LSU Musculoskeletal Research Consortium

LOUISIANA STATE UNIVERSITY

Musculoskeletal Scientific Research Consortium (MSRC) Mission Statement

Merge scientific knowledge and clinical experience of faculty from three schools and one research institute within the Louisiana State University system

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Facilitate academic and industrial investigations

Promote multi-disciplinary collaborations to support all stages of research, technologies, and capability platforms

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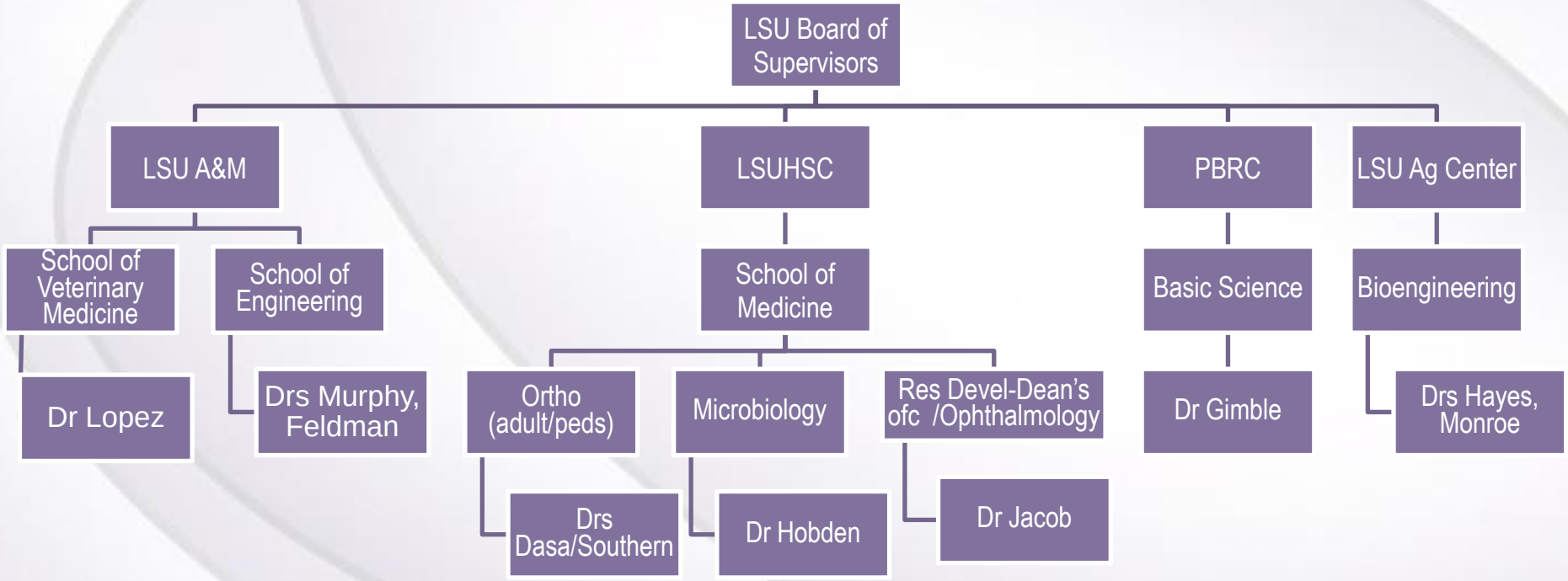
In-depth collaboration and translational research
in vitro and *In vivo* animal models
Pre-clinical *(GLP)* and Clinical trials
All aspects of musculoskeletal treatments, devices, and drug delivery systems.

Participants

- Dr. Czarny-Ratajczak- Genetics- Tulane
- Dr. Dasa- LSU Orthopedics (Co-Director)
- Dr's Danrad, Maristany, Smith- Radiology LSUHSC
- Dr's Escorpizo and Nelson- - LSU Allied Health
- Dr. Grewal- Rheumatology LSUHSC
- Dr Lopez- LECOR/Orthopaedics/Regeneration- LSU (Co-Director)
- Dr. Mcnulty- Veterinary Anatomy- LSU
- Dr. Murphy- Mechanical Engineering- LSU
- Dr. Mussell- Anatomy- LSUHSC
- Dr. Hayes- Bio-engineering/Materials- LSU
- Dr. Gimble- Tissue Regeneration- Tulane
- Dr. Hobden- Microbiology & Immunology- LSU
- Dr. Jacob- Research Development- LSU

LOUISIANA STATE UNIVERSITY

Louisiana State University System



- Only Veterinary Medical School in LA
- Campus leader
  - National, Foundation, Industry funding
  - Translational/Basic/Clinical research
- GLP, GCP standards
- Collaboration
  - State to global

- 11 Fields of Engineering
- Mechanical Engineering
  - 25 Faculty, 110 graduate students, 800 undergrads
  - Research areas
    - Materials
    - Mechanical systems
    - Microsystems
    - Thermal fluid systems

LOUISIANA STATE UNIVERSITY

LSU Health New Orleans

- Schools
  - Allied Health, Dentistry, Nursing, Public Health, Medicine, Graduate Studies
- School of Medicine
  - Only Level 1 Trauma in state of Louisiana
  - 16 accredited residency programs
  - >$1B, 400+ bed, level 1 trauma center under construction
- Eleven Regional Practice Sites throughout Southern LA
- Over 60 Clinical Trials Currently Ongoing on New Orleans Campus Alone
- GLP Capabilities

PENNINGTON BIOMEDICAL RESEARCH CENTER

Louisiana State University System

- 48 labs, 19 core facilities
- 234 acres, 688,000 sq ft research space
- 3 major research groups
  - Basic Science
  - Clinical Diabetes and Obesity
  - Population Science

LSU

LOUISIANA STATE UNIVERSITY

- One of the top research institutes nation-wide regarding return on investment dollar
- 50+ scientists hold patents
- 12 departments
  - Agricultural economics to crop physiology
  - Bio-engineering

LOUISIANA STATE UNIVERSITY

Recent Manuscripts

Biocompatible/Bioabsorbable Silver Nanocomposite Coatings

Ammar T. Qureshi,[1] W. Todd Monroe,[1] Mandi J. Lopez,[2] Marlene E. Janes,[3] Vinod Dasa,[4] Sunggook Park,[5] Alborz Amirsadeghi,[5] Daniel J. Hayes[1]

[1]Department of Biological and Agricultural Engineering, Louisiana State University and Agricultural Center, Baton Rouge, Louisiana 70803
[2]Department of Veterinary Clinical Sciences, Louisiana State University, Baton Rouge, Louisiana 70803
[3]Department of Food Science, Louisiana State University Agricultural Center, Baton Rouge, Louisiana 70803
[4]Department of Orthopedics, Louisiana State University Health Science Center, New Orleans, Louisiana 70115
[5]Department of Mechanical Engineering, Louisiana State University, Baton Rouge, Louisiana 70803

Received 11 June 2010; accepted 28 September 2010
DOI 10.1002/app.33481
Published online 12 January 2011 in Wiley Online Library (wileyonlinelibrary.com).

Antimicrobial biocompatible bioscaffolds for orthopaedic implants

Ammar T. Qureshi[1], Lekeith Terrell[1], W. Todd Monroe[1], Vinod Dasa[2], Marlene E. Janes[3], Jeffrey M. Gimble[4], Daniel J. Hayes[1,*]

Article first published online: 15 JUN 2012
DOI: 10.1002/term.1532

Issue

Journal of Tissue Engineering and Regenerative Medicine

Early View (Online Version of Record published before inclusion in an issue)

JOURNAL OF TISSUE ENGINEERING AND REGENERATIVE MEDICINE
J Tissue Eng Regen Med (2012)
Published online in Wiley Online Library (wileyonlinelibrary.com) **DOI:** 10.1002/term.1565

RESEARCH ARTICLE

Comparison of infrapatellar and subcutaneous adipose tissue stromal vascular fraction and stromal/stem cells in osteoarthritic subjects

Pedro Pires de Carvalho[1,2,3#], Katie M. Hamel[1#], Robert Duarte[4], Andrew G. S. King[4], Masudul Haque[5], Marilyn A. Dietrich[5], Xiying Wu[1], Forum Shah[1], David Burk[1], Rui L. Reis[2,3], Jennifer Rood[1], Ping Zhang[4,6], Mandi Lopez[4,5], Jeffrey M. Gimble[1,4*] and Vinod Dasa[4]

[1]*Pennington Biomedical Research Center, 6400 Perkins Road, Baton Rouge, LA, USA*
[2]*3Bs Research Group, Biomaterials, Biodegradables and Biomimetics, University of Minho, Headquarters of the European Institute of Excellence on Tissue Engineering and Regenerative Medicine, Avepark, Guimarães, Portugal*
[3]*ICVS/3Bs PT Government Associated Laboratory, Braga/Guimarães, Portugal*
[4]*Louisiana State University Health Sciences Center and Musculoskeletal Research Consortium, New Orleans, LA, USA*
[5]*Louisiana State University School of Veterinary Medicine, Baton Rouge, LA, USA*
[6]*Michigan State University, Department of Surgery, East Lansing, MI, USA*

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journal homepage: www.elsevier.com/locate/tvjl

In vitro expansion and differentiation of fresh and revitalized adult canine bone marrow-derived and adipose tissue-derived stromal cells

Nakia D. Spencer [a], Raymond Chun [a], Martin A. Vidal [a,1], Jeffrey M. Gimble [b], Mandi J. Lopez [a,*]

[a]*Laboratory for Equine and Comparative Orthopedic Research, Louisiana State University, School of Veterinary Medicine, Skip Bertman Drive, Baton Rouge, LA 70803, USA*
[b]*Stem Cell Biology Laboratory, Pennington Biomedical Research Center, Baton Rouge, LA 70808, USA*

Human adipose-derived stem cells and three-dimensional scaffold constructs: A review of the biomaterials and models currently used for bone regeneration

Andrea S. Zanetti,[1] Cristina Sabliov,[1] Jeffrey M. Gimble,[2] Daniel J. Hayes[1]

[1]Department of Biological and Agricultural Engineering, Louisiana State University and LSU AgCenter, Louisiana
[2]Pennington Biomedical Research Center, Stem Cell Biology Lab, Louisiana State University, Louisiana

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Published online 21 September 2012 in Wiley Online Library (wileyonlinelibrary.com). DOI: 10.1002/jbm.b.32817

Vinod Dasa MD

- Assistant professor
- Director of Research
- Fellowship- Insall Scott Kelly Institute
- Clinical focus in arthroplasty
- Research
  - Clinical (health economics, outcomes, effectiveness)
  - Basic science- MSRC

Jeff Gimble MD PhD (PBRC)

- PhD in Cell Biology
- Residency in Internal Medicine
- Post-doctoral Fellowship in Immunology
- 25 years experience in stromal/stem cells
- 4 years biotechnology experience in RTP, NC
- Professor, Stem Cell Biology Lab, PBRC
- Co-Founder of LaCell LLC (New Orleans & Baton Rouge, LA)

Gimble Lab Capabilities

- Human stromal/stem cell isolation, characterization, cryopreservation, quantification, and in vitro/in vivo application
- Global proteomic methods (mass spectroscopy)
- Global transcriptomic methods (microarray)

Additional Capabilities

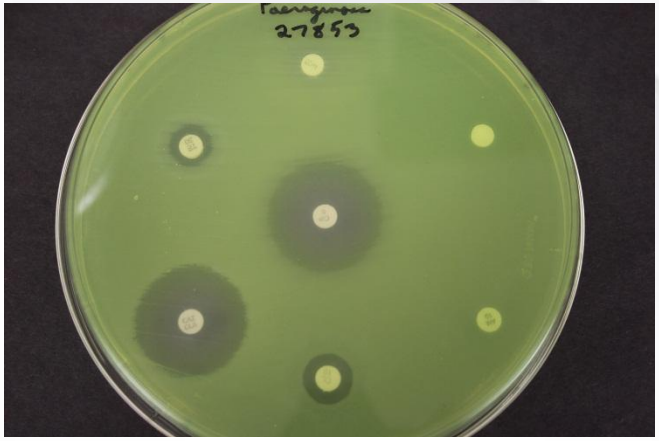
- Clinical trials in metabolic diseases using the Pennington Biomedical's In-Patient and Out-Patient Units and Cores
  - Metabolic Chambers
  - Clinical Chemistry
  - Sleep Laboratory
  - Glucose Clamps
  - Exercise Physiology
  - Non-invasive Imaging (MRI)

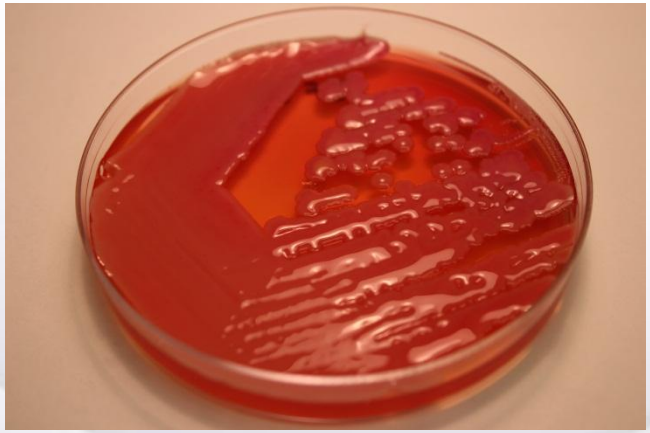
Dr Daniel Hayes (AG center)

- Ph.D. Engineering Science and Mech. (2004)
- Nano and Microfabrication
- Co-Founder of NanoHorizons Inc.
- Assistant Professor of Bioengineering
- Completing a $1M NSF funded lab expansion for a class 1000 clean room and wet labs

Dr. Jeff Hobden (Microbiology/LSUHSC)

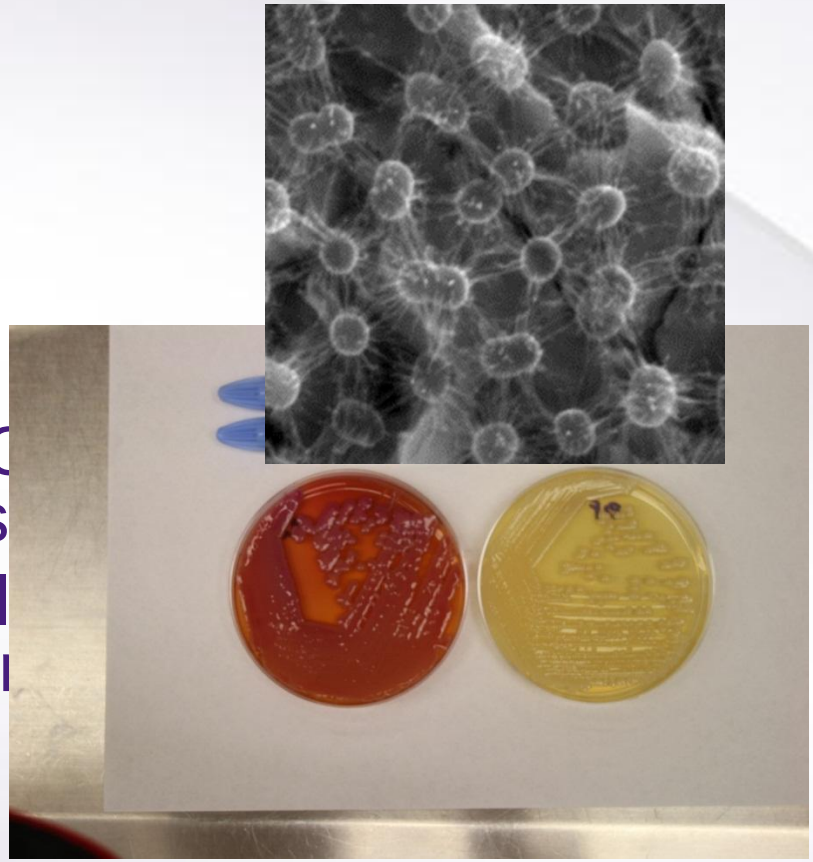
- Doctorate in Medical Microbiology, 1992
- Associate Professor with tenure, Dept. of Microbiology, Immunology, & Parasitology
- Memberships
  - American Society for Microbiology, 1987
  - Infectious Disease Society of America, 2008
- Expertise in host-pathogen interactions, drug delivery, & evaluation of novel therapies
  - 48 Abstracts at local, national, & international meetings
  - Over 50 peer-reviewed publications





Dr. Hobden's Research Laboratory

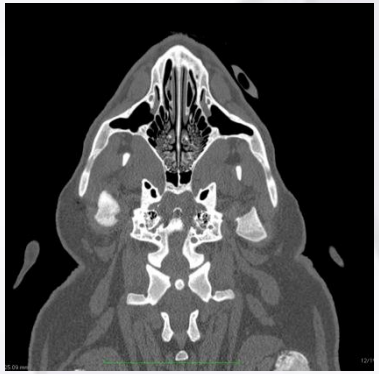
- Fully equipped bio-safety Level 2+ lab
- Capable of working with most pathogens, including anaerobes
- Extensive collection of ATC strains and clinical isolates
- Equipped for most molecul biology techniques, includi PCR and RT-PCR
- light microscopy, laser confocal microscopy and scanning electron microscopy capable

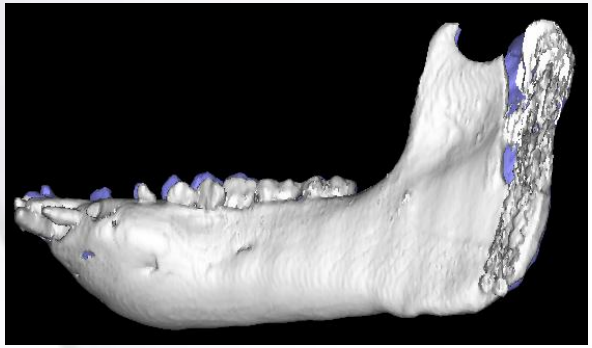


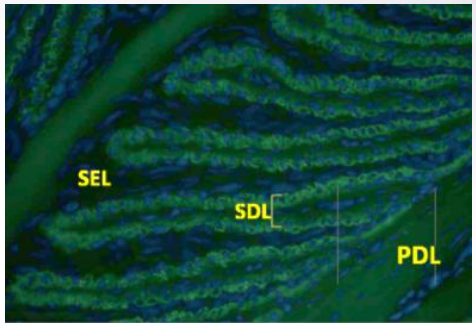
Mandi J. Lopez, DVM, MS, PhD

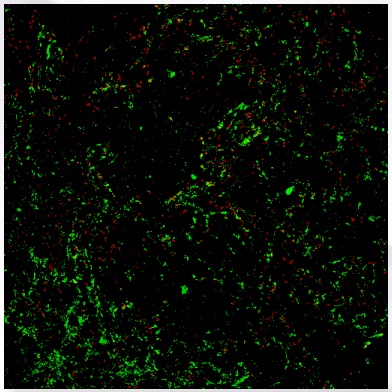
Diplomate, American College of Veterinary Surgeons

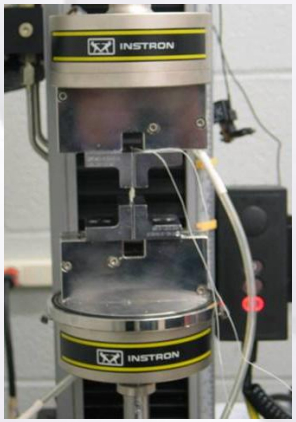
Laboratory for Equine and Comparative Orthopedic Research

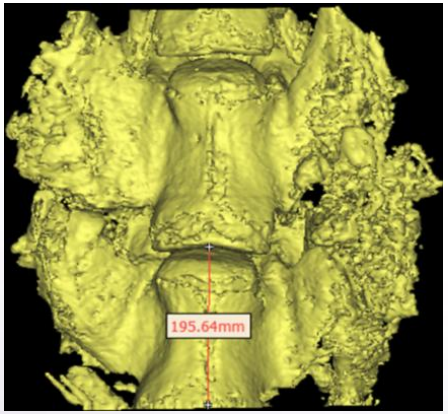


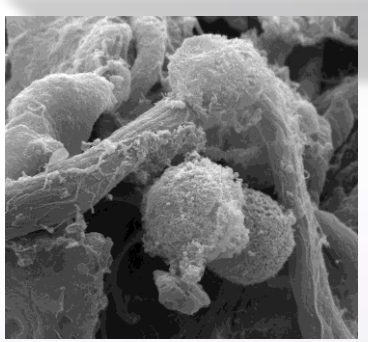


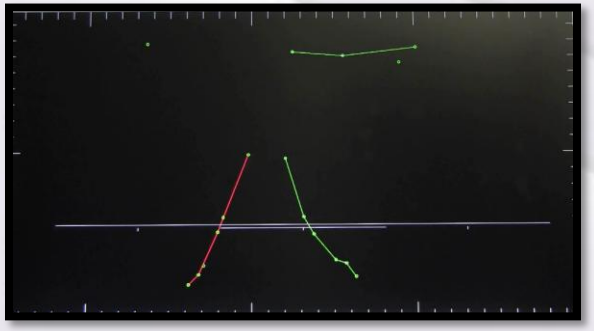


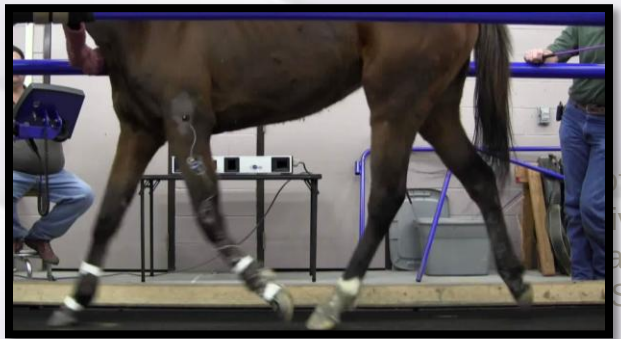












Michael C. Murphy

Roy O. Martin Jr. Lumber Company Professor
PhD, Mechanical Engineering (MIT)

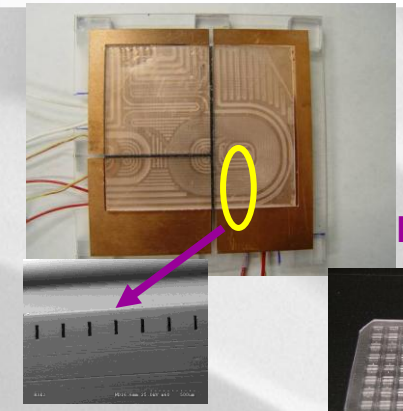
CBM² CENTER FOR BIOMODULAR MULTI-SCALE SYSTEMS

- Modular Micro/Nano-Systems for Biomedical Applications

Microsystems
- **Design**
- **Fabrication**
- **HARMS**
- **Assembly**

Biomechanics
- **Measurement of Knee Kinematics**
- **Displacement Workspaces**
- **Velocity Workspaces**

Devices

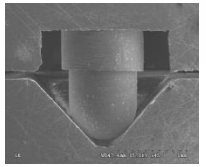


PCR

LDR

Modules

Assembly Technology

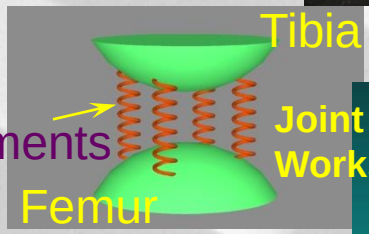


Endoscopic Instruments

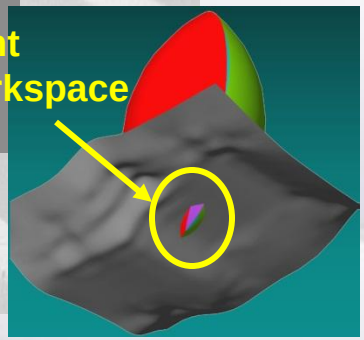
Systems

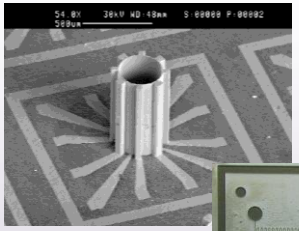
Multi-well Platforms

- Robust Sensors and Actuators



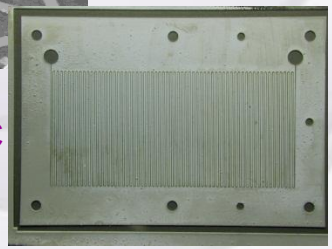
- Understanding the Kinematics and Control of the Knee





microGyro

microGC



Mixed Scale Fabrication Resources

Forming Patterns
10^{-8} m => 10^{-1} m

UV lithography

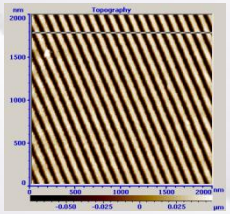
X-ray lithography

Excimer laser

Micro-milling

Obducat
nano-imprinting

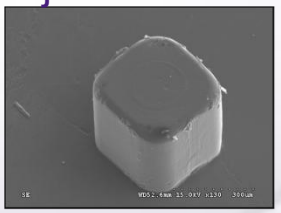
Replicating Patterns
10^{-8} m => 10^{-1} m



50 nm grating

Jenoptik HEX 02

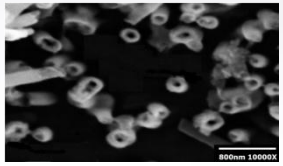
Double-sided
hot embossing

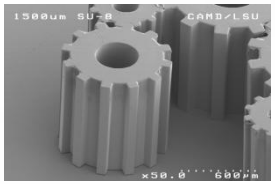


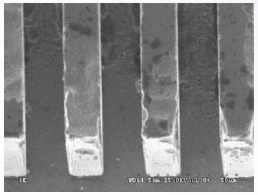
Injection molded
Cube

Battenfeld injection molding

Filling Patterns (Metals)
10^{-8} m => 10^{-1} m







Jean T. Jacob, PhD
Director of Research Development
(Dean's Office, LSUHSC-SOM)

- Facilitates Research Collaborations
  (both intra- and extramural)
- GLP, Quality Assurance Officer SOM
- Biomedical Polymer Scientist
- 8 patents
- Expertise in Implant Biocompatibility Testing and Drug Delivery System Development

LSU Musculoskeletal Research Consortium

Dasa, Lopez, Gimble, Hayes, Hobden, Jacob, Murphy

Clinical Trials

Preclinical Testing (GLP)

Cell, Tissue Testing

Surgery
Engineering
Animal Models
Cell Physiology
Biocompatibility
Implants
Polymers

Nano-,Microfabrication
Bioactive Implant Coatings

Microbial Testing/Detection

Intra-cellular, joint and whole body assessments

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