ARBIOS SYSTEMS INC
Form 10KSB
March 31, 2006

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

_____

FORM 10-KSB

(Mark One)

x ANNUAL REPORT UNDER SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the fiscal year ended December 31, 2005

o TRANSITION REPORT UNDER SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the transition period from _____ to _____

_____

Commission File Number: **000-32603**

ARBIOS SYSTEMS, INC.
(Name of small business issuer in its charter)

Delaware	**91-1955323**
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)
8797 Beverly Boulevard, #304 Los Angeles, CA 90048	**90048**
(Address of principal executive offices)	(Zip Code)

Issuer's Telephone Number**: 310-657-4898**

Securities registered pursuant to Section 12(b) of the Act: None

Securities registered pursuant to Section 12(g) of the Act:

Common Stock, $.001 par value
(Title of class)

Check whether the issuer is not required to file reports pursuant to Section 13 or 15(d) of the Exchange Act. o

Check whether the issuer (1) filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the past 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days.Yes x No o

Check if there is no disclosure of delinquent filers pursuant to Item 405 of Regulation S-B contained in this form, and no disclosure will be contained, to the best of the registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-KSB or any amendment to this Form 10-KSB. o

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes o No x

Issuer's revenues for its most recent fiscal year: None

The aggregate market value of the voting and non-voting common equity held by non-affiliates computed by reference to the price at which the common equity was sold, or the average bid and asked price of such common equity, as of March 6, 2006 was approximately $13,648,789 based on the closing sales price reported by the OTC Bulletin Board on such date.

There were 17,460,181 shares of the Company's common stock outstanding on March 6, 2006.

DOCUMENTS INCORPORATED BY REFERENCE: None.

Transitional Small Business Disclosure Format (check one): Yes o No x

TABLE OF CONTENTS

Introductory Comment

Throughout this Annual Report on Form 10-KSB, the terms “we,” “us,” “our,” and “our company” refer to Arbios Systems, Inc., a Delaware corporation.

Forward Looking Statements

The Private Securities Litigation Reform Act of 1995 provides a “safe harbor” for forward-looking statements. This annual report contains forward-looking statements within the meaning of the federal securities laws. These include statements about our expectations, beliefs, intentions or strategies for the future, which we indicate by words or phrases such as “anticipate,” “expect,” “intend,” “plan,” “will,” “we believe,” “the company believes,” “management believes” similar language. The forward-looking statements are based on our current expectations and are subject to certain risks, uncertainties and assumptions, including those set forth in the discussion under “Description of Business” and “Management’s Discussion and Analysis or Plan of Operation - Factors that May Affect Future Results and Market Price of Our Stock.” Our actual results may differ materially from results anticipated in these forward-looking statements. We base our forward-looking statements on information currently available to us, and we assume no obligation to update them. For a discussion of some of the factors that may cause actual results to differ materially from those suggested by the forward-looking statements, please read carefully the information under “Management’s Discussion and Analysis or Plan of Operation - Factors that May Affect Future Results and Market Price of Our Stock.”

PART I

ITEM 1. DESCRIPTION OF BUSINESS.

Company Overview

Arbios Systems, Inc., or Arbios, is a Delaware corporation based in Los Angeles, California. We seek to develop, manufacture and market liver assist therapies to meet the urgent need for medical treatment of liver failure.

We are a medical device and cell therapy company that is focusing on the development of products for the treatment of liver failure. Our lead products under development currently consist of a novel extracorporeal blood purification therapy called the SEPET™ Liver Assist Device and an extracorporeal, bioartificial liver therapy referred to as the HepatAssist-2™ Bioartificial Liver System that incorporate porcine pig liver cells. We also have rights and a licensing agreement to the LIVERAID™ Bioartificial Liver System, which is a potential enhancement to HepatAssist-2™, but development of that system is on an indefinite hold. We currently own seven key U.S. patents and are the licensee of seven other U.S. patents, as well as the owner of a patent application and numerous related trade secrets.

In April 2005, we received permission from the United States Food and Drug Administration, or the FDA, to commence a 15 patient feasibility clinical study of our SEPET™ cartridge. The enrollment of patients for the clinical trial has been slower than we anticipated; however, the FDA has granted us permission for additional clinical sites to participate in the clinical trial. We currently have three clinical sites enrolling patients and we have broadened the patient eligibility criteria to expedite patient accrual Our HepatAssist-2™ Bioartificial Liver System is an enhanced version of a system referred to as HepatAssist® which we acquired from another company, Circe Biomedical, Inc. and which has been tested in Phase II/III clinical trials. We have an active Phase III investigational new drug application, or IND, to conduct additional clinical trials using HepatAssist™ and intend to focus on introducing this important liver assist technology into clinical practice. Because of the high cost and technological difficulties in the manufacture of LIVERAID™ devices, we have decided to stop the development of the LIVERAID™ Bioartificial Liver System indefinitely. This decision allows us to allocate our financial and organizational resources to the development of the

SEPET™ and HepatAssist-2™ technologies.

1

A glossary of certain terms used in this Annual Report is contained on page 18 below.

Company History. Arbios Systems, Inc. was originally incorporated in February 1999 as Historical Autographs U.S.A., Inc., or HAUSA. Until October 2003, HAUSA was an e-commerce based company engaged in the business of acquiring and marketing historical documents. On October 30, 2003, HAUSA completed a reorganization (the "Reorganization") in which HAUSA, through its wholly-owned subsidiary, acquired all of the outstanding shares of Arbios Technologies, Inc., or ATI, in exchange for 11,930,598 shares of HAUSA common stock. As a result of the Reorganization, ATI became the wholly-owned subsidiary of HAUSA. After the Reorganization, HAUSA changed its name to "Arbios Systems, Inc.," replaced its officers and directors with those of ATI, closed its offices, ceased its e-commerce business, and moved its offices to Los Angeles, California. On July 25, 2005, Arbios Systems, Inc. completed its reincorporation as a Delaware corporation by merging with and into Arbios Systems, Inc., a Delaware corporation. The foregoing merger was approved by the Company's stockholders at the annual meeting of stockholders held on July 7, 2005. In order to consolidate the functions and operations of Arbios and ATI, on July 26, 2005, ATI merged into Arbios. As a result, Arbios now owns all of the assets of ATI and all of the operations of the two companies have been consolidated into Arbios.

Our principal operations and executive offices are located at 8797 Beverly Blvd., Suite 304, Los Angeles, California 90048 and our telephone number is (310) 657-4898. We also maintain corporate offices at 1050 Winter Street, Suite 1000, Waltham, Massachusetts 02451 and a manufacturing facility based in Connecticut. We also maintain a web site at www.arbios.com. The information on our web site is not, and you must not consider such information to be, a part of this filing.

Products Overview

We currently have two products under development; a novel extracorporeal blood purification therapy called the SEPET™ Liver Assist Device and an extracorporeal, bioartificial liver therapy referred to as the HepatAssist-2™ Bioartificial Liver System that incorporates pig liver cells, or porcine hepatocytes.

SEPET™ is a single-use cartridge that contains specially designed microporous tubes called hollow fibers. When a patient's blood is pumped through these hollow fibers, substances normally metabolized by the liver and accumulated in the blood during liver failure move across the porous wall and are discarded. As a result of this blood purification, or detoxification, process, we believe that the levels of pathological blood components will move toward normal ranges, leading to amelioration of liver failure and stabilization or improved function of a patient's liver. SEPET™ was designed and qualified for use with the PRISMA hemodialysis system (manufactured by Gambro, Inc.) and for use with other commercially available kidney dialysis units and/or plasma apheresis systems that utilize hollow-fiber cartridges.

In April 2004, we acquired from Circe Biomedical, Inc., an unaffiliated biomedical company, the rights to a bioartificial liver, known as the HepatAssist® system. Certain technologies included in the HepatAssist® bioartificial liver were designed and tested in pre-clinical and early clinical studies by Drs. A. A. Demetriou and J. Rozga, who later founded Arbios Systems, Inc. Our HepatAssist-2 Bioartificial Liver System utilizes a single-use cartridge that contains pig liver cells plus columns that contain certain chemical particles referred to as sorbents. When a patient's blood is pumped through the bioartificial liver cartridge, substances normally metabolized by the liver and accumulated in the blood during liver failure move across the porous tubes into two plasma compartments; one compartment is filled with pig liver cells and the other compartment incorporates columns that contain sorbents. The exposure of the viable pig liver cells to patient plasma causes toxic substances contained in the plasma to be metabolized, thereby reducing their level. In addition, the sorbents lower the level of pathological blood components, such as ammonia. At the same time, substances produced by pig liver cells move across the porous wall back into the blood compartment. As a result of these two processes (provision of whole liver functions by the pig liver cells and removal of toxins by the sorbents) we believe the levels of pathological and normal blood components will move toward normal ranges. Our belief is supported by the results of tests performed during clinical trials using the

HepatAssist® system.

Our HepatAssist-2™ Bioartificial Liver System is similar to the earlier HepatAssist® system, and we have subsequently enhanced it by employing a larger quantity of pig cells. We do not anticipate that HepatAssist-2™ will use the proprietary perfusion platform, which is a machine through which the patient's blood is circulated, that was originally designed and developed for the HepatAssist® system. Instead, we are testing a perfusion platform known as the PERFORMER for use as the platform to provide bioartificial liver therapy. The PERFORMER is a multi-function integrated system capable of supporting extracorporeal blood/plasma/fluid circulation therapies that is manufactured by RanD S.r.l. (Italy) and distributed world-wide by Medtronic, Inc. The PERFORMER has been equipped with proprietary software and a tubing set for use with our HepatAssist-2™ Bioartificial Liver System.

Both SEPET™ and HepatAssist-2™ rely on single-use cartridges that are placed on a blood perfusion apparatus that is attached to the patient's blood circulation system. Following treatments with any of our products, the disposable cartridges are discarded, and new cartridges are used for the next therapy.

Background of our Company

Arbios Technologies, Inc., our former operating subsidiary, was formed in August of 2000 by Drs. A. A. Demetriou and J. Rozga, two leaders in the field of artificial liver therapy, to develop extracorporeal therapies for the treatment of liver failure. As former employees of Cedars-Sinai Medical Center, Drs. Demetriou and Rozga previously were involved in the development of a first generation bioartificial liver known as HepatAssist® that was licensed by Cedars-Sinai Medical Center in 1994 to W.R. Grace & Co. and then subsequently transferred to Circe Biomedical, Inc. The prior owners of this technology spent millions of dollars on the research and development of the original HepatAssist® system, the perfusion platform and on the related technologies and operating procedures necessary to bring the product to market. The original HepatAssist® system was tested in Phase II/III clinical trials approved by the FDA in patients with fulminant and subfulminant liver failure and primary non-function following liver transplantation. These trials of the original HepatAssist® system were the first large (171 patients) prospective, randomized, controlled multi-center trial demonstrating a survival advantage for an extracorporeal liver assist system utilizing pig liver cells. Although treated fulminant/subfulminant hepatic failure patients with viral and drug-induced liver injury retrospectively demonstrated improved survival compared to controls when adjusted for the effect of confounding factors (such as liver transplantation), the prospective primary clinical end point in the overall study population (survival at 30 days post-transplantation) was not achieved. Accordingly, the HepatAssist® system was not approved for marketing, and the FDA requested that a new Phase III clinical study be performed. A new Phase III protocol was prepared and reviewed by the FDA. However in 2003, before these new studies could be undertaken, Circe Biomedical ceased its operations. In April 2004, we purchased the remaining assets of Circe Biomedical that related to its bioartificial liver operations, including rights to the original HepatAssist® system, the new Phase III protocol that had been reviewed by the FDA, and over 400 manufacturing and quality control and quality assurance standard operation protocols previously reviewed by FDA. In July 2005, we merged Arbios Technologies, Inc. into the parent company, Arbios Systems, Inc.

To date, we have funded our operations from the gross proceeds of funds we raised from the sale of over $13,000,000 of our equity securities and $321,000 of Small Business Innovation Research, or SBIR, grants that have been awarded by the United States Small Business Administration. We intend to apply for additional SBIR grants to fund a portion of our research expenditures. However, whether or not we receive additional SBIR grants, we will have to raise substantial additional proceeds to fund our future clinical development expenses and our on-going working capital needs.

Our research offices and laboratories are located at Cedars-Sinai Medical Center, Los Angeles, California. Under our lease agreement and other arrangements with Cedars-Sinai, we have access to all of the key development resources of that leading medical center, including animal facilities, surgical core facilities and clinical laboratories. Cedars-Sinai Medical Center is one of the clinical testing sites for our SEPET™ clinical testing program. We also lease administrative office space in Los Angeles, California and Waltham, Massachusetts, as well as an animal breeding and cell manufacturing facility in Woodstock, Connecticut which will be used to harvest porcine livers for use in our

HepatAssist-2™ product.

We have also entered into various agreements with Spectrum Laboratories, Inc., including research and development agreements and manufacturing agreements. Spectrum Laboratories is a company that specializes in the development and manufacture of innovative molecular separation products for the research community and is a supplier of dialysis and ultrafiltration membranes used for biomedical research, molecular biology and clinical diagnostics throughout the world.

Strategy

We believe that the clinical testing and regulatory approval periods for the SEPET™ Liver Assist Device will be shorter than our HepatAssist-2™ Bioartificial Liver System because SEPET™ may be evaluated as a medical device that does not contain biological components such as the pig cells that are an integral part of our HepatAssist-2™ product. Accordingly, because of the shorter regulatory period and the ability of SEPET™ to operate through the use of a standard, currently available kidney dialysis unit, we expect that the development of SEPET™ will be completed before the development of HepatAssist-2™ is completed.

We have already performed *in vitro* and *in vivo* testing of the SEPET™ prototype device and commenced clinical testing of SEPET™ during 2005. We anticipate that we will be able to file an application requesting market approval of SEPET™ as early as late 2007. We are currently evaluating the possibility of conducting clinical studies of the HepatAssist-2™ system under a modified version of the FDA-reviewed Phase III IND protocol that we acquired in March 2004 from Circe Biomedical. Since we are still currently developing our clinical and regulatory strategies for the HepatAssist-2™ Bioartificial Liver System, we cannot estimate when an application requesting marketing approval of that system will be filed.

The April 2004 acquisition of the assets of Circe Biomedical has provided us with new potential opportunities for the development of a bioartificial liver. The Circe Biomedical bioartificial liver device that we acquired consisted of the following four distinct components that we believe may be useful to the development of our bioartificial liver products:

(1) *FDA-approved standard operating procedures*. These are standard operating procedures for production of porcine cells including harvesting, freezing, storing, shipping and processing by the end user (thawing, washing) of the cells. These procedures and protocols have been reviewed by the FDA.

(2) *The cartridge used in the Phase III trial of HepatAssist™*. We intend to use the existing, FDA-approved cartridge, and intend to seek the FDA's approval to increase the number of pig cells that the cartridge could contain, which increase we believe will improve the functionality of the system.

(3) *An FDA reviewed Phase III protocol acquired from Circe Biomedical*. We may modify this protocol and submit the modified protocol to the FDA for approval.

(4) *The HepatAssist™ perfusion platform.* The HepatAssist perfusion platform is Circe Biomedical's specially designed machine that pumped the patient's plasma through the HepatAssist cartridge. This machine was used in the Phase II/III trial of HepatAssist.

Rather than using Circe Biomedical's specially designed machine, we intend to use the PERFORMER, a commercially available machine that is distributed by Medtronic, Inc. We are currently testing units of The PERFORMER that have been equipped with proprietary software and our tubing to enable the machine to work with our bioartificial liver products. We believe that the PERFORMER may become the platform for our HepatAssist-2™ Bioartificial Liver System.

We are currently in the process of designing further clinical trials to demonstrate the safety and tolerability of SEPET™ in treating patients with acute exacerbation of chronic liver failure. In April 2005 we received permission from the FDA to commence a 15 patient clinical feasibility study for SEPET™. The FDA has since given permission to expand the trial to a total of up to four clinical sites and up to 20 patients. Based on our current assumptions, we estimate that the clinical cost of developing SEPET™ will be approximately $5 million to $10 million and the clinical cost of developing HepatAssist-2™ will be between $15 million and $20 million. These amounts, which could vary substantially if our assumptions are not correct, are well in excess of the amount of cash that we currently have available to us. See “Management’s Discussion and Analysis or Plan of Operation - Factors that May Affect Future Results and Market Price of Our Stock.”

Liver Function Background

The liver controls, or affects, almost every aspect of metabolism and most physiologic regulatory processes, including protein synthesis, sugar and fat metabolism, blood clotting, the immune system, detoxification of alcohol, chemical toxins, and drugs, and waste removal. Loss of liver function is a devastating and life threatening condition. Liver failure affects all age groups and may be due to many causes, including viral infection, hepatitis, ingestion of common medications, alcohol, and surgical liver removal for trauma and cancer.

Currently, there is no direct treatment for liver failure, except a successful liver transplant. There is, however, a current scarcity of donor livers, and approximately two thousand patients on the waiting list for donor livers die annually before receiving liver transplants. Our management believes that treatments with currently available technologies such as blood detoxification methods are short-term measures, and none of them has achieved wide clinical use or ability to arrest or reverse liver failure and improve survival. As a consequence, liver failure patients must still either undergo liver transplantation or endure the probability of prolonged hospitalization with a low probability of survival. In addition, many patients do not qualify for transplantation or live in regions of the world where transplantation is not readily available. Still others do not recover after transplantation because of irreversible brain damage or other organ damage caused by liver failure. Although the liver has a remarkable capacity for regeneration, the repair process after massive liver damage is markedly impaired by the continued presence of toxins, inflammatory cytokines and other inhibitors of organ regeneration still present in the blood of patients.

In liver failure patients, there is a need for an effective blood purification therapy that will clear the blood of toxins, mediators of inflammation and inhibitors of hepatic growth. SEPET™ is a novel form of such therapy developed by us in which the plasma fraction containing substances that are toxic to the brain, the liver and other internal organs and tissues are removed from patient blood and replaced with normal human plasma. We have demonstrated an extension of survival in large animal model testing of SEPET™, which results have led to the initiation of a clinical feasibility trial in human patients.

There is a further need to develop artificial means of liver replacement with the aim of either supporting patients with borderline functional liver cell mass until their liver regenerates or until a donor liver becomes available for transplantation. Such an “artificial liver” should also support patients during recovery after transplantation with marginal livers and after extended liver resections for trauma or cancer. To achieve these effects, effective liver support systems should be able to lower blood levels of substances toxic to the brain and liver and to provide whole liver functions, which are impaired or lost.

The founders of this Company as well as investigators not associated with this Company have demonstrated *in vitro* and in animal models of liver failure that cell-based bioartificial livers using viable isolated liver cells, or hepatocytes, can provide whole liver functions. However, only a few bioartificial livers have been tested in humans and it remains to be seen whether systems utilizing hepatocytes as the only means of liver support are effective. We believe that in order to provide the maximum support for the failing liver, porcine hepatocyte therapy should be combined with blood purification or detoxification.

5

Our bioartificial liver system, HepatAssist-2™, was designed to become an advanced effective application of the basic bioartificial liver concept. In the bioartificial liver system, liver cell therapy in the form of porcine hepatocytes, is combined with blood detoxification, in the form of sorbent based plasma therapy. Depending on the cause of liver disease, severity of illness and deficiency of specific liver functions, the bioartificial liver mode of therapy can be provided individually, simultaneously or sequentially. Because of these features, we believe our bioartificial liver technology is well suited to treat patients with liver failure of all causes and severity, including those requiring maximum liver support. While the HepatAssist-2™'s predecessor HepatAssist Phase II/III clinical trial demonstrated an increase in patient survival in patients with viral and drug-induced fulminant/subfulminant hepatic failure, a new Phase III clinical trial will be needed before our HepatAssist-2™ system, which is an enhanced version of the original HepatAssist system, can be used by human patients. Pre-clinical data for our HepatAssist-2™ Bioartificial Liver System indicates that this system can improve heart rate and blood pressure and provide clearance of ammonia and indocyanine green (ICG), which is a liver function test.

The Products We Are Developing

We currently are developing novel treatments for acute and chronic liver failure. We believe that our SEPET™ Liver Assist Device and our HepatAssist-2™ Bioartificial Liver System may:

- help keep liver failure patients alive and neurologically intact before, during and immediately after transplantation;
- allow other patients to recover liver functionality and to survive without a transplant (a "bridge" to liver regeneration);
- support patients during periods of functional recovery and regeneration after extensive removal due to liver trauma and/or cancer;
- accelerate recovery from acute exacerbation of chronic liver disease;
- shorten length of stay in intensive care units;
- shorten hospital stay;
- reduce the cost of care; and
- reduce intractable itching associated with severe jaundice.

We believe that our SEPET™ Liver Assist Device and HepatAssist-2 Bioartificial Liver System can achieve these effects because they can lower blood levels of substances that are toxic to both the brain and liver. However, final proof of clinical benefit in patients is lacking at this time, and the clinical utility of these products still needs to be demonstrated in patients with acute liver failure.

We own certain technologies and rights related to our products, and have licensed certain other technologies. See "-Patents and Proprietary Rights" below for a description of the rights that we own and have licensed.

SEPET™

We are developing the SEPET™ Liver Assist Device as a blood purification measure to provide temporary liver support during acute liver failure and acute exacerbation of chronic liver disease. SEPET™ therapy will be provided through the sale of our single-use, disposable cartridge that contains a bundle of hollow fibers made of bio- and hemo-compatible material capable of sieving substances with molecular weight of up to 100 kilodaltons, or kDa. The importance of using fibers with this sieving characteristic, which is larger than for conventional renal dialysis cartridges, is that most hepatic failure toxins as well as mediators of inflammation and inhibitors of hepatic regeneration have a molecular weight that is less than 100 kDa, while "good" blood components, for the most part, have molecular weight greater than 100 kDa. At present, Spectrum Laboratories is the manufacturer of these disposable cartridges. See "—Manufacturing" below. The SEPET™ system is designed for use with any commercially available kidney dialysis unit or other similar machines that utilize hollow-fiber cartridges. Accordingly, no specialized apparatus needs to be developed or manufactured for SEPET™. Accessory components for the SEPET™ system such as disposable tubings and

connectors will mostly consist of standard components that are currently used in renal dialysis and provided by manufacturers of those systems. We expect that any new accessory components that may be required will be manufactured for us by third-party vendors.

During SEPET™ therapy, an ultrafiltrate containing toxins, inhibitors of hepatic growth and mediators of inflammation with molecular weight of 100 kDa or less will be removed from the patient's blood stream by exiting from the side port of the cartridge, while at the same time, intravenous electrolyte solutions, albumin solution, fresh frozen plasma, or a combination thereof will be administered to the patient. We believe that as a result of these two processes, the levels of pathological and normal blood components present in the patient's circulation will move toward normal ranges, thereby facilitating recovery from liver failure. Based on published medical literature, rapid and efficient blood detoxification is expected to protect the liver, brain and other organs against further injury, accelerate healing of the native liver and improve its residual functions.

HepatAssist2™ Bioartificial Liver System

Our current bioartificial liver system under development is the HepatAssist-2™ Bioartificial Liver System. We have designed our HepatAssist-2™ Bioartificial Liver System to provide temporary liver support during acute liver failure and acute exacerbation of chronic liver disease. The HepatAssist-2™ Bioartificial Liver System incorporates several proprietary components and technologies into an integrated liver assist system, including a hollow fiber cartridge with porcine hepatocytes and a plasma re-circulation circuit that incorporates a cell cartridge and sorbents. The HepatAssist-2™ Bioartificial Liver System is designed to (i) provide liver cell functions by utilizing viable pig liver cells that are housed in specially designed cartridges and (ii) detoxify blood. Since it has been scientifically established that pig liver cells perform liver functions when maintained in specially designed cartridges outside of the human body, our bioartificial liver cartridge is designed to bring human plasma into contact with viable pig liver cells in a manner similar to that observed in the normal human liver inside the body in order to provide liver functions to the patient. In addition, our bioartificial liver system is designed to lower the levels of pathological blood components (through activated charcoal or other purification sorbents).

Critical to the HepatAssist-2™ technology is (i) the source and method of procurement of liver cells, (ii) the cryopreservation, or freezing, of the liver cells, (iii) the storage of the liver cells, (iv) the proprietary plasma re-circulation loop incorporating the cell cartridge and sorbents, and (v) the standard operating procedure protocols and quality control and programs related to the foregoing. We currently own or have licensed numerous proprietary technologies and methods for sourcing and using hepatocytes, which technologies and methods apply to our HepatAssist-2™ system. The following addresses our current plans and procedures regarding viable liver cells (hepatocytes).

Hepatocyte donors. Ideally, human hepatocytes should be used in a bioartificial liver. However, there is a shortage of organ donors and published data demonstrating that pig liver cells can outperform other animal and human liver cell lines, including those derived from liver cancers. In addition, use of human cancer-derived cells raises safety concerns. At this time, we intend to utilize pig liver cells.

Hepatocyte harvest. The founders of Arbios and Circe Biomedical developed certain semi-automated methods for large-scale harvest of pig hepatocytes. The methods of harvesting and collecting liver cells are covered by four patents, which patents we either have acquired from Circe Biomedical and now own or have licensed from Cedars-Sinai Medical Center.

Hepatocyte storage. Hepatocyte storage, quality control and shipment of cells to treatment sites are best achieved by use of cell freezing, or cryopreservation. Cryopreservation also provides greater protection from bacterial and viral contamination because frozen cells can be stored until microbiologic testing is completed and cells are then released for clinical use. Prior to use, cells are rapidly thawed and their viability is tested. The patented hepatocyte cryopreservation technology is now owned by us and by Cedars-Sinai Medical Center, which has licensed this technology to us.

The pig liver cells are expected to be harvested from young purpose-bred, pathogen-free, vaccinated pigs raised in an United States Department of Agriculture, or the USDA, certified facility specifically for biomedical research purposes. Each batch of cryopreserved pig liver cells will be released for clinical use only after proper verification of biosafety and viability/functionality of the cells. We acquired all of the required laboratory and quality assurance protocols from Circe Biomedical, which protocols were previously reviewed by the FDA and deemed to be in compliance with FDA requirements. We are currently leasing facilities in which we will be able to house and maintains pigs and surgically acquire their livers. The facilities, which are still under development, would be used to monitor the health of these pigs and to assure that the pigs and cells remain free from infection and meet specific FDA requirements and to harvest the pig livers. We believe that once suitable modifications and FDA approved leasehold improvements are implemented and completed, these facilities will be suitable to meet our near-term goals for maintaining and harvesting the number of pig livers that we expect to need until the commercial viability of our products is established.

HepatAssist-2™ is designed to be used in the same manner as any other plasma therapy device. In a typical clinical procedure, the operator will install bioartificial liver components consisting of the cell cartridge, oxygenator, sorbent detoxification column(s), and tubing kit, into the blood/plasmaperfusion platform. Approximately 15 billion viable pig hepatocytes will be seeded into the extra-fiber space through the cartridge side ports. At the start of treatment, the platform will be attached to the patient and the bioartificial liver system will be perfused with the patient's oxygenated plasma. At the end of treatment, the disposables will be discarded in the normal manner that all other biohazardous waste products (such as syringes and bandages) are handled and disposed. No special governmental regulations have been required, or are expected, to dispose of the used cartridges and disposable products.

We expect to demonstrate that during HepatAssist-2™ therapy, substances normally metabolized by the liver and accumulated in the blood during liver failure will diffuse freely across the porous membrane into the compartment containing pig liver cells. At the same time, products of pig liver cell metabolism will diffuse back into the plasma compartment and then into the blood circuit. It is anticipated that as a result of these two processes, the levels of pathological and normal blood components present in the patient's circulation will move toward normal ranges, thereby facilitating recovery from liver failure. Additional therapeutic benefits may be provided by blood purification, or detoxification, therapy. In this mode of therapy, small and large protein-bound toxins, which accumulate in the blood during liver failure, are expected to be removed by sorbents. Blood detoxification is believed to protect the liver, brain and other organs against further injury, accelerate healing of the native liver and improve its residual functions. Decreased blood toxicity is also expected to prolong the life and metabolic activity of pig hepatocytes in the bioartificial liver modules.

Product Advantages

We believe that SEPET™ as a blood purification therapy will be more effective than sorbent-based devices such as charcoal, resin and silica, and more effective than whole plasma exchange therapy, because only the plasma fraction containing known toxins of hepatic failure is being removed and discarded during SEPET™ therapy. In contrast, sorbent-based blood purification is not toxin-specific, and in the case of charcoal sorption it is limited because of the protective coating of the charcoal particles. It also fails to remove most mediators of inflammation and protein bound toxins from the blood which are associated with liver failure. Subject to the successful completion of clinical trials and FDA or other regulatory approval, we believe that SEPET™ will be able to be used with currently available hospital kidney dialysis systems, which may offer the following advantages:

- Ease of use. The systems bring user friendliness (e.g., pump integration, automation and an intuitive user interface) to traditionally complex liver support procedures.

- Simplicity. Kidney dialysis systems are routinely used and, therefore, there may be no need for extensive personnel training for use of these similar systems in SEPET™. They are also commonly available in intensive care units and other settings where SEPET™ may be used.

.