 본 발명의 항균제는 유익한 균은 사멸시키지 않고 병원성 균인 이질균만을 선택적으로 죽일 수 있어, 부작용이 없으며 병원성 균의 내성 내지 저항성을 유도하지 않아 기존의 항생물질에 비하여 효과적으로 이용될 수 있다.
- [0028] 본 발명의 항균제는 통상적인 항균제 제조방법으로 제조될 수 있으며, 상기 본 발명의 항균제는 유효성분인 본 발명의 박테리오파지 또는 이의 배양물 외에 필요에 따라 담체, 기타 보조제 등을 추가적으로 포함할 수 있는데, 상기 담체는 생리식염수, 증류수, 사료, 박테리아용 배지(예, Tryptic Soy Agar) 등일 수 있으며, 보조제는 pH 교정 등의 목적으로 완충액 등일 수 있다. 또한, 본 발명의 항균제는 액상, 반 고체상 또는 고체상으로 제제 형태는 분말제, 과립제, 정제 등의 고체상 제제, 현탁제 또는 주사액제 등의 액상 제제 및 크림, 로션, 젤, 페이스트 등의 반 고체상 제제 등으로 제형화될 수 있다.
- [0029] 한편, 본 발명의 약학적 조성물은 상기 박테리오파지 또는 이의 배양물을 유효성분으로 함유하는 이질균에 의해 유발되는 질환의 예방 또는 치료용인 것을 특징으로 한다.
- [0030] 상기 박테리오파지 또는 이의 배양물은 상기 기재한 바와 같이 이질균에 특이적 사멸능이 있어, 상기 성분을 유효성분으로 함유하는 본 발명의 약학적 조성물은 이질균에 의해 유발되는 질환의 예방 또는 치료용으로 효과적으로 사용될 수 있다. 상기 시겔라속 균은 이에 한정되지 않지만 바람직하게는 시겔라소네이(Shigella sonnei) 균일 수 있다.
- [0031] 상기 이질균에 의해 유발되는 질환은 이에 한정되지 않지만 바람직하게는 세균성 이질일 수 있다.

- [0032] 본 발명의 약학적 조성물은 상기 질환 부위에서의 도포 또는 분무하는 방법으로 이용할 수 있으며, 그 밖에 경구 또는 비경구 투여를 통해 투여할 수도 있으며, 비경구 투여의 경우 정맥내 투여, 복강내 투여, 근육내 투여, 피하 투여 또는 국부 투여를 이용하여 투여할 수 있다.
- [0033] 본 발명의 약학적 조성물의 적합한 도포, 분무 및 투여량은 제제화 방법, 투여 방식, 환자의 연령, 체중, 성, 질병 증상의 정도, 음식, 투여 시간, 투여 경로, 배설 속도 및 반응 감응성과 같은 요인들에 의해 다양하며, 보통으로 숙련된 의사는 소망하는 치료에 효과적인 투여량을 용이하게 결정 및 처방할 수 있다. 일반적으로, 본 발명의 약학적 조성물은 이에 한정되지 않지만 바람직하게는 1×10^3 내지 1×10^{10} pfu/ml의 박테리오파지를 포함할 수 있다.
- [0034] 본 발명의 약학적 조성물은 당업자가 용이하게 실시할 수 있는 방법에 따라, 약리학적으로 허용 가능한 담체, 부형제, 희석제 또는 부성분을 추가로 포함할 수 있다. 상기 약학적으로 허용되는 담체, 부형제 또는 희석제의 예로는, 락토즈, 텍스트로즈, 수크로즈, 솔비톨, 만니톨, 자일리톨, 에리스리톨, 말티톨, 전분, 아카시아 고무, 알지네이트, 젤라틴, 칼슘 포스페이트, 칼슘 실리케이트, 셀룰로즈, 메틸 셀룰로즈, 미정질 셀룰로즈, 폴리비닐 피롤리돈, 물, 메틸하이드록시벤조에이트, 프로필하이드록시벤조에이트, 탈크, 마그네슘 스테아레이트 및 광물 유, 프로필하이드록시벤조에이트, 탈크, 마그네슘 스테아레이트 및 광물유, 텍스트린, 칼슘카보네이트, 프로필렌글리콜, 리퀴드 파라핀 및 생리식염수로 이루어진 군에서 선택된 1 이상을 들 수 있으나, 이에 한정되는 것은 아니며 통상의 담체, 부형제 또는 희석제 모두 사용 가능하다. 또한, 상기 약학 조성물은 통상의 충전제, 증량제, 결합제, 봉해제, 항응집제, 윤활제, 습윤제, pH 조절제, 영양제, 비타민, 전해질, 알긴산 및 그의 염, 펙트산 및 그의 염, 보호성 콜로이드, 글리세린, 향료, 유화제 또는 방부제 등을 추가로 포함할 수 있다.
- [0035] 한편, 본 발명의 사료첨가제 또는 식품첨가제는 상기 박테리오파지 또는 이의 배양물을 포함하는 것을 특징으로 한다.
- [0036] 상기 박테리오파지 또는 이의 배양물은 상기 기재한 바와 같이 이질균에 특이적 사멸능이 있어, 상기 성분을 유효성분으로 함유하는 본 발명의 사료첨가제 또는 식품첨가제는 이질균을 특이적으로 사멸시킬 수 있다. 상기 시겔라속 균은 이에 한정되지 않지만 바람직하게는 시겔라소네이(Shigella sonnei) 균일 수 있다.
- [0037] 상기 식품첨가제가 사용될 수 있는 식품에는 제한이 없으며, 상기 식품첨가제는 이질균에 감염되기 쉬운 식품에 당업계에 공지된 방법에 따라 첨가제의 형태로 제조된 것을 말한다. 상기 사료첨가제는 이에 한정되지 않지만 가축용 및 어류용 사료에 첨가제의 형태로 제조된 것을 말한다. 상기 사료첨가제 또는 식품첨가제의 첨가량은 당업자라면 용이하게 정할 수 있으며, 이질균의 감염 용이성, 감염 정도에 따라 달리 정할 수 있다.

효 과

- [0038] 본 발명의 박테리오파지는 이질균을 특이적으로 사멸시킬 수 있어, 상기 박테리오파지 또는 이의 배양물은 항균제, 이질균에 의해 유발되는 질환의 예방 또는 치료용 약학적 조성물, 사료첨가제 또는 식품첨가제로 효과적으로 사용될 수 있다.

발명의 실시를 위한 구체적인 내용

- [0039] 이하, 본 발명을 실시예에 의해 상세히 설명한다.
- [0040] 단, 하기 실시예는 본 발명을 예시하는 것일 뿐, 본 발명의 내용이 하기 실시예에 한정되는 것은 아니다.

[0041] <실시예 1>

[0042] 본 발명의 박테리오파지의 분리 및 동정

[0043] <1-1> 본 발명의 박테리오파지의 분리

- [0044] 이질균을 특이적으로 사멸시킬 수 있는 박테리오파지를 분리하기 위하여, 이질균이 존재할 것으로 예상되는 곳에서 시료를 채집한 후 이의 배양액을 이질균에 접종하여 이질균을 사멸시키는 박테리오파지를 분리하였다.

[0045] 구체적으로 박테리오파지가 존재할 것이라 예상되는 하천수에서 검체를 채집하여 여과 종이로 일차 여과한 후에, 회수된 여과액을 0.22 μm 의 필터를 이용하여 여과한 다음, 여과액을 이질균과 함께 30℃에서 1일 동안 배양하고 다시 8,000 rpm에서 20분간 원심분리하여 상등액을 회수하였다. 상기 회수된 상등액을 0.22 μm 의 필터를 이용하여 다시 여과한 다음, 그 여과액을 이용해 용균반 분석(plaque assay)(Calson, K. (2004) Appendix. Working with Bacteriophages: Common Techniques and Methodological Approaches. In the Bacteriophages: Biology and Applications (Kutter, E & Sulakvelidze, A eds) pp 437-494, CRC Press, Florida)을 함으로써 이질균을 특이적으로 사멸시킬 수 있는 박테리오파지를 분리하였다.

[0046] <1-2> 본 발명의 박테리오파지의 형태학적 분류 및 기탁

[0047] 상기 <실시예 1-1>에서 수득한 박테리오파지의 형태학적 특성을 살펴보기 위해, 상기 박테리오파지를 10% 폴리 에틸렌 글리콜 8000에 넣은 후 4℃에서 하룻밤 동안 클로로포름으로 이질균과 파괴된 세포 잔해를 제거하였다. 이 후 염화세슘(CsCl) 밀도 구배법(밀도: 1.15 g/ml, 1.45 g/ml, 1.50 g/ml 및 1.70 g/ml)을 이용한 원심분리 (20,000 rpm, 2시간, 4℃)를 통하여 박테리오파지를 정제하였다.

[0048] 상기 정제된 박테리오파지를 구리 그리드(copper grid)에 묻고, 2% 우라닐 아세테이트(uranyl acetate)로 대조 염색(negative staining) 및 건조한 다음, 투과전자현미경을 이용하여 형태를 관찰하고 그 결과를 도 1에 기재 하였다.

[0049] 상기 도 1에 나타난 바와 같이, 본 발명의 박테리오파지는 형태학적 분류상 미오비리데 (*Myoviridae*) 속 및 T4 유사 파지에 속하는 것을 알 수 있고 도 3에 나타난 바와 같이 계통학적으로 T4 유사 파지에 속하는 것을 알 수 있었다.

[0050] 상기와 같이 분리한 박테리오파지를 'bacteriophage SP18'로 명명하고 2008년 11월 21일자로 생명공학연구소 유 전자은행(Korean Collection for Type Cultures, KCTC)에 기탁번호 KCTC 11432BP로 기탁하였다.

[0051] <1-3> 본 발명의 박테리오파지의 성장 특성

[0052] 본 발명의 박테리오파지의 성장특성을 살펴보기 위하여 성장곡선을 작성하였다. 구체적으로 one-step growth curve test를 실시하였으며, 보다 구체적으로 이질균을 TSB (tyrptic soy broth, Difco)에 접종한 후 30℃에서 exponential time (OD 0.2-0.3)까지 배양한 후 MOI (multiplicity of infection) 0.1 수준의 본 발명의 박테리 오파지를 접종 한 후 30℃에서 10분 간격으로 배양액을 추출하고 OD와 박테리오파지의 수(plaque form unit, PFU)를 측정하여 그 결과를 도 2에 기재하였다.

[0053] 상기 도 2에 기재한 바와 같이, 본 발명의 박테리오파지는 30분 정도의 잠복기를 가지며, 접종 후 한 시간 후부 터 감염된 배양액에서 OD 수치가 감소하는 것을 알 수 있다.

[0054] <1-4> 본 발명의 박테리오파지의 유전자 서열 분석 및 비교

[0055] 1L의 TSB에서 30℃에서 배양한 후 본 발명의 박테리오파지를 접종하여 용균 현상이 관찰될 때 폴리에틸렌글리콜 침전 및 염화세슘 고속원심분리를 통하여 박테리오파지를 농축하였다(Calson, K. (2004) Appendix. Working with Bacteriophages: Common Techniques and Methodological Approaches. In the Bacteriophages: Biology and Applications (Kutter, E & Sulakvelidze, A eds) pp 437-494, CRC Press, Florida). 상기 농축된 박테리 오 파지에서 DNA를 분리하여 (Sambrook, J. & Russell, D. W. (2001). Molecular cloning: A laboratory manual. Cold Spring Harbor Laboratory Press, New York.) 박테리오파지의 전체 유전체 서열 (170605개의 DNA 서열)을 밝혀 서열번호 1에 기재하였다.

[0056] 또한 본 발명의 박테리오파지의 외피 단백질 중의 하나인 g23 단백질의 아미노산 서열(서열번호 2)을 다른 박 테리오파지와 비교한 결과, 도 3에 기재한 바와 같이 본 발명의 박테리오파지는 엔테로파지 JS98 (91%의 DNA 상 동성) 등 다른 박테리오파지와 동일하지 않으며 차이가 있음을 알 수 있다.

[0057] <실시예 2>

[0058] **본 발명의 박테리오파지의 이질균주에 대한 특이적 사멸 효과**

[0059] 본 발명의 박테리오파지의 숙주에 대한 감염성을 조사하기 위하여, 이질균과 분자 계통학적으로 가장 가까운 균을 숙주로 하고 실험을 수행하였다. 상기 균주를 TSA(tryptic soy agar, Difco) 배지에 배양하고 페이퍼 디스크(paper disc)를 가운데 놓은 후, <실시예 1-2>에서 정제된 박테리오파지 30ul를 디스크 위에 접종하였다. 상기 접종 후, 30℃에서 24시간 동안 배양한 후, 환이 생기면 본 발명의 박테리오파지의 용균(lysis) 활성이 있는 것으로 나타냈으며, 상기 결과를 하기 표 1에 기재하였다.

표 1

[0060] 본 발명의 박테리오파지의 이질균주에 대한 특이적 사멸 효과

번호	기탁번호	종	사멸여부
1	KCTC2293	<i>Escherichia coli</i>	-
2	KCTC2441	<i>Escherichia coli</i>	-
3	KCTC2790	<i>Escherichia coli</i>	-
4	DSM4481	<i>Escherichia blattae</i>	-
5	DSM4560	<i>Escherichia hermannii</i>	-
6	DSM4564	<i>Escherichia vulneris</i>	-
7	DSM13698	<i>Escherichia fergusonii</i>	-
8	KCTC2518	<i>Shigella sonnei</i>	+
9	KCTC2009	<i>Shigella sonnei</i>	+
10	DSM5570	<i>Shigella sonnei</i>	+
11	DSM 14848	<i>Salmonella choleraesuis indica</i>	-
12	DSM 14846	<i>Salmonella choleraesuis choleraesuis</i>	-
13	DSM 13772	<i>Salmonella bongori</i>	-
14	DSM 9386	<i>Salmonella choleraesuis arizonae</i>	-
15	DSM 9221	<i>Salmonella choleraesuis hountenae</i>	-
16	DSM 9220	<i>Salmonella choleraesuis salamae</i>	-
17	ATCC 13311	<i>Salmonella typhimurium</i>	-
18	ATCC 13076	<i>Salmonella enteritidis</i>	-
19	DSM 14847	<i>Salmonella choleraesuis diarizonae</i>	-

[0061] - KCTC: the Korean Collection for Type Cultures

[0062] - DSM: the German Collection of Microorganisms and Cell Cultures

[0063] - ATCC: the American Type Culture Collection

[0064] 상기 표 1에 나타난 바와 같이, 본 발명의 박테리오파지는 이질균을 특이적으로 사멸시킬 수 있음을 알 수 있다.

도면의 간단한 설명

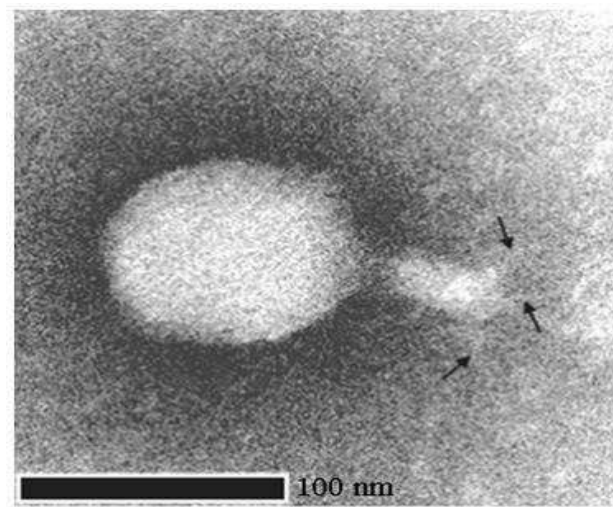
[0065] 도 1은 본 발명의 박테리오파지를 투과전자현미경으로 관찰한 사진이다.

[0066] 도 2는 본 발명의 박테리오파지의 생장 특성을 나타낸 one-step 생장곡선이다. (○: 박테리오파지가 감염되지 않은 배양액의 OD값, ●: 박테리오파지가 감염된 배양액의 OD값, ◆: pfu/ml를 나타냄)

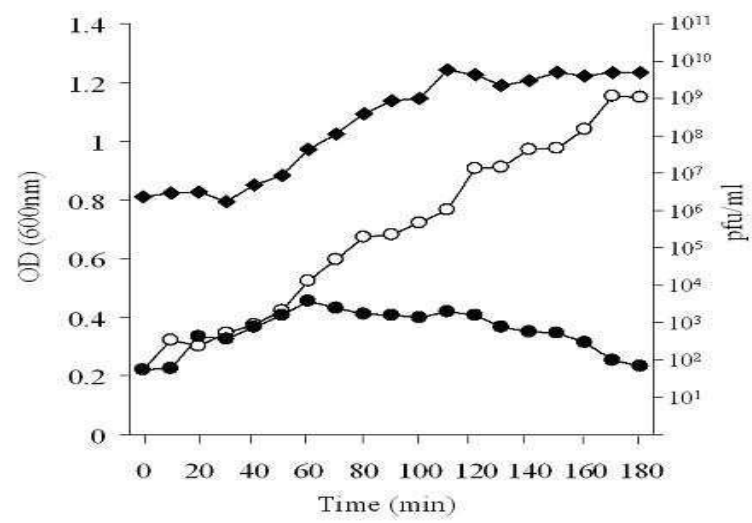
[0067] 도 3은 본 발명의 박테리오파지 (SP 18)의 외피 단백질 중의 하나인 g23 단백질의 아미노산 서열을 다른 박테리오파지와 비교하여 계통학적 위치를 나타낸 것이다.

도면

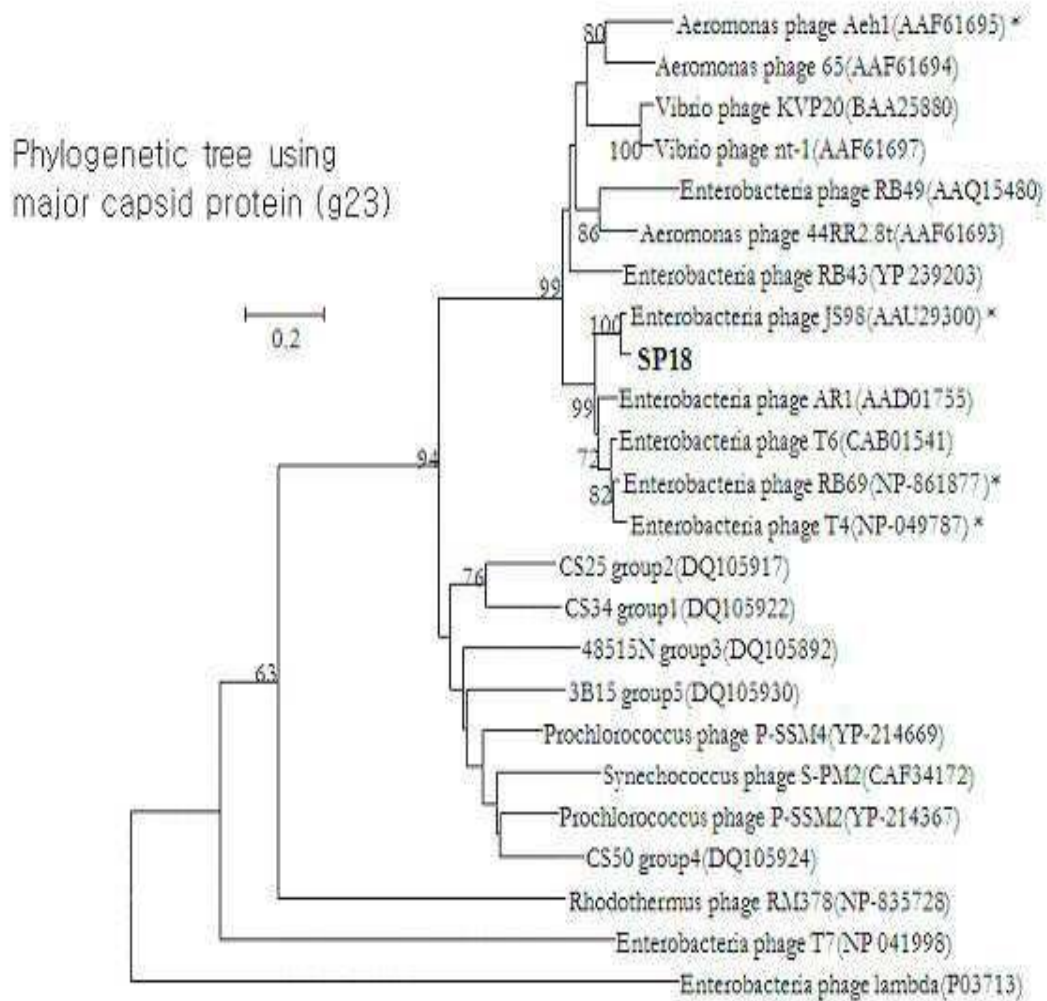
도면1



도면2



도면3



서열 목록

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