Cellular and Molecular Mechanisms of ASD

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Inflammation is a common mechanism of human disease.
Findings to Date

Pathophysiological Mechanisms of ASD

- Oxidative Stress
- Mitochondrial Dysfunction
- Environmental Toxicants
- Inflammation

Molecular Psychiatry 2012;17:389
Multidisciplinary Autism Research

- Understand basic cellular and molecular mechanisms of ASD in an animal model of autism
  - Pro-oxidative pathways in brain in an animal model of autism
  - Pro-inflammatory pathways in brain in an animal model of autism
  - Mechanisms of blood-brain barrier (BBB) disruption in an animal model of autism
- Identify biomarkers and therapeutic targets for early detection and treatment of ASD in an animal model of autism
  - Determination of pro-oxidative and pro-inflammatory biomarkers
  - Determination of therapeutic efficacy of anti-oxidants and anti-inflammatory drugs
- Translate basic science discoveries into clinically effective therapy for human ASD patients
  - Evaluation of biomarkers
  - Evaluation of anti-oxidative and anti-inflammatory therapy
Current Working Relationships with Resources Available

- **Animal Facility:**
  Center for Molecular Medicine and Infectious Disease at Virginia Tech

- **School of Biomedical Engineering and Sciences:**
  Well-equipped laboratory space, Shared equipment (e.g., autoclave, water purification system, ice maker, etc.), and Office at ICTAS 1 Building.

- **Laboratory of Vascular Biology:**
  3 graduate students and 2 undergraduate students

- **Current Funding:**
  1 NIH and 2 NSF grants

- **Current Research Collaborations (Selected):**
  - University of Oklahoma Health Sciences Center – Dr. William Sonntag
  - Virginia Tech-Wake Forest University – Dr. Pamela VandeVord
  - Konkuk University (Seoul, South Korea) – Dr. Jung-Soo Han
  - Virginia Tech – Dr. Luke Achenie
Collaborations and Resources Needed

• **Basic Mechanistic Studies:**
  • Expertise and core facility in the design, implementation, and analysis of behavioral experiments in an animal model of autism
  • Expertise in mathematical/computational modeling related to development of therapeutic approaches for ASD

• **Human Clinical Studies:**
  • Expertise in recruitment of ASD patients
  • Expertise in evaluation of biomarkers (e.g., blood withdrawal, brain functional or molecular imaging, etc.)
  • Expertise in evaluation of therapeutic efficacy (e.g., diagnosis of different levels of ASD patients)

• Funding for pilot work in both basic and clinical studies