

# Current Activities and Support for Stem Cell, Tissue Engineering and Regenerative Medicine at the NIH

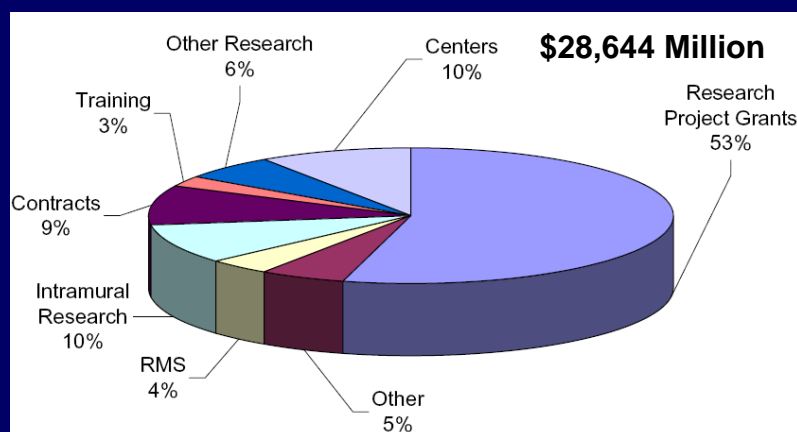
Stephen I. Katz, M.D., Ph.D.  
NIAMS, NIH, DHHS



Multi-Agency Tissue Engineering Science Interagency Working Group "Stem Cell Research in Regenerative Medicine and Tissue Engineering" Workshop  
NSF, VA, 2/2/2007



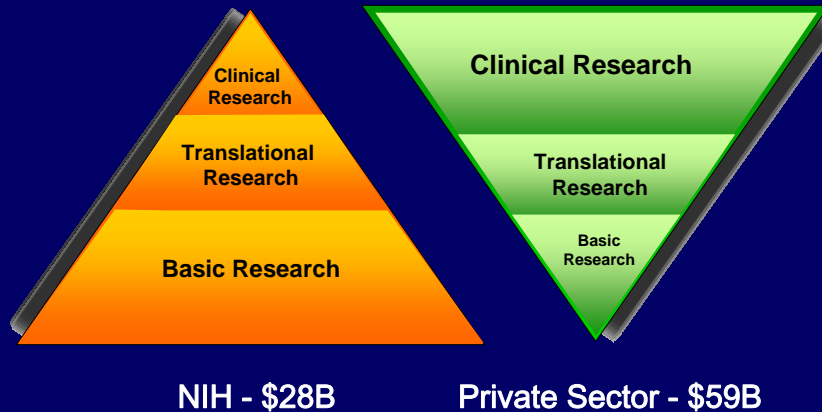
## FY 2005 NIH Budget



<http://officeofbudget.od.nih.gov/pdf/Press%20info%20final.pdf>



## Balanced National Biomedical Research Portfolio



## NIH Definition of TE/RM

### Definition and Opportunity

- Multidisciplinary field ...that seeks to develop functional cell, tissue, and organ substitutes to repair, replace or enhance tissue or organ function... It includes both the regeneration of tissues *in vitro* for subsequent implantation (Tissue Engineering) as well as regeneration directly *in vivo* (Regenerative Medicine).
- Engineered tissues can also be used for capturing complex 3D tissue physiology *in vitro*—this may be useful, for example, in the development of drugs, identification of novel genes, evaluation of potential drug targets (?) and testing for drug metabolism, uptake and toxicity.



## Challenges/Opportunities in TE/RM

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- Understanding and controlling the cellular response
- Formulating biomaterial scaffolds and the 3D tissue matrix environment
- Developing enabling tools
- Promoting scale-up, translation, and commercialization



## TE: Capturing complex 3D tissue physiology *in vitro*

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- Some tools are now available to create 3D tissue models *in vitro*, but the blueprints for what to make and how exactly to make them have been slower to arrive.
- Design principles for recreating the interwoven set of biochemical and mechanical cues in the cellular microenvironment, and the methods for implementing them are needed.
- Applications that involve epithelial tissues for which 3D models could explain mechanisms of disease or aid in drug development are also needed.



From Griffith and Swartz, Nature Reviews, March 2006



## Some Recent NIH Activities in Stem Cells and TE/RM

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- **Some examples of funding opportunities announcements:**  
NIBIB PAR on Enabling Technologies for TE/RM <http://grants.nih.gov/grants/guide/pa-files/PAR-06-504.html>  
NHLBI PA on Directed Stem Cell Differentiation for Cell Based Therapies for Heart, Lung, Blood, and Aging Diseases <http://grants.nih.gov/grants/guide/pa-files/PA-06-124.html> and <http://grants.nih.gov/grants/guide/pa-files/PA-06-125.html>  
NIDDK PA on Developmental Biology and Regeneration of the Liver <http://grants.nih.gov/grants/guide/pa-files/PA-07-026.html>
- **The recent NIH Roadmap RFI on “Tissue Engineering and Regenerative Medicine”**
- **A recent report on “Regenerative medicine 2006”** focusing on stem cells research at [http://stemcells.nih.gov/staticresources/info/scireport/PDFs/Regenerative\\_Medicine\\_2006.pdf](http://stemcells.nih.gov/staticresources/info/scireport/PDFs/Regenerative_Medicine_2006.pdf)



## Some Recent NIAMS Activities on Stem Cells and TE/RM

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- 2006 Scientific Retreat on “Stem Cells – Basic Biology and Therapeutic Applications ” and “Musculoskeletal Development and Regeneration”
- Establishment of a new NIAMS program of “Musculoskeletal Development, Tissue Engineering and Regenerative Medicine”
- 2007 Roundtable Discussions on “Musculoskeletal Injury and Trauma” and “Wound Healing”



## Move TE/RM Forward

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- Continue the current research support
- Coordinate multi-/inter-disciplinary research to facilitate translation of knowledge gained in basic research into clinical applications



# Thank you!

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