

# **THE EVOLVING PARADIGM FOR BIOMEDICAL RESEARCH**

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# **Evolving Research Paradigm**

- **Much more multidisciplinary**
- **Integrative or Systems approach**
- **More dependent on advanced instrumentation and technologies**
- **Bioinformatics, Internet, and scalable computing resources essential**
- **Virtual laboratories to facilitate access to advanced technologies**
- **Imaging technologies from molecules to organisms**

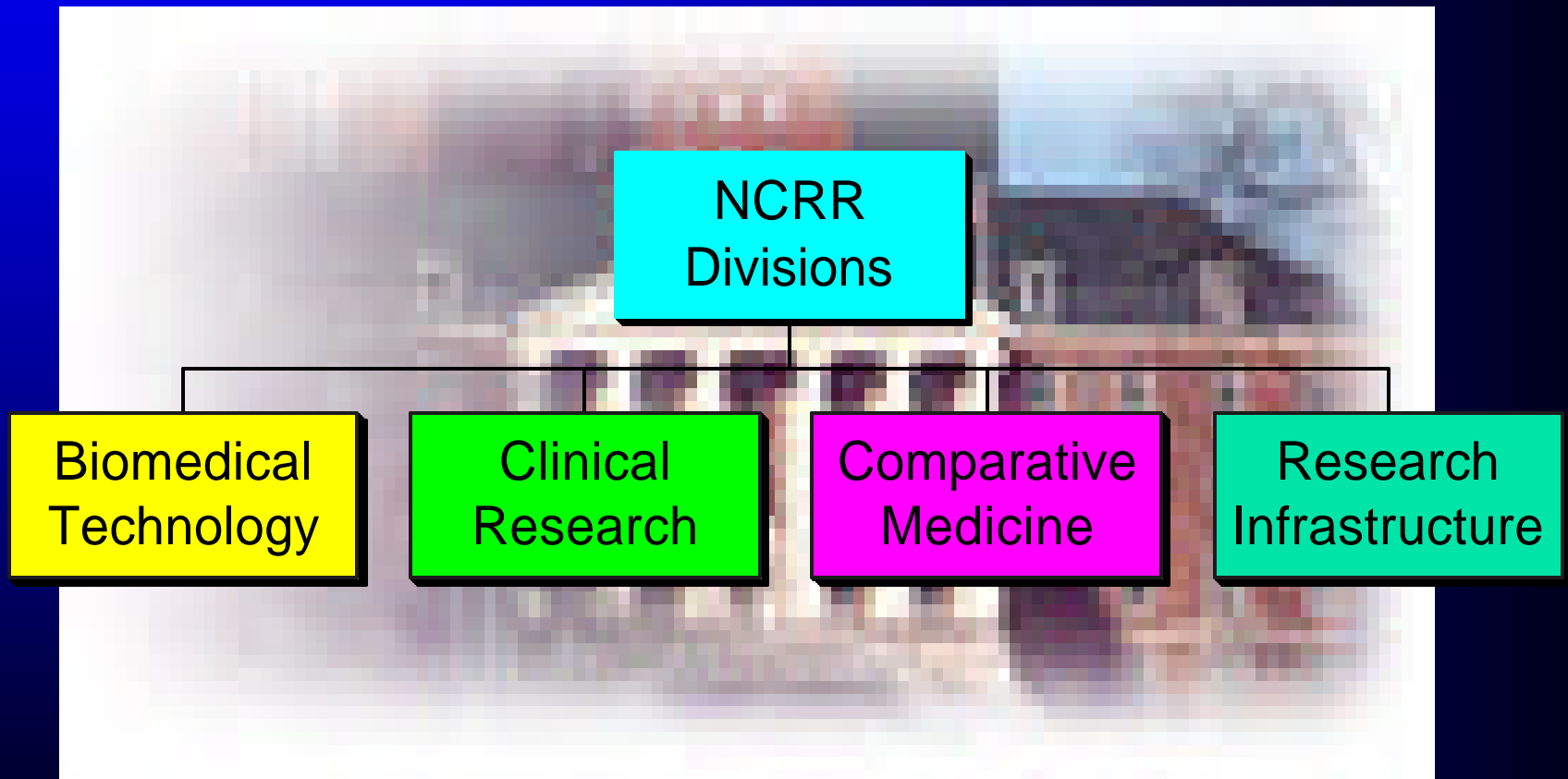
# **NCRR's Mission: To serve as a “catalyst for discovery” for NIH supported investigation**

**NCRR creates, develops, and provides a comprehensive range of human, animal, technological, and other resources to enable biomedical research advances. NCRR promotes collaborations within and across scientific disciplines and provides quick, flexible approaches to new and emerging research needs.**

# Infrastructure and Related Core Needs for Biomedical Research

- **Instrumentation**
- **Information Technologies and networks**
- **Advanced resource technologies**
  - ✓ **Proteomics, glycomics -- an integrated approach**
  - ✓ **Structural Biology - synchrotron beam lines, high field NMR**
- **Resources to facilitate research**
  - ✓ **Clinical research**
  - ✓ **Animal research**
- **Research Facilities-- construction and renovation**
  - ✓ **Animal research**
  - ✓ **Research laboratories**

# National Center for Research Resources



# Division of Clinical Research

- **Resources for Clinical Research**
  - ✓ **National Gene Vector Laboratories**
  - ✓ **National Disease Research Interchange**
  - ✓ **Human Islet Cell Resources**
  - ✓ **Regional Genotyping Resources**
  - ✓ **Bioinformatics Regional Resources and Institutional cores**
  - ✓ **BIRN Network; CFnet; MSIInet**
  - ✓ **Research Subject Ombudsman/Advocate**

# General Clinical Research Centers

- **Institutional resource for both inpatient and outpatient research**
- **Hosts investigators funded by other NIH components, other Federal, state and local agencies, as well as by the private sector**
- **Specialized paramedical personnel - e.g., research nurses, dietitians, data managers**
- **Specialized laboratories**
  - ✓ **Human applications laboratories, cell sorting, mass spectrometry, imaging, pharmacogenetics, mass spectroscopy; BAL; cell sorting, DNA extraction, PCR**
- **Bioinformatics Cores: Computerized database management and analyses, Biostatisticians, Systems Managers, Internet access.**
- ✓ **Treatment & Diagnostic Network for Cystic Fibrosis; BRIN**

# **NCRR Resources for Patient-Oriented Clinical Research**

- **Investigator Development**
  - ✓ **Medical Student program**
  - ✓ **Clinical Research Feasibility Funds - pilot research**
  - ✓ **Mentored Clinical Research Scholar program (K12)**
  - ✓ **Expand K23 program; expand K24 funding**
  - ✓ **Loan Repayment program**



# **Division of Biomedical Technology**

- **Network of 47 Biomedical Technology Centers (discover, create, and develop technological innovations that have application to a broad spectrum of biomedical research activities)**
- **Shared Instrumentation Program ( support to acquire commercially available instrumentation at a cost greater than \$100 K)**

# Biomedical Technology Resource Centers

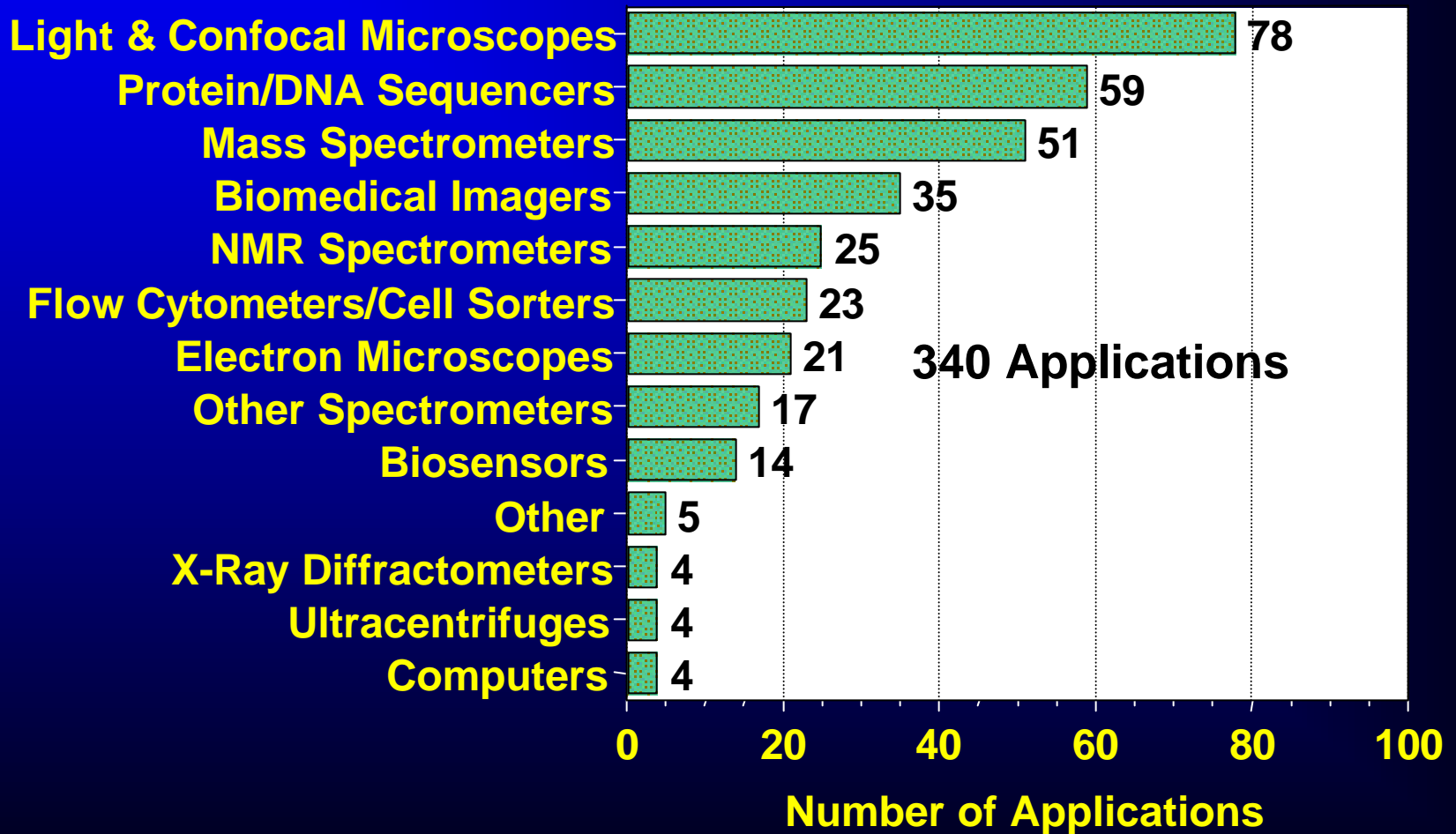
- **Develop and provide access to advanced biomedical research technologies**
- **Principal functions:**
  - ✓ **Research and Development, Collaborative Research, Service, Training and Dissemination of technology**
- **Scope---examples:**
  - ✓ **Structural and functional biology -- "postgenomics"**
  - ✓ **Simulation and computation**
  - ✓ **Integrative technologies**
  - ✓ **Imaging from molecule to organ (e.g., brain research)**
- **Host institution provides research space for visiting scientists.**

# Shared Instrumentation Grant Program

- **Provide funds (\$100-500K) for "off-the-shelf" instrumentation**
- **MOU with NSF for instrumentation request >\$500K. NCRR and NSF may provide up to \$500K each.**
- **Too expensive to purchase with research project grant funding**
- **Shared by at least 3 NIH-supported investigators. (Now up to about 15)**
- **Applicant institution encouraged to provide access via centralized facility with technical support. No NIH matching**

# Shared Instrumentation Grant Program

## Applications by Instrument, FY 2001



# "High End" Instrumentation Program

- **Complements existing Shared Instrumentation Grant Program for equipment requests between \$100K to \$500K**
- **President's Budget Request: \$22 M in FY 2003**
- **Eligibility: same as for SIG program**
- **Application:**
  - ✓ **Minimum request \$750,000**
  - ✓ **Maximum request \$2.0 million. If equipment needed costs more, must have funds available before award made. No IDCs; one year award**
- **Match: none required**

# **New "High End" Instrumentation Program**

**Mass Spectrometers - combinations of electrospray ionization with Fourier transform ion cyclotron resonance (FTICR) mass spectrometry Range (\$1.0 - \$1.2 M)**

**Electron Microscopes - IVEM with field emission illumination for high resolution Range (\$1.5-\$2.0 M)  
Cryoelectron microscopy Range (\$3.0 - \$4.5M)**

**Imaging equipment - PET, CAT, MRI; higher field MRI (3T to 8T); MR spectroscopy/functional imaging Range (\$1.2-\$10 M)**

**Nuclear Magnetic Resonance - three dimensional structures. NMRs up to 900MHz. Range (\$1.5-\$10 M)**

# Division of Comparative Medicine

- **Network of 8 National Primate Research Centers ( a special environment to maintain nonhuman primates (20,000, 30 species)**
- **The NIH Chimpanzee Management Program to house and maintain chimpanzees owned by NIH for biomedical research**
- **Supports models and resources for biomedical research such as *C. elegans*, zebrafish, and mutant mice**

# **Biorepositories**

## ***Examples***

- **Bloomington Drosophila Stock Center**
  - ✓ **Collections of mutations**
- **Caenorhabditis Genetics Center**
  - ✓ **Over 1600 strains available**
- **National Resource for Cephalopods**
  - ✓ **Provides live, healthy squids and other cells, tissues and organ systems**
  
- **Yeast Genetic Stock Center**
  - ✓ **Collection of over 5,000 genetically defined strains; distributes updates of the genetic map of *S. cerevisiae***
- **American Type Culture Collection**
  - ✓ **Develops or acquires, preserves, authenticates and distributes microorganisms, cell lines and recombinant DNA materials, genetic stocks**



# Induced Mutant Resources

- *National Network:*
- **The Jackson Laboratory**
  - ✓ **University of California at Davis**
  - ✓ **Taconic Farms**
  - ✓ **Harlan Sprague Dawley**
  - ✓ **University of North Carolina**
- **Data Core: The Jackson Laboratory**
  - ✓ **tracks mutants, phenotypes**

**"As for the Future,  
your (NCCR's) task is not to  
foresee, but to enable it."**

**.... Antoine de Saint-Exupery  
The Wisdom of the Sands**



***<http://www.ncrr.nih.gov>***