# Biomedical Informatics for Medical Physicists Introduction

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# Background and Purpose of Symposium

- Background
  - Informatics, as concept and discipline, is becoming ubiquitous
  - Difficult to identify exactly what it is
  - Medical physicists are often the people looked to when topic comes up
  - We don't want to look too clueless
- Purpose
  - Provide a few clues
  - Demonstrate some of the concepts and types of projects of some people working in field
  - Not meant to be definitive–field is too big

# CAMPEP View

- Curriculum standards include Informatics as one of 3 or 4 main areas for all specialities
- Radiation oncology curriculum
  - Beam data acquisition/management
  - Beam modeling
  - Treatment planning algorithms
  - Validation of imported images
  - PACS systems and their integration
  - HL7
  - DICOM standards and DICOM-RT
  - Information acquisition from PACS/images
  - Quality/maintenance of imaging workstations
  - Evaluation of viewing conditions
  - Image registration, fusion, segmentation, processing
  - Quantitative analysis
  - Record and verify systems
  - Treatment record design/maintenance
  - IHE Radiation Oncology (IHE-RO)
  - Network integration/management

# National Library of Medicine View

- **Health care/clinical informatics:** Applications of informatics principles and methods to direct patient care, such as advanced clinical decision support systems and multimedia electronic health records; design and provision of informational support to health care consumers.
- **Translational bioinformatics:** Applications of informatics principles and methods to support 'bench to bedside to practice' translational research, such as genome-phenome relationships, pharmacogenomics, or personalized medicine; health effects of environmental factors, genome-wide association studies (GWAS) and other similar areas.
- **Clinical research informatics:** Applications of informatics principles and methods to support basic clinical trials and comparative effectiveness research; biostatistics; in-silico clinical research trials; merging and mining large disparate data sets that mix images, text and data.
- **Public health informatics:** Applications of informatics principles and methods to build integrated resources for health services research, for decision support in public health agencies, to support regional or global health research, or syndromic surveillance; health literacy, health effects of climate change.

# Externally-supported Informatics Training Centers

- Columbia University
- Harvard Medical School
- Ohio State University
- Oregon Health Sciences University
- Rice University
- Stanford University
- University of California–San Diego
- University of Colorado–Denver
- University of Pittsburgh
- University of Utah
- University of Washington
- University of Wisconsin–Madison
- Vanderbilt University
- Yale University

# My view

- begin with **Data**
  - raw information that is specific to given arrangement of your variables
- transform it to **Information**
  - within a statistical, mathematical and/or causal framework, the data is is used to build or buttress a model
- which may lead to **Knowledge**
  - information can be useful even if we don't understand the underlying mechanisms, but ultimately it is this process that does lead to knowledge of cause and effect

# Talks in this session

- "An Overview of Biomedical Informatics"
  *Ira Kalet*
- "Database sharing model for research in radiation therapy"
  *Todd McNutt*
- "Probabilistic models"
  *Wade Smith*