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(54) Title: USE OF D-RIBOSE TO TREAT CARDIAC ARRHYTHMIAS

(57) Abstract: D-ribose, given in doses of five to 15 grams daily, reduces or prevents the occurrence of atrial fibrillation in persons experiencing atrial fibrillation.

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USE OF D-RIBOSE TO TREAT CARDIAC ARRHYTHMIAS

RELATED APPLICATIONS

This application claims priority of United States Provisional Application 60/881,940, filed January 23, 2007.

BACKGROUND OF THE INVENTION

The heart, like other muscles, is caused to contract by electrical stimulation by nerve fibres. The normal electrical conduction system allows the nerve impulse that is generated by the sinoatrial node of the heart to be propagated to and stimulate the myocardium to contract in an orderly progression, resulting in an efficient heart beat. When the nerve impulses proceed in the normal functional manner, the heart is said to be eurythmic. When the nerve impulses are reduced or non-uniform the heart is said to be arrhythmic. Arrhythmias may be paroxysmal, that is, acute and short lasting, or chronic.

Extrasystole, or skipped beat, is generally an acute, recurrent event which can be caused by underlying heart disease, valve defects, or may be induced by triggers such as caffeine, nicotine or alcohol. Extrasystole can be felt as "palpitations" and although disturbing, is not, in itself dangerous. Therapy comprises treatment of an underlying heart condition and avoidance of triggers.

Tachycardia is an increased heart rate and can be caused by any trigger that raises the adrenaline levels, such as stress, exercise, strong emotion, caffeine or amphetamine. Heart rate returns to normal as the condition subsides. A severe form of arrhythmia is paroxysmal tachycardia, in which the ventricles contract rapidly and for a prolonged time in the absence of triggers or after the trigger has subsided. The condition is difficult to treat and can be fatal, as the ventricles may pass into fibrillation, in which the blood pressure drops to zero and circulation is halted. Immediate intervention with a defibrillating machine is necessary to preserve life.

Atrial fibrillation is a less serious occurrence. When the atria quiver in fibrillation, blood is not passed to the ventricles efficiently. Circulation is not generally impaired if the period of fibrillation is short; however, the stagnated pool of blood may clot and the clots may be passed to the pulmonary circulatory bed, the coronary arteries, the brain or other organs. It is estimated that about 2.2 million Americans suffer from atrial fibrillation and about 15% of strokes are

related to this condition. Paroxysmal atrial fibrillation may have vague symptoms of unease during an attack or the subject may be completely unaware of the condition. Diagnosis is made by the absence of the P wave, representing depolarization of the atria, on EKG.

Atrial fibrillation may be treated with medications which slow the heart rate, "thinning" the blood with aspirin or warfarin to protect the patient from clotting, controlling the heart rate with beta blockers, calcium channel blockers or cardiac glycoside. Electrocardioversion may give persistent normalizing results.

The need remains for a simple treatment with no side effects to help control arrhythmias.

SUMMARY OF THE INVENTION

It has been discovered by this Applicant that D-ribose, in low doses, treats atrial fibrillation and prevents its occurrence partially or completely.

Administration of five grams of D-ribose daily, taken as a single dose or divided into two doses is effective at preventing atrial fibrillation. More preferably, ten grams of D-ribose daily, divided into two to four doses is effective at preventing atrial fibrillation. Most preferably, the subject ingests 15 grams of D-ribose daily, divided into at least three doses. No more than five grams of D-ribose is ingested in one dose.

The D-ribose may be taken in a small amount of water, sprinkled on food, or ingested as a powder.

DETAILED DESCRIPTION OF THE INVENTION

The use of D-ribose to improve the function of skeletal and heart muscle has been documented. United States Patent Number 6,159,943 teaches that D-ribose can relieve the cramps and soreness in skeletal muscle caused by exercise. Pending US Patent Application Serial Number 10/692,388 teaches that low doses of D-ribose can improve the cardiac function of patients suffering from congestive heart failure. While the use of D-ribose for improving the function of skeletal and cardiac muscle is now well known, before this invention nothing was known of the effect of D-ribose on nerve function. Not wishing to be bound by theory, Applicant speculates that the beneficial effect of D-ribose found in the following study may be due to improving the transmission of the nerve impulses.

Eight patients with a diagnosis of atrial fibrillation were administered D-ribose. The results are tabulated below.

TABLE I.

Patient #	duration of AT	amount of D-ribose daily	other medications	Relief?
1.	Recent	N/R*	CoQ	complete, immediate
2.	N/R	N/R	N/R	complete, immediate
3.	N/R	5 grams	N/R	"helped"
4.	N/R	5 grams		complete, within two weeks

5.	20 years	10 grams	CoQ, L-carnitine, Mg	complete, immediate
6.	N/R	10-15 grams	N/R	"practically nonexistent"
7.	N/R	5 grams	N/R	complete, immediate

*N/R = not reported

It can be seen from the above data that not all patients are completely and immediately relieved of atrial fibrillation. Patients 5 and 6, all of whom ingested the more preferred and most preferred doses of D-ribose had complete and immediate relief. Patients 3 and 4 had only partial relief (3) or delayed relief (4). Therefore, it is recommended that patients ingest 10 to 15 grams of D-ribose daily.

The relief has persisted for more than a year. Therefore, since there are no side effects from the administration of low doses of D-ribose, it is suggested that use should be continued long term or chronically. While 15 grams daily has been shown to be most effective, larger amounts of D-ribose, up to 30 grams a day may be ingested, provided that no one dose exceeds eight grams, preferably five grams. It has been seen in other studies, as discussed more thoroughly in the '388 application, that many people experience flatulence and diarrhea at doses over about eight grams. Most people tolerate a dose of five grams, which is efficacious for the use taught herein, without experiencing these digestive symptoms.

I claim:

1. The use of D-ribose to treat atrial fibrillation in persons experiencing atrial fibrillation.
2. The method of claim 1 wherein D-ribose is given in daily doses of five to 30 grams
3. The method of claim 1 therein D-ribose is given in daily doses of ten to 15 grams.
4. The method of claim 1 wherein D-ribose is given in single doses not exceeding eight grams.
5. The method of claim 1 wherein D-ribose is given long-term or chronically.

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2008/000845

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61K31/70 A61P9/06

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A61K A61P

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, CHEM ABS Data, WPI Data, PAJ, FSTA, EMBASE, BIOSIS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DATABASE WPI Week 200024 Derwent Publications Ltd., London, GB; AN 2000-281310 XP002476749 & RU 2 127 548 C1 (ALABOVSKII V V) 20 March 1999 (1999-03-20) abstract	1,5
X	----- DATABASE CA [Online] CHEMICAL ABSTRACTS SERVICE, COLUMBUS, OHIO, US; 2005. LIU, PINGHUAI ET AL: "Research of anti-myocardial ischemia and anti-arrhythmia cordis effect of D-ribose" XP002476117 retrieved from STN Database accession no. 2006:1033194 abstract -/--	1,5

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

A document defining the general state of the art which is not considered to be of particular relevance

E earlier document but published on or after the international filing date

L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

O document referring to an oral disclosure, use, exhibition or other means

P document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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Z document member of the same patent family

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INTERNATIONAL SEARCH REPORT

International application No

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	<p>"RAPID COMMUNICATION. RIBOSE ACCELERATES THE REPLETION OF THE ATP POOL DURING RECOVERY FROM REVERSIBLE ISCHEMIA OF THE RAT MYOCARDIUM" JOURNAL OF MOLECULAR AND CELLULAR CARDIOLOGY, vol. 16, no. 9, September 1984 (1984-09), pages 863-866, XP000856788 ISSN: 0022-2828 the whole document</p> <p>-----</p>	1-5
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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WO 9404158	A	03-03-1994	AU 4942393 A DE 4228215 A1	15-03-1994 03-03-1994
US 4719201	A	12-01-1988	NONE	