9.0 510(k) Summary of Safety and Effectiveness Information

Date Prepared: July 30, 1999

I. Sponsor

A. Sponsor Name

SangStat Medical Corporation
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Fremont, CA 94555
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B. Official Correspondent

Mark D. Tolpin, M.D.
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II. System Identification

A. Proprietary Product Name

Celsior™ Cold Storage Solution

B. Common or Usual Product Name

Cold Storage Solution

C. Product Classification

Class II, Panel Number 78-KDL

III. Predicate Device

A. Name

ViaSpan® (Belzer UW-CSS), Du Pont Pharmaceuticals (Wilmington, Delaware) [510(k) Notification Number K900492 and K883782], Class Code with Panel Number 78-KDL.

B. Indications for Use

The solution is intended for flushing and cold storage for organs including kidney, liver, and pancreas at the time of their removal from the donor in preparation for storage, transportation and eventual transplantation into a recipient.

C. Device Description

ViaSpan®, (Belzer UW-CSS) Cold Storage Solution (Du Pont Pharmaceuticals, Wilmington, Delaware), is a clear to light yellow, sterile, non-pyrogenic solution used for flushing and storage of human organs. This solution has an approximate calculated osmolarity of 320 mOsm, a sodium concentration of 29 mEq/L, a potassium concentration of 125 mEq/L, and a pH of roughly 7.4 at room temperature. The composition of ViaSpan is thus consistent with that of an intracellular solution.

IV. Celsior™ Device Information

A. Indications for Use

Celsior™ is intended to be used for flushing, storage, and transportation of hearts in preparation for eventual transplantation into a recipient.

B. Device Description

Celsior (SangStat Medical Corporation, Fremont, CA) is a clear to slightly yellow, sterile, non-pyrogenic, extracellular solution for hypothermic flushing and storage of hearts. The solution is slightly acidic (pH 7.3 $\pm$ 0.10), slightly hypertonic (osmolarity 320-360 mOsmol) with low viscosity (1.15 cSt), and has a high buffering capacity (acidic approximately 11 mmol, alkaline approximately 7 mmol). The composition of Celsior is thus consistent with that of an extracellular solution.

Celsior is filled into 1 liter ethylene-vinyl acetate copolymer (EVA) bags. The EVA bags are sterilized (ethylene oxide) and aseptically filled up to 1,000 mL in a sterile area. After filling, each EVA bag is enveloped by an aluminum protected bag containing an oxygen absorbent sachet. This product must be stored under refrigerated conditions at 2° to 8°C (36° to 46°F) until it is used.

V. Substantial Equivalence

A. Indications for Use

ViaSpan and Celsior have the same intended use. Both solutions are intended for the flushing and cold storage of an organ at the time of its removal from a donor in preparation for storage, transportation, and eventual transplantation into a recipient.

B. Technological Characteristics

Celsior and ViaSpan are clear to light yellow, sterile, non-pyrogenic solutions. Celsior's chemical composition has a number of similarities to that of ViaSpan. However, the potassium content of Celsior is more similar to that of an extracellular solution, whereas the potassium content of ViaSpan is more consistent with that of an intracellular solution. Both Celsior and ViaSpan contain impermeants, buffers, reduced glutathione, electrolytes, and water for injection. The impermeant in Celsior is mannitol and the buffer is histidine, while the impermeant in ViaSpan is pentafraction and the buffers are potassium hydroxide and sodium hydroxide.

C. Performance Data

To demonstrate that Celsior is substantially equivalent to ViaSpan for its intended uses, SangStat conducted three clinical studies and several non-clinical studies using Celsior. The study conducted in the U.S. (IDE file number G970052) was a multicenter, randomized, controlled, open-label clinical trial comparing Celsior to standard preservation solutions, including ViaSpan. The primary efficacy endpoint of seven (7) day patient survival was comparable between groups as were the secondary endpoints of 30 day patient and graft survival. In the first 30 days posttransplant, significantly fewer subjects receiving Celsior-treated hearts had one or more cardiac-related serious adverse events based on one-sided 95% confidence interval analysis. Clinical studies demonstrated that Celsior and ViaSpan had similar adverse event profiles and that adverse events using Celsior were also similar to that for other hospital solutions currently used to prepare hearts for transplant.

Preclinical studies conducted in isolated rabbit hearts and mongrel canines demonstrate that Celsior-treated hearts performed better than ViaSpan-treated hearts. Preclinical studies also demonstrate the biocompatibility (e.g., cyotoxicity, intracutaneous, *in vitro* hemolysis, *in vivo* hemolysis, osmotic fragility), sterility (ethylene oxide, ethylene chlorohydrin, and ethylene glycol), and stability of Celsior.

VI. Conclusion

ViaSpan and Celsior have the same intended use. Data contained in the 510(k) demonstrate that Celsior is substantially equivalent.

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Food and Drug Administration
9200 Corporate Boulevard
Rockville MD 20850

AUG - 5 1999

Mark D. Tolpin, M.D
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and Regulatory Affairs
SangStat Medical Corporation
1505 Adams Drive
Menlo Park, CA 94025

Re: K991594.
Celsior™ Cold Flush, Storage and
Transport Solution for Hearts
Dated: May 6, 1999
Received: May 7, 1999
Regulatory Class: II
21 CFR §876.5880/Procode: 78 MSB

Dear Dr. Tolpin:

We have reviewed your Section 510(k) notification of intent to market the device referenced above and we have determined the device is substantially equivalent (for the indications for use stated in the enclosure) to legally marketed predicate devices marketed in interstate commerce prior to May 28, 1976, the enactment date of the Medical Device Amendments, or to devices that have been reclassified in accordance with the provisions of the Federal Food, Drug, and Cosmetic Act (Act). You may, therefore, market the device, subject to the general controls provisions of the Act. The general controls provisions of the Act include requirements for annual registration, listing of devices, good manufacturing practice, labeling, and prohibitions against misbranding and adulteration.

If your device is classified (see above) into either class II (Special Controls) or class III (Premarket Approval), it may be subject to such additional controls. Existing major regulations affecting your device can be found in the Code of Federal Regulations, Title 21, Parts 800 to 895. A substantially equivalent determination assumes compliance with the Current Good Manufacturing Practice requirements, as set forth in the Quality System Regulation (QS) for Medical Devices: General regulation (21 CFR Part 820) and that, through periodic QS inspections, the Food and Drug Administration (FDA) will verify such assumptions. Failure to comply with the GMP regulation may result in regulatory action. In addition, FDA may publish further announcements concerning your device in the Federal Register. Please note: this response to your premarket notification submission does not affect any obligation you might have under sections 531 through 542 of the Act for devices under the Electronic Product Radiation Control provisions, or other Federal laws or regulations.

This letter will allow you to begin marketing your device as described in your 510(k) premarket notification. The FDA finding of substantial equivalence of your device to a legally marketed predicate device results in a classification for your device and thus, permits your device to proceed to the market.

If you desire specific advice for your device on our labeling regulation (21 CFR Part 801 and additionally 809.10 for in vitro diagnostic devices), please contact the Office of Compliance at (301) 594-4613. Additionally, for questions on the promotion and advertising of your device, please contact the Office of Compliance at (301) 594-4639. Also, please note the regulation entitled, "Misbranding by reference to premarket notification"(21 CFR 807.97). Other general information on your responsibilities under the Act may be obtained from the Division of Small Manufacturers Assistance at its toll-free number (800) 638-2041 or (301) 443-6597, or at its internet address "http://www.fda.gov/cdrh/dsma/dsmamain.html".

Sincerely yours,

CAPT Daniel G. Schultz, M.D.
Acting Director, Division of Reproductive,
Abdominal, Ear, Nose and Throat,
and Radiological Devices
Office of Device Evaluation
Center for Devices and
Radiological Health

Enclosure

510(k) Number (if known):	Subject of this Submission
Device Name:	Celsior™ Cold Flush, Storage and Transport Solution for Hearts
Indications for Use:	Celsior™ is intended for flushing and cold storage of a heart at the time of its removal from a donor in preparation for storage, transportation, and eventual transplantation into a recipient.

(Please Do Not Write Below This Line - Continue On Another Page If Needed
Concurrence of CDRH, Office of Device Evaluation (ODE)

Prescription Use ✓ **Or** **Over-The-Counter Use** _____
(Per 21 CFR §801.109) **(Optional Format 1-2-96)**

David C. Dreyer

(Division Sign-Off)
Division of Reproductive, Abdominal, ENT,
and Radiological Devices
510(k) Number iii K991594