Innovative Devices to Treat Kidney Failure

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Disclosures: Innovative BioTherapies, Inc.; CytoPherx, Inc.; Renal Solutions, Inc.
The Cox Proportional Hazard ratio was 0.49 indicating that the risk of death for patients in the CVVH + RBT group was ~ 50% of that observed in the CVVH alone group.
Cell Therapy Manufacturing

Cell Isolation

↓

Cell Expansion

↓

Device Fabrication

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Device Storage and Distribution
RAD PHASE IIb CLINICAL STUDY

• Interim analysis suspended study
• Predicted improvement in mortality was not achievable due to be higher than expected survival in the control sham group
• Control group had a non-cell second cartridge
• Subgroup analysis demonstrated difference in the sham group between heparin and citrate anticoagulation

Blood Purification 29:183-190, 2010
Survival Rates of Patients (n=12 each arm) in Phase II Multicenter, Randomized Clinical Trial
Leukocytes Adherent To Surface of Fibers In Dialysis Cartridge
Inappropriate Inflammatory Response
58% Mortality in Acute Renal Failure

- Inappropriate Leukocyte Activation
- SIRS
- Endothelial Dysfunction
  - Capillary Leak & Poor Tissue Perfusion
  - Leukocyte Tissue Infiltration
- Ischemic & Toxic Tissue Injury
- Multiorgan Dysfunction
One-Pump System
Working Hypothesis of Mechanism for SCD Influence on SIRS

1. Primed
   patient blood
   PMN
   monocyte

2. Activation
   UF

3. Adherence
   UF

4. Inhibition
   Citrate and Ca i↓
SCD Mechanism of Action
REGULATION AND MODULATION OF NEUTROPHIL KINETICS

↑ barrier dysfunction (GI, lung) → bacteria entry into blood → sepsis

↑ vascular resistance (sludging) → right heart strain → right ventricular failure

↑ vascular leak → acute lung injury → respiratory failure

↑ vascular leak → acute renal injury → renal failure

↑ vascular leak → acute hepatocyte injury → hepatic dysfunction

↑ vascular leak → ↑ platelet consumption → bleeding

↑ vascular leak → inotropes & vasopressors → arrhythmia
Clinical Studies

Clinical Trial I
- Retrospective data analysis
  - n = 24 Pts
  - 33.3% Mortality
- Large Animal Porcine Sepsis Studies
  - n = 29
- A Selective Cytopheretic Inhibitory Device (SCD) to Treat the Immunological Dysregulation of Acute and Chronic Renal Failure, H. David Humes, et al.
- Blood Purification

Clinical Trial II
- China Safety & Dose Response
  - n = 9 Pts
  - 33.3% Mortality

Clinical Trial III
- Pilot Safety Study
  - n = 35 Pts
  - 31.4% Mortality
- Safety Study of a Selective Cytopheretic Device (SCD) in Patients with Acute Renal Failure
  - FDA NCT01072682
- Pivotal Safety and Efficacy
  - n = 344 Pts
  - Projected mortality < 35%

Completed

3/7/2011
Approved 6/24/11
Enrollment 9/8/11 – Q3
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Renal Cell Therapy Development

• Cardiorenal syndrome: BRECS (Bioartificial Renal Epithelial Cell System) testing in a CHF canine model

• ESRD: WEBAK (Weareable Bioartificial Kidney) using recycling peritoneal fluid for dialysate regeneration (sorbent based) and BRECS maintenance testing in a chronic uremic sheep model.

• BRECS improves MOF in pig septic shock model.