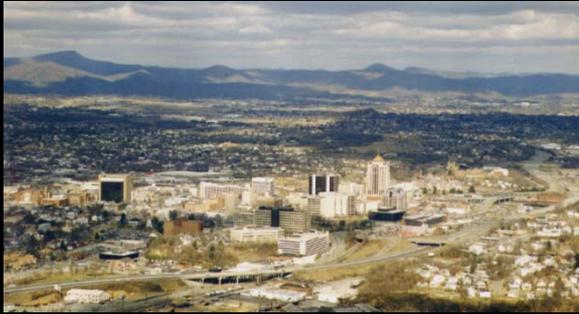


The Virginia Tech Carilion Research Institute



Presented to:
The Education Subcommittee of
the Senate Finance Committee
January 22, 2013

by: Michael J. Friedlander, Ph.D.
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Professor, Biological Sciences, Biomedical Engineering, Virginia Tech
Sr. Dean for Research, VTC School of Medicine
President, Society for Experimental Biology and Medicine

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VTCRI mission different from VTCSOM

VTCRI Mission

make major scientific advances in human health

**Discover and develop innovative preventions,
diagnostics, treatments
and cures for human disease**

VTCRI Highlights

- Opened September, 2010
- Over 135 staff (research associates, postdoctoral fellows; software engineers, graduate students, technicians and administrators);
- 21 faculty team leaders recruited with 40 extramural research grants (annual value = \$12M; remaining portfolio value = \$31M);
55 grants “in review” @ \$19M annual, \$78M total portfolio costs;
- Interdisciplinary research (biologists, mathematicians, engineers, computer scientists, behavioral/education scientists, economists);
- Development of start up companies by several faculty.

Brain

(autism, Alzheimer's disease,
traumatic brain injury,
psychiatric disorders,
cerebral palsy, epilepsy,
Parkinson's disease,
addiction and
substance abuse)

Cancer

(tumor genetics, brain tumors,
breast cancer,
individualized therapeutics
and diagnostics,
theranostics)

VTCRI Research Focus Areas

Heart

(cardiac developmental disorders
cardiac repair and regeneration,
arrhythmias,
sudden cardiac death)

Infection

(vaccine development,
childhood infections,
inflammation, emerging
infections
neuroimmunology)

Why focus on the brain?

“...disorders of the central nervous system, when taken as a whole, account for more hospitalizations, more long term care and more chronic suffering than all other disorders combined.”

Cowan, M.W. and Kandel, E.R.

	annual new cases	Economic cost - \$/year (direct medical + indirect)
all cancers	1.6 million	\$240 billion
heart disease	6.4 million	\$175 billion
brain disorders	8.2 million	\$995 billion

Active VTCRI Brain Research Programs

addiction

Alzheimer's disease

amyotrophic lateral sclerosis

autism spectrum disorder

borderline personality disorder

brain cancer imaging and theranostics

cerebral palsy

dementia

depression

epilepsy

malignant brain tumors

medical decision-making

mental retardation

Parkinson's disease

post traumatic stress disorder (PTSD)

traumatic brain injury (TBI)

stroke

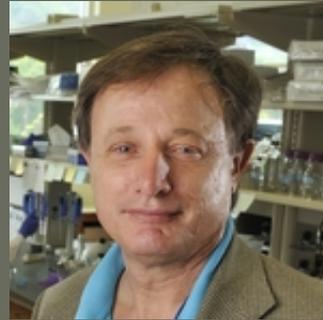
Current VTCRI Collaborations with other Institutions (n=75; 27 states, 17 countries, 6 continents)

- Baylor College of Medicine, Houston, TX
- Boston University School of Medicine, Boston, MA
- Brown University Medical School, Providence, RI
- Cal Tech, Los Angeles, CA
- Cape Coast School of Medical Sciences, Ghana
- Cardiff University, Wales, UK
- Center for the Developing Child, New Orleans, LA
- Child Mind Institute, New York, NY
- Children's National Medical Center, Washington, DC
- Chinese Academy of Sciences, Guangzhou Institute of Public Health, Guangzhou, China
- City College of New York, NY
- Columbia University Medical School, New York, NY
- Developing Families Center, Washington, DC
- Drexel University, Philadelphia, PA
- Emory and Henry College, Emory, VA
- ETH, Zurich, Switzerland
- Federal University of Minas Gerais, Brazil
- Harvard University, Boston, MA
- Healthy Families, Baltimore, MD
- Hong Kong University of Science and Technology, Hong Kong
- **Howard Hughes Medical Institute, Ashburn, VA**
- Imperial College, London, UK
- IRL, Wellington, New Zealand
- Johns Hopkins University Medical Center, Baltimore, MD
- Kyoto University, Kyoto, Japan
- Linköping University, Sweden
- Michael E DeBakey VA Medical Center, Houston, TX
- MIT, Boston, MA
- MUSC, Charleston, SC
- Nanyang Technological University, Singapore
- National Institute of Aging, Bethesda, MD
- National Institute of Mental Health, Bethesda, MD
- National Institute of Standards and Technology, Charleston, SC
- New York University, New York, NY
- Ohio State University Medical School, Columbus, OH
- Penn State University Medical Center, Hershey, PA
- Purdue University, Indianapolis, IN
- **Radford University, Radford, VA**
- **Salem VA Medical Center, Salem, VA**
- SUNY at Buffalo Medical Center, NY
- Texas A&M University Medical Center, College Station, TX
- University College, London, UK
- University of Alabama at Birmingham Medical School, AL
- University of Alabama at Birmingham, AL
- University of Bristol, UK
- University of California, Davis, CA
- University of California, Berkeley, CA
- University of Central Florida, Orlando, FL
- University of Chicago Medical School, Chicago, IL
- University of Copenhagen, Denmark
- University of Georgia, Athens, GA
- University of Ghent, Belgium
- University of Hawaii at Hilo, HI
- University of Houston, TX
- University of Illinois, Urbana-Champaign, IL
- University of Indiana Medical Center, Indianapolis, IN
- University of Louisiana, Lafayette, LA
- University of Louisville Medical Center, Louisville, KY
- University of Massachusetts Medical School, Worcester, MA
- University of Michigan Medical Center, Ann Arbor, MI
- University of Minnesota Medical School, Minneapolis, MN
- University of Missouri Research Reactor Center Columbia, MO
- University of Modena, Italy
- University of North Carolina, Chapel Hill, NC
- University of Oslo Medical School, Oslo, Norway
- University of Oulu, Finland
- University of Utah Medical Center, Salt Lake City, UT
- **University of Virginia Medical School, Charlottesville, VA**
- University of Wisconsin Medical Center, Madison, WI
- University of Zurich, Switzerland
- Vanderbilt University School of Medicine, Nashville, TN
- **Via Virginia College of Osteopathic Medicine, Blacksburg, VA**
- **Virginia Commonwealth University, Richmond, VA**
- Wake Forest University School of Medicine, Winston-Salem, NC
- Washington Hospital Center MedStar Research Institute, Washington, DC
- Yonsei University Medical College, Seoul, South Korea

A few VTCRI highlights of 2012



VTCRI's Debbie Kelly patents new brain cancer screen technology



VTCRI's Rob Gourdie named Commonwealth Eminent Scholar in Regenerative Medicine Research



VTCRI's Sharon and Craig Ramey children's health behavior and development; Star City reads



VTCRI's Read Montague TedGlobal launches Roanoke brain study

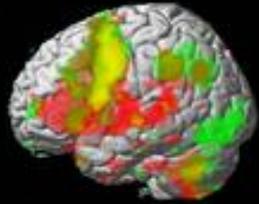


VTCRI's Jamie Tyler receives McKnight Foundation Technological Innovations in Neuroscience Award

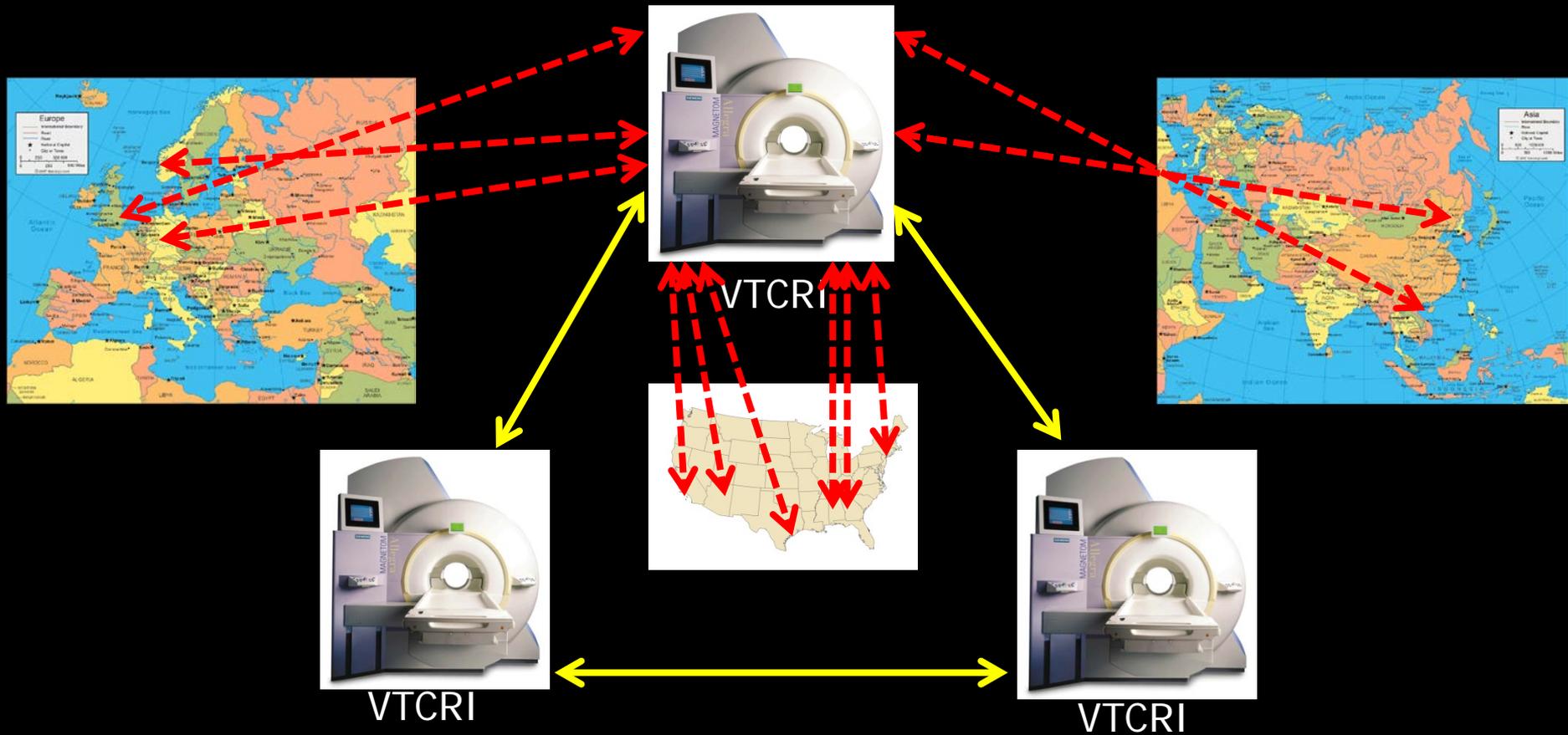


VTCRI's Warren Bickel receives APA award for outstanding research in addiction

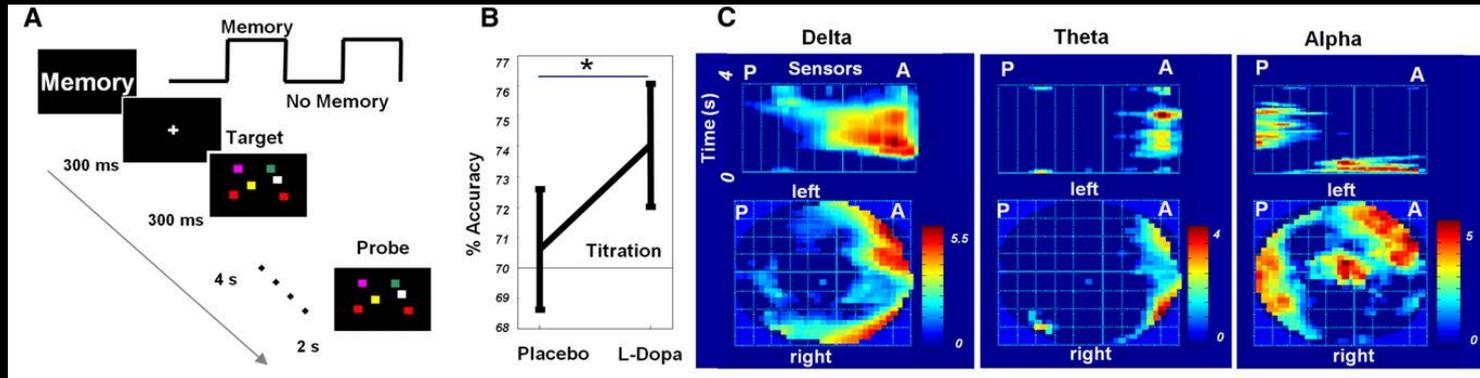
Roanoke based world wide interactive human functional brain imaging network **autism**



Read Montague



Changing functional connectivity between brain areas in Alzheimer's disease – early markers

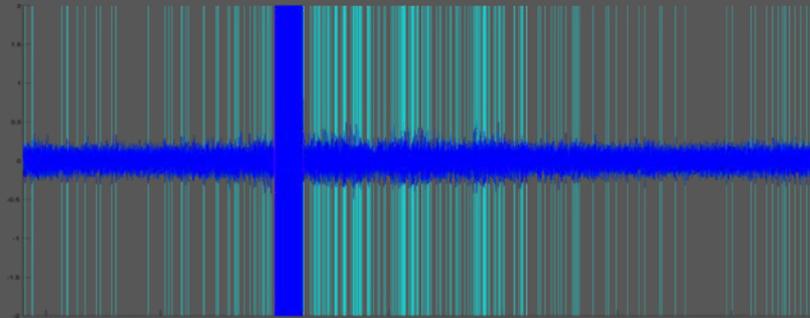


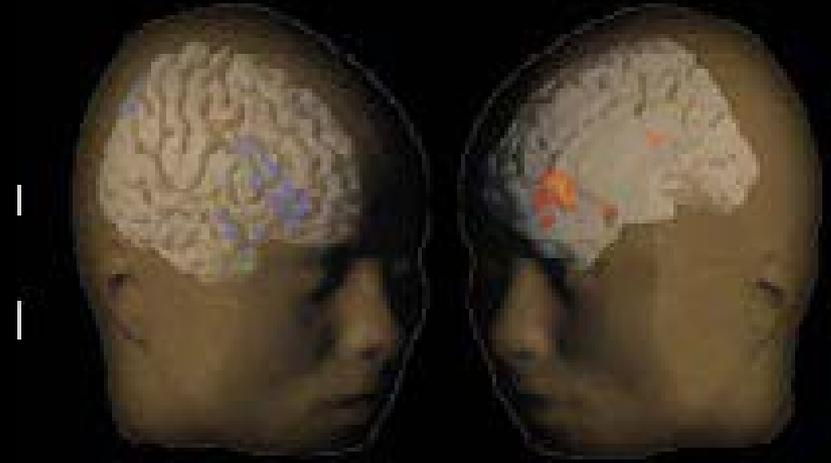
**Rosalyn
Moran
University College
London**

**Focused ultrasound
non-invasive therapeutic neuromodulation for
seizure disorders in children, Parkinson's disease,
neuropsychiatric disorders:**

new company in Roanoke – Neurotrek

**William “Jamie” Tyler
(Arizona State)**





“How our brains value and discount the future”

Warren Bickel

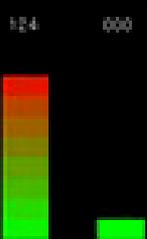
Training healthy decision-making and developing treatments for addictive behaviors

Scaling up – world wide addiction quit registry

Real time fMRI neurorehabilitation for TBI, stroke, PTSD



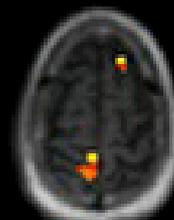
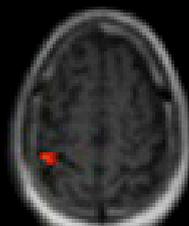
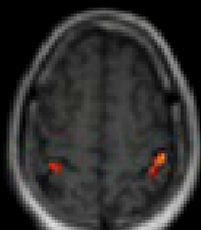
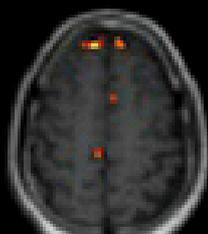
Button



Visual Stimulus Paradigm



Experimental Timing And Classifier Output



Experiment 4:
Testing (With Feedback)

Block Design: TR = 2 sec
30 s Left, 30 s Right 8 repeats

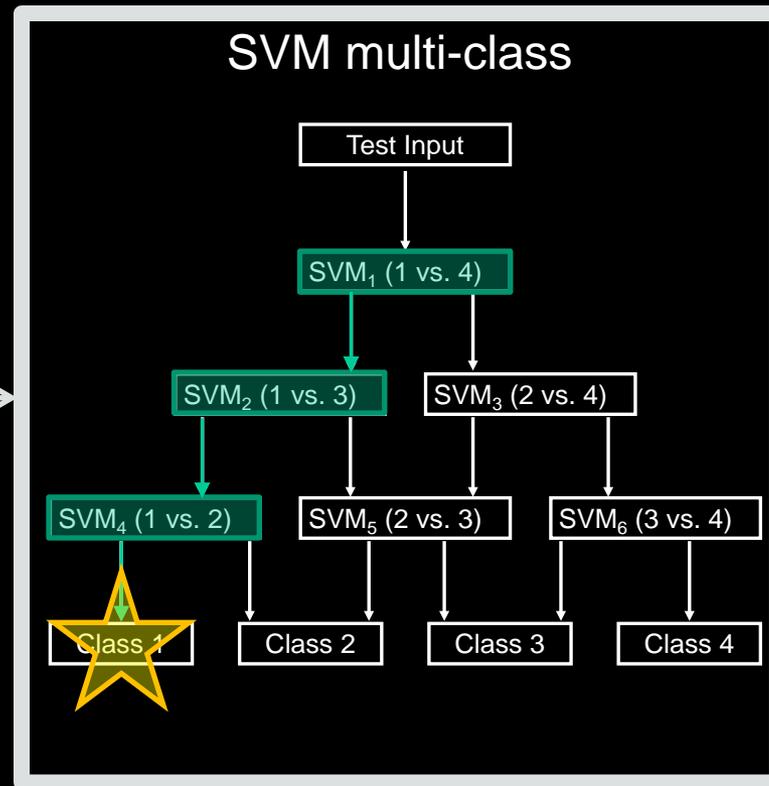
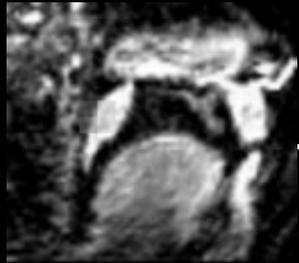
Time = 8 min (Movie speed-up 12x)



**Stephen
LaConte**

Speech Neurorehabilitation

Stephen LaConte



Functional brain reorganization in cerebral palsy – NIH funded research clinic comes to Roanoke's VTCRI



Sharon
Ramey
(Georgetown)



Stephanie
DeLuca
(UAB)



Neurorehabilitation research and clinic at VTCRI for children with cerebral palsy



The_little_fighter.flv