Translational Medicine

*From Discovery to Health*

Jamal A. Ibdah, MD, PhD

*Sr. Associate Dean & Director, MU Institute for Clinical and Translational Science*
Translational Medicine

Translational Medicine describes the steps between a fundamental discovery and its application in clinical medicine, from bench to bedside to the practice in community and vice versa.
Translational Medicine

Basic Research ➔ T1 ➔ Clinical Research ➔ T2 ➔ Improved Health

- Translation from basic science to human studies
- Translation of new knowledge into clinical practice

Adapted from Sung et al. (2003) JAMA, 289, 1278-89.
Accelerating Research from Discovery to Improved Health

Community

Improved patient care

Clinical

Pre-clinical

Science education

Community engagement

Animal model resources

Research capacity & training

Clinical research support

Imaging & informatics advances
The Current Buzz-Word

*Interest From All Corners*

• Google Search (3/5/2010)
  – Translational Medicine 1,840,000 results
  – Translational Research 2,020,000 results

• YouTube Search (3/5/2010)
  – Translational Medicine 140 videos
  – Translational Research 260 videos
Translational Medicine

A Catch Phrase
Stake Holders Motivations

“Pursuing The Greater Vision”

- All stakeholders seek recognition and prestige
- Universities: Foster pipeline for innovation
- Hospitals: Provide patients with cutting edge treatments and clinical trials
- Industry: Bridging “valley of death” between life sciences discoveries and drug/device development
- Funding agencies/NIH: Cost effective funding with speedy translation to patient benefits
Why Translational Medicine?

- Evolving public health challenges
- Slow speed of translating discoveries
- Changing funding environment

![Graph showing percentage changes over years.]
Challenges To Translational Medicine

- Shortage of Translational Researchers
- Academic culture favors individual research contributions
- Silos

Two Different Worlds of Research

“Departments used to contain a mixture of pure physicians, physician-scientists, and even a few basic scientists, all united in their quest to understand and treat human disease. Now, these departments are split. An enormous gap separates those who practice medicine from those who practice science.”

Michael Brown
Recipient, Nobel Prize for Medicine
Challenges To Translational Medicine

- Underdeveloped Translational infrastructure
  - Space design and management
  - Integration of research resources and cores
  - Regulatory and ethics support
  - Bioinformatics support
  - Community engagement support
  - Technology transfer support
  - Data and tissue repositories (Biobank)
Transformative National Movement
In Translational Medicine

- Academic medical centers: Institutes and centers for translational medicine
- Universities: Clinical and translational science educational programs
- NIH: Road map initiatives for a more efficient and translational biomedical research including establishing a national consortium in clinical and translational research
The goal of the Institutional CTSA program is to transform the local, regional and national environment for clinical and translational science, thereby increasing the efficiency and speed of clinical and translational research. This transformation will be achieved by creating an academic home, which can be a center, department, or Institute, comprising faculty and programs that integrate clinical and translational science across multiple departments, schools, clinical and research institutes and hospitals. The C/D/I is expected to include faculty able to conduct original research, develop graduate and postgraduate training curricula and lead programs that integrate clinical and translational science across multiple departments, schools, clinical and research institutes and hospitals.
Clinical and Translational Science Awards

- Eliminate institutional barriers
- Enhance team science across disciplines
- Design state-of-the-art informatics tools
- Improve training and mentoring
- Build new partnerships with private and public health care organizations

CTSAWeb.org
Clinical & Translational Science Award

NIH & other government agencies

Industry

Healthcare & community organizations

CTSA HOME

Biomedical Informatics

Clinical Research Ethics

Trial Design

Advanced Degree-Granting Programs

Participant & Community Engagement

Regulatory Support

Biostatistics

Clinical Resources
- 12 Academic Health Centers (AHCs) nationwide
- 52 AHC planning grants to prepare applications to join consortium
- In 2012, ~60 institutions will be linked to energize clinical and translational science
MU And Translational Medicine

Capacity For Concept To Completion

• Academic and health affairs on the same campus
• Excellence in life sciences research
• Strong collaborative academic culture
• Rich culture of service to the community
• A national leader in medical education
Unique Preclinical Resources

- Largest academic research reactor in the world
- The only NIH funded national swine resource and research center in the nation
- The second largest research animal diagnostic laboratory (RADIL) in the country
- One of 3 mutant mouse regional resource centers
- One of 12 NCI cancer nanotechnology platforms
- One of 12 sites in the NCI Comparative Oncology Trials Consortium
MU Translational Programs

• Radiopharmaceuticals: FDA-approved cancer therapies including Therasphere® and Quadramet®
• Comparative medicine
• Cardiovascular & microcirculation
• Phytomedicine
• Nanomedicine
• Reproductive biology
The vision is to take advantage of MU educational and research assets to create an environment that advances health care through interactions among basic scientists, clinical investigators, patients, community physicians, industry, and other partners to make a meaningful impact on the quality-of-life and the health of the citizens of Missouri, the nation, and the world.
Drug Discovery and Development Pipeline:

Strategic Partnerships

Discovery

- Research Reactor
- Radiopharmaceutical Science
- Life Sciences Center
- Bioengineering
- Food 21st Century
- Animal Sciences
- Physics
- Chemistry
- Nanotechnology

Preclinical

- Custom synthesis (API)
- Radio-label synthesis
- Stable-label synthesis
- Clinical trials materials
- Drug metabolism
- Pharmacokinetics
- Pharmacodynamics

Phases I-III

- Analytical method development and validation
- Impurity/metabolite ID and characterization
- Analytical support formulation/formulation
- Raw materials component testing/COAs
- Reference standard qualification
- Stability/forced degradation
- Extractables/leachables programs
- Scientific and regulatory program

Post-Commercialization

- Batch release testing
- Stability programs
- Bioequivalency testing
- DC- and re-formulation
- Radio-labeling synthesis
- Reference standard synthesis

IND/INAD

- Animal trials
- In-vitro/in-vivo DMPK
- Toxicology
- Toxicokinetics
- Pre-tox screening
- Animal resource centers

NDA

- Tertiary care hospitals (2) and clinics
- Ellis Fischel Cancer Center
- Clinical Research Unit
- Clinical Trials Offices (3)
- Biostatistics
- Investigational pharmacy
- Practice-based Research Network
- Institutional Review Board
- Data and safety monitoring
- Metabolic control program

Technology transfer

- Missouri Innovation Center
- Life Science Incubator
- Center for Innovation and Entrepreneurship
- Centennial Investors

University of Missouri

- Health Care
- School of Medicine
- University of Missouri – Columbia

CEPTED INVESTORS

MU-ICTS

- IOTS
Thank You!