

Research Funding at the NIH

Council for Chemical Research 32nd Annual Meeting

May 2, 2011

Bill Heetderks

Associate Director, NIBIB, NIH
National Institute of Biomedical
Imaging and Bioengineering



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	Project Number	Sub #	Project Title	Contact Principal Investigator	Organization	FY	Admin IC	Funding IC	FY Total Cost by IC
<input type="checkbox"/>	1R15HL089925-01		CHOLESTEROL TRAFFICKING BY HUMAN SERUM ALBUMIN	ABELT, CHRISTOPHER J	COLLEGE OF WILLIAM AND MARY	2007	NHLBI	NHLBI	\$216,000
<input type="checkbox"/>	5R01NS065263-02		STRUCTURAL CONSEQUENCES OF ALS-RELATED MODIFICATIONS OF SOD1	AGAR, JEFFREY NEIL	BRANDEIS UNIVERSITY	2010	NINDS	NINDS	\$342,169
<input type="checkbox"/>	1R21NS071256-01		STABILIZING FALS SOD1 VARIANTS BY CROSSLINKING SUBUNITS	AGAR, JEFFREY NEIL	BRANDEIS UNIVERSITY	2010	NINDS	NINDS	\$237,000
<input type="checkbox"/>	1R56DK080128-01.A1		RATIONAL DESIGN OF PEPTIDOMIMETICS TARGETING GLUCAGON-LIKE PEPTIDE-1 RECEPTORS	AHN, JUNG-MO	UNIVERSITY OF TEXAS DALLAS	2010	NIDDK	NIDDK	\$229,500
<input type="checkbox"/>	5R01CA118972-05		SIGNAL TRANSDUCTION PATHWAYS IN MELANOMA	AHN, NATALIE G.	UNIVERSITY OF COLORADO AT BOULDER	2011	NCI	NCI	\$241,406
<input type="checkbox"/>	5R01GM074134-04		REGULATION OF MAP KINASE BY PROTEIN MOTIONS	AHN, NATALIE G.	UNIVERSITY OF COLORADO AT BOULDER	2010	NIGMS	NIGMS	\$245,998
<input type="checkbox"/>	5R01AI066975-07		TARGETING HIV-1 REGULATORY RNA ELEMENTS	AL-HASHIMI, HASHIM M	UNIVERSITY OF MICHIGAN AT ANN ARBOR	2011	NIAID	NIAID	\$264,578
<input type="checkbox"/>	1R01GM089846-01.A1		DYNAMICS OF NORMAL AND DAMAGED DNA UNDER RELAXED AND SUPERCOILED CONDITIONS	AL-HASHIMI, HASHIM M	UNIVERSITY OF MICHIGAN AT ANN ARBOR	2010	NIGMS	NIGMS	\$354,931
<input type="checkbox"/>	5R01CA139599-03		MULTIPLEXED MEASUREMENT OF KINASE ACTIVITY IN SINGLE CANCER CELLS	ALLBRITTON, NANCY L	UNIVERSITY OF NORTH CAROLINA CHAPEL HILL	2011	NCI	NCI	\$540,722
<input type="checkbox"/>	5R01HG004843-03		RAPID GENETIC ENGINEERING OF STEM CELLS	ALLBRITTON, NANCY L	UNIVERSITY OF NORTH CAROLINA CHAPEL HILL	2011	NHGRI	NHGRI	\$450,459

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	Project Number	Sub #	Project Title	Contact Principal Investigator	Organization	FY	Admin IC	Funding IC	FY Total Cost by IC
<input type="checkbox"/>	5DP1OD000783-05		NIH DIRECTOR'S PIONEER AWARD	PIELAK, GARY JOSEPH	UNIVERSITY OF NORTH CAROLINA CHAPEL HILL	2010	OD	NIA OD	\$365,000 \$365,000
<input type="checkbox"/>	5DP1OD0003584-04		2007 NIH DIRECTOR'S PIONEER AWARD PROGRAM (DP1)	ISMAGILOV, RUSTEM F	UNIVERSITY OF CHICAGO	2010	OD	OD	\$767,500
<input type="checkbox"/>	5DP1OD0003893-03		NANO- AND MICROELECTRONIC TOOLS FOR INTERROGATING NEURONAL CIRCUITS AND NETWORKS	PARK, HONGKUN	HARVARD UNIVERSITY	2010	OD	NIDA	\$840,000
<input type="checkbox"/>	5DP1OD0003899-03		RECONSTRUCTING SUB-CELLULAR STRUCTURE USING PLASMONIC METAMATERIALS	ODOM, TERI WANG	NORTHWESTERN UNIVERSITY	2010	OD	NIBIB	\$762,500
<input type="checkbox"/>	5DP1OD0003900-03		NANOWIRE NANO-ELECTRONIC/CELL ASSEMBLIES AS HYBRID FUNCTIONAL BIOMATERIALS	LIEBER, CHARLES M	HARVARD UNIVERSITY	2010	OD	OD	\$840,000
<input type="checkbox"/>	5DP1OD0003961-03		ENABLING THE STUDY OF ENDOGENOUS PROTEINS IN LIVE CELLS	TING, ALICE Y	MASSACHUSETTS INSTITUTE OF TECHNOLOGY	2010	OD	NIGMS OD	\$420,000 \$420,000
<input type="checkbox"/>	5DP1OD0006432-02		DELIVERY OF BIOLOGICAL THERAPEUTICS: USING ENGINEERED PARTICLES AND NOVEL DELIVER	DESIMONE, JOSEPH M	UNIVERSITY OF NORTH CAROLINA CHAPEL HILL	2010	OD	NCI	\$740,000

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Project Information ?

[BACK TO QUERY FORM](#)[BACK TO SEARCH RESULTS](#)[PRINT VERSION](#)**DESCRIPTION****DETAILS****RESULTS****HISTORY****SUBPROJECTS****Project Number:** 5DP1OD003899-03**Contact Principal Investigator:** [ODOM, TERI WANG](#)**Title:** RECONSTRUCTING SUB-CELLULAR STRUCTURE USING PLASMONIC METAMATERIALS**Awardee Organization:** NORTHWESTERN UNIVERSITY

Abstract Text:

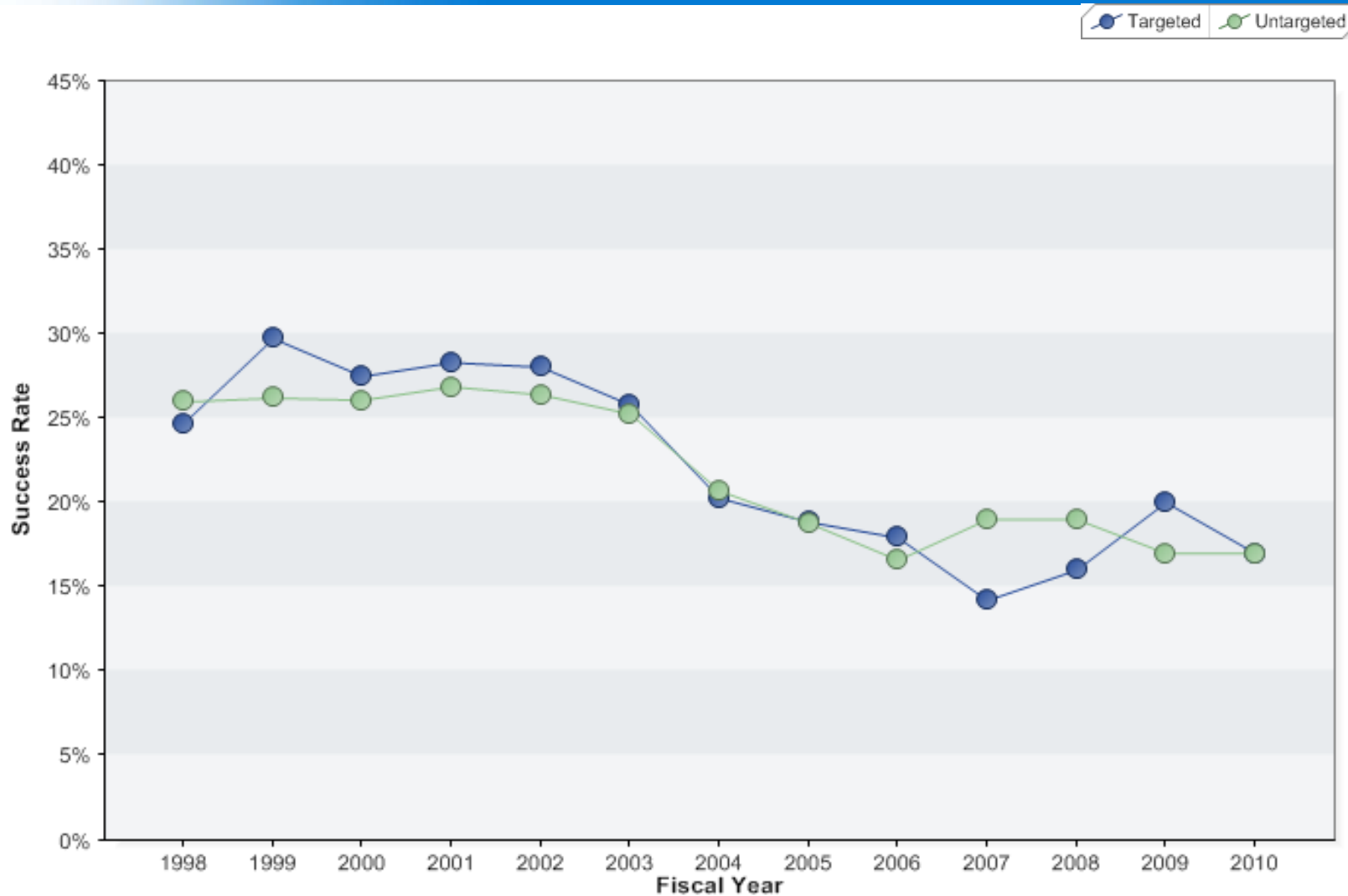
ABSTRACT: Reconstructing Sub-Cellular Structure with Plasmonic Metamaterials The ability to resolve intracellular structure has opened new opportunities for deciphering complex chemical interactions, for relating the composition and organization of organelles to cellular processes, and for observing the infection of cells by viruses. This project describes how plasmonic metamaterials can resolve sub-cellular structure in three dimensions (3D), with sub-diffraction resolution, and without the use of fluorescent labels. These new types of metal nanostructures can be integrated with standard optical microscopes. Because the light that emerges from a metal film perforated with a finite number of nanoholes (a patch) is periodically modulated in 3D, these plasmonic metamaterials can be used for determining the structure of thick, transparent samples like cells. Unlike in conventional optics, where lenses are situated far from the object, these planar metallic lens structures can be constructed directly on glass coverslips. Hence, higher resolution can be achieved because the light does not disperse prior to or after impinging on the sample. We propose to investigate two classes of plasmonic structures for the label-free imaging of cells: (1) gold films perforated with microscale patches of nanoscale holes, which can achieve 3D imaging by deconstructing interference patterns from structured beams of light and (2) gold pyramidal particles, which can be used to identify the spatial locations of specific biomarkers within cells.

NIH Spending Category:

Discipline: Materials Science

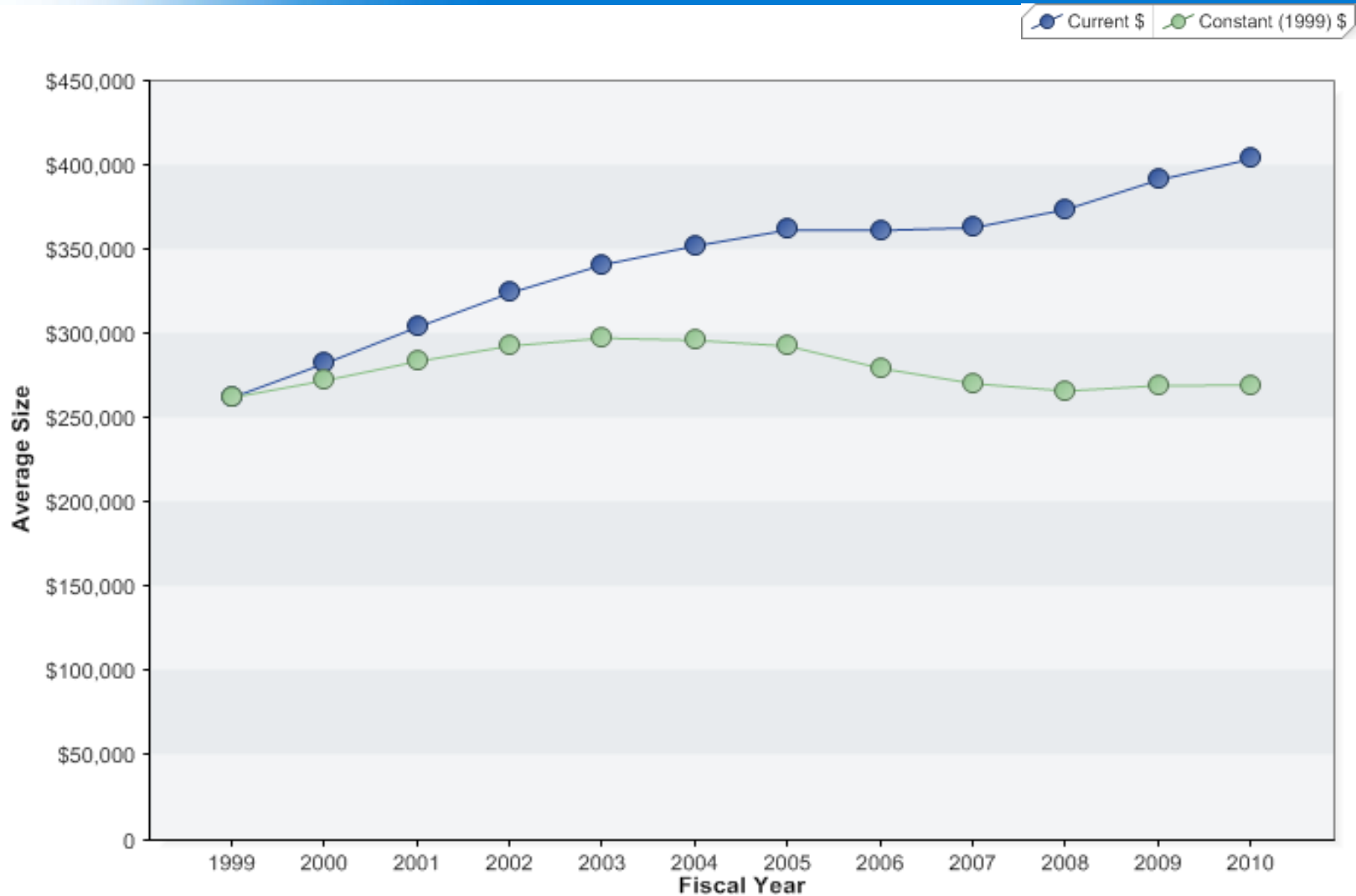


Research Project Grants Success rates of new (type 1) applications for targeted and untargeted research

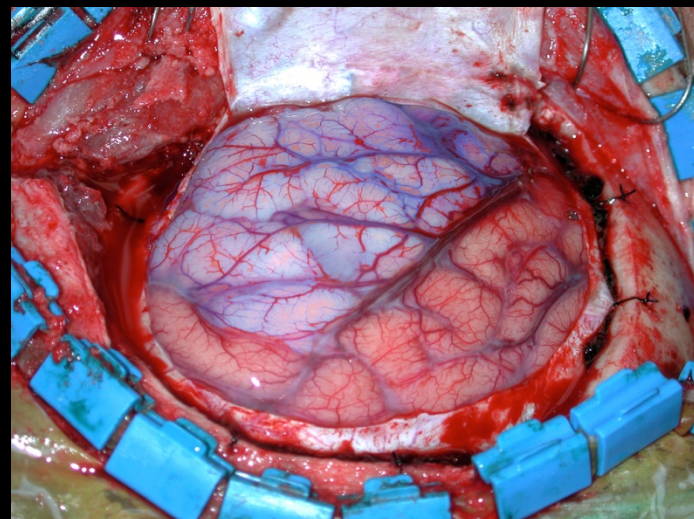
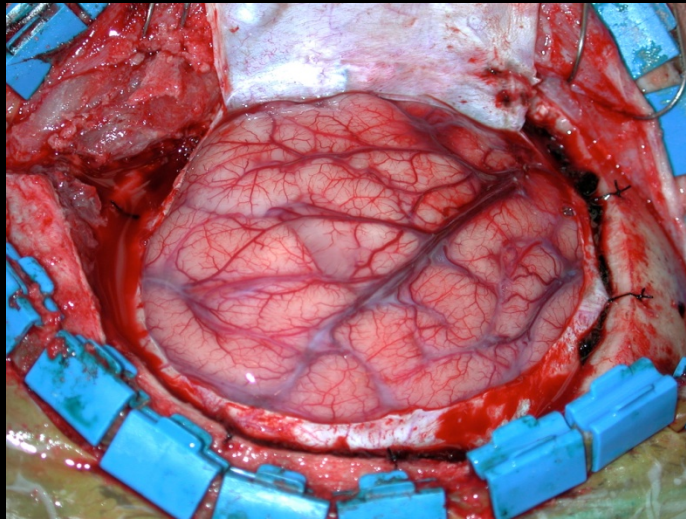
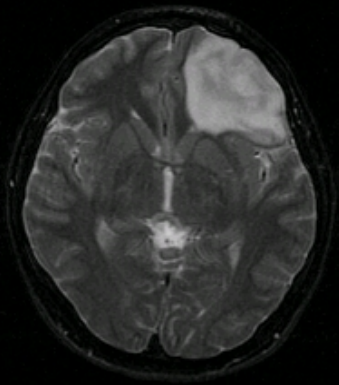




R01-Equivalent grants Average size



Goal: Intraoperative Visible Tumor Delineation by Dye Loaded Nanoparticles



Ph.D. Field of Study	Total Number of 2008 Ph.D.s	NIH-Supported Ph.D. Recipients	Percent of Doctorates in Field Supported by NIH
Physical Sciences	8,129	139	1.7%
<u>Chemistry</u>	2,247	85	3.8%
<u>Computer Sciences</u>	1,786	11	0.6%
<u>Mathematics</u>	1,400	12	0.9%
<u>Physics</u>	1,586	31	2.0%
Engineering	7,862	174	2.2%
Education	6,578	13	0.2%
Humanities	4,722	3	0.1%
Other Fields	2,914	17	0.6%
Neuroscience	880	359	40.8%

Pathway to Independence Program (K99/R00 - Kangaroo Award)

- ✓ US citizen/permanent residents or non-citizens on visas
- ✓ No more than 5 years of postdoctoral experience
- ✓ Must be in dependent position

K99 Dependent Phase

- 1-2 yrs mentored postdoctoral support
 - \$50K salary, \$20K research costs + 8% F&A

R00 Independent Phase

- 3 yrs -- contingent upon securing an independent research/faculty position
- \$249/yr total cost with full F& A

Pathway to Independence Program (K99/R00 - Kangaroo Award) – cont.

- NIBIB committed to 5 K99/R00 awards/yr
- 23 awards since 2007
- 9 successful transitions to R00 phase

Matthew J Allen, PhD

Assistant Professor

Department of Chemistry, Wayne State University

“Increasing the Utility of Contrast Agents for MRI”



		<u>BY-PRODUCTS</u>		<u>BATON ROUGE</u>				
<input type="checkbox"/>	5R00EB007129-04	INCREASING THE UTILITY OF CONTRAST AGENTS FOR MRI	ALLEN, MATTHEW J	WAYNE STATE UNIVERSITY	2010	NIBIB	NIBIB	\$247,499
<input type="checkbox"/>	5R00ES017177-04	ENZYME CATALYSIS OF TOLUENE DEGRADATION AND UNUSUAL DNA PHOTOPRODUCT REPAIR	LI, LEI	INDIANA UNIV-PURDUE UNIV AT INDIANAPOLIS	2010	NIEHS	NIEHS	\$248,997
<input type="checkbox"/>	4R00ES017476-02	MECHANISMS OF TRINUCLEOTIDE REPEAT EXPANSION VIA OXIDATIVE DNA DAMAGE AND REPAIR	LIU, YUAN	FLORIDA INTERNATIONAL UNIVERSITY	2010	NIEHS	NIEHS	\$249,000
<input type="checkbox"/>	5R00GM082983-04	INNOVATIVE TECHNOLOGIES FOR METABOLITE PROFILING AND NATURAL PRODUCTS DISCOVERY	CARLSON, ERIN ELIZABETH	INDIANA UNIVERSITY BLOOMINGTON	2010	NIGMS	NIGMS	\$246,234
<input type="checkbox"/>	4R00GM087306-03	ELUCIDATING CELLULAR SIGNALING FUNCTIONS OF DIPHOSPHOINOSITOL POLYPHOSPHATES	FIEDLER, DOROTHEA	PRINCETON UNIVERSITY	2010	NIGMS	NIGMS	\$248,999
<input type="checkbox"/>	5R00GM087533-03	NATURAL AND SYNTHETIC SMALL-MOLECULE MODULATORS OF DAUER DEVELOPMENT IN NEMATODES	BUTCHER, REBECCA A	UNIVERSITY OF FLORIDA	2011	NIGMS	NIGMS	\$224,100
<input type="checkbox"/>	4R00GM087550-03	IDENTIFYING MUTATIONS THAT PROMOTE MICROBIAL EVOLVABILITY	BARRICK, JEFFREY E	UNIVERSITY OF TEXAS AUSTIN	2011	NIGMS	NIGMS	\$249,000
<input type="checkbox"/>	4R00GM087551-02	TRANSITION METAL CATALYSIS AND METABOLIC ENGINEERING USING ARTIFICIAL METALLOENZY	LEWIS, JARED C	UNIVERSITY OF CHICAGO	2011	NIGMS	NIGMS	\$248,999
<input type="checkbox"/>	4R00GM088483-03	STRUCTURAL INTERACTIONS OF BACTERIAL ADHESIN WITH GLYCOSAMINOGLYCANS	WANG, XU	ARIZONA STATE UNIVERSITY-TEMPE CAMPUS	2011	NIGMS	NIGMS	\$234,914
<input type="checkbox"/>	5R00RR024105-04	POST-EXPRESSION ISOTOPE LABELING: NMR INSIGHTS INTO GLYCOPROTEIN STRUCTURE	MACNAUGHTAN, MEGAN ALANE	LOUISIANA STATE UNIV A&M COL BATON ROUGE	2010	NCRR	NCRR	\$243,986
<input type="checkbox"/>	5R00RR024367-03	NANOSCALE BIOMEMBRANE CHARACTERIZATION: MODEL SYSTEMS TO CELLS	SCHULTZ, ZACHARY	UNIVERSITY OF NOTRE DAME	2010	NCRR	NCRR	\$244,838
<input type="checkbox"/>	3R01AG020866-08S1	GIANT MITOCHONDRIA IN AGING	ARRIAGA, EDGAR A	UNIVERSITY OF MINNESOTA TWIN CITIES	2011	NIA	NIA	\$45,058
<input type="checkbox"/>	5R01AG027853-05	MECHANISM OF AMYLOID	ZAGORSKI, MICHAEL	CASE WESTERN RESERVE UNIVERSITY	2010	NIA	NIA	\$268,538

Mentored Quantitative Research Development Award (K25)

- Early-career investigators with **quantitative** backgrounds who are changing their focus to **biomedical** research.
- Quantitative (e.g., mathematics, statistics, economics, computer science) and engineering backgrounds

Brian S Caffo, PhD

Associate Professor

Department of Biostatistics, Johns Hopkins University

“Mentored Training Program in Quantitative Medical Imaging”



New Biomedical Frontiers at the Interface of the Life and Physical Sciences (R01) PAR-10-142

- NIBIB, NIGMS, NIAMS, NSF
- research that may create entirely new areas of biomedical investigation through bridging the physical and life/behavioral sciences
 - ‘accurate prediction of electrostatic interactions, solvent effects in aqueous biological systems, and trajectories of reactions’



Getting Started

- **Contact scientific program staff at the appropriate Institute**



<http://www.nibib.nih.gov/About/Directories>

**Read good applications before you
start**

Solicit and pay attention to criticism

- **Obtain Feedback**
 - From someone who has an NIH grant
- **Revised Applications**
 - Respond to ALL reviewer critiques
 - Put your ego aside

Use the web sites

The screenshot shows a Microsoft Internet Explorer browser window displaying the NIBIB website. The address bar shows <http://www.nibib.nih.gov/HomePage>. The website header includes navigation links for [Help](#), [Site Index](#), and [Staff Directories](#), along with a search bar. The main heading reads "National Institute of Biomedical Imaging and Bioengineering" with the text "NATIONAL INSTITUTES OF HEALTH U.S. DEPARTMENT OF HEALTH & HUMAN SERVICES" below it. A central banner features a photograph of a scientist in a lab coat holding a skull, alongside several small images representing various biomedical technologies. Below the banner, the NIBIB logo is displayed next to the tagline: "Improving health by leading the development and accelerating the application of biomedical technologies". A left sidebar contains a menu with links for [Research](#), [Funding](#), [Training](#), [Health & Education](#), [News & Events](#), [About NIBIB](#), and [Información en Español](#). The main content area is divided into two sections: "Research" and "Funding". The "Research" section includes links for [Labs at NIBIB \(Intramural\)](#), [Scientific Program Areas \(Extramural\)](#), [Biotechnology Resource Centers](#), [Quantum Grants](#), and [Resources for Researchers](#). The "Funding" section is currently empty. A "What's New" section on the right lists recent updates: "November 6 - Optical Imaging Program Progress Review Now Available" and "NIBIB Fifth Anniversary Symposium - June 1, 2007 Watch the Videocast". The browser's status bar at the bottom shows the current page is <http://www.nibib.nih.gov/Research/Intramural>.

Questions?