

Serum Biomarker to Predict Mortality in Septic Shock Patients



Center for Technology Commercialization

TECHNICAL FIELD

Diagnostic and Therapeutic Target: Septic shock (2005-0305)

BACKGROUND

Sepsis is a severe medical condition resulting from the immune system's response to an infection. It is usually developed by people who are very young or very old, have weakened immune systems, are wounded or injured, have addictive habits, or are receiving certain invasive treatments or examinations. It is become more common in hospitals because of the advances associated with medical treatments, the increased number of elderly and cancer patients, and the widespread use of antibiotics. Septic shock is sepsis complicated by a low blood pressure that does not respond to standard treatment. Also associated are problems with one or more organs, including the heart, lungs, kidneys, and liver. As a result, the body does not get enough oxygen. The death rate for patients with septic shock is 50%.

Currently, there are ~42,000 cases per year of pediatric septic shock in the U.S. with a 10% mortality rate. Because of this, the development of biomarkers associated with septic shock would be advantageous. Early prediction of an adverse outcome would allow for the implementation of high-risk therapies to the appropriate patient populations. Additionally, the identification of novel processes involved with the progression of septic shock would provide more specific therapeutic targets for the treatment of the disease.



TECHNOLOGY

Dr. Hector Wong and his colleagues conducted a large study on children with septic shock that involved creating a national-level data bank of clinical samples and data. By performing microarray analysis on samples collected during this study, they were able to identify a unique genome-level signature of gene activation and gene repression in children with septic shock that progressed to death. One particular gene family was a strong and early predictor of death in samples obtained from patients on day 1 of septic shock. Patients that progressed to death had high expression levels of this particular gene family, while control patients and patients who survived septic shock did not.

This gene signature can be used to stratify patient populations into patients who will survive septic shock and those who will ultimately succumb to the disease. The latter group can be treated aggressively with high-risk therapeutics to give them the best chance at a favorable outcome. The identification of this signature also provides a novel target that can be used in the development of innovative therapeutics for septic shock.

We are currently seeking collaborators to aid in developing this technology further, both as a diagnostic tool and a therapeutic target.

APPLICATIONS

- 1. A diagnostic to predict early death in patients with septic shock.**
- 2. A novel target for therapeutics to treat septic shock.**

ADVANTAGES

- **Early predictor (day 1 of septic shock)**
- **Identifies patients that need to be treated aggressively**

INVESTIGATOR

Hector Wong, MD
Critical Care
Cincinnati Children's Hospital Medical Center

Bruce Aronow, Ph.D.
Biomedical Informatics
Cincinnati Children's Hospital Medical Center

Thomas Shanely, MD
Pediatric Critical Care Medicine
University of Michigan Medical School

STATUS

Patent applications pending.

CONTACT

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THE INVENTOR

Hector Wong, MD
Critical Care

BACKGROUND

MD: University of Medicine and Dentistry of New Jersey-Robert Wood Johnson Medical School, Piscataway, NJ, 1989.

Residency: Department of Pediatrics, George Washington University School of Medicine, Children's National Medical Center, Washington, DC, 1990-1992.

Fellowship: Clinical Fellow, Department of Anesthesiology, Division of Pediatric Critical Care Medicine, University of Pittsburgh School of Medicine, Children's Hospital of Pittsburgh, Pittsburgh, PA, 1992-1995;
Research Fellow, Department of Pharmacology, University of Pittsburgh School of Medicine, Pittsburgh, PA, 1992-1995.

Certification: Diplomate, National Board of Medical Examiners, 1990; Diplomate, American Board of Pediatrics, 1993;
Diplomate, American Board of Pediatrics: Sub-Board of Pediatric Critical Care Medicine, 1996.



AWARDS AND HONORS

Awarded "2005 Best Doctors"

Awarded "2004 Best Doctors"

Phi Eta Sigma (Academic Honor Society), 1982

Honorable Mention, Academic Collegiate All-America in Baseball, 1984

Honorable Mention, Academic Collegiate All-America in Baseball, 1985

Alpha Omega Alpha, 1988

Society of Critical Care Medicine Educational Scholarship, 1994

Society of Critical Care Medicine Educational Scholarship, 1995

Society of Critical Care Medicine Specialty Award (Pediatrics), 1997

Mentored Clinical Scientist Development Award, National Institutes of Health, 1997

Presidential Citation, Society of Critical Care Medicine, 2000

Presidential Citation, Society of Critical Care Medicine, 2001

Research Citation, Society of Critical Care Medicine, 2001

Presidential Citation, Society of Critical Care Medicine, 2002

Best Doctors selection, 2002

Presidential Citation, Society of Critical Care Medicine, 2003

Best Doctors selection, 2003

PROFESSIONAL ORGANIZATION MEMBERSHIPS

Diplomat, National Board of Medical Examiners

Diplomat, American Board of Pediatrics

Member, Society of Critical Care Medicine

Member, Shock Society

Diplomat, American Board of Pediatrics, Sub-Board of Pediatric Critical Care Medicine

Member, Cell Stress Society International

Member, American Thoracic Society

Member, Society for Pediatric Research