

DEPARTMENT OF HEALTH AND HUMAN SERVICES

NATIONAL INSTITUTES OF HEALTH

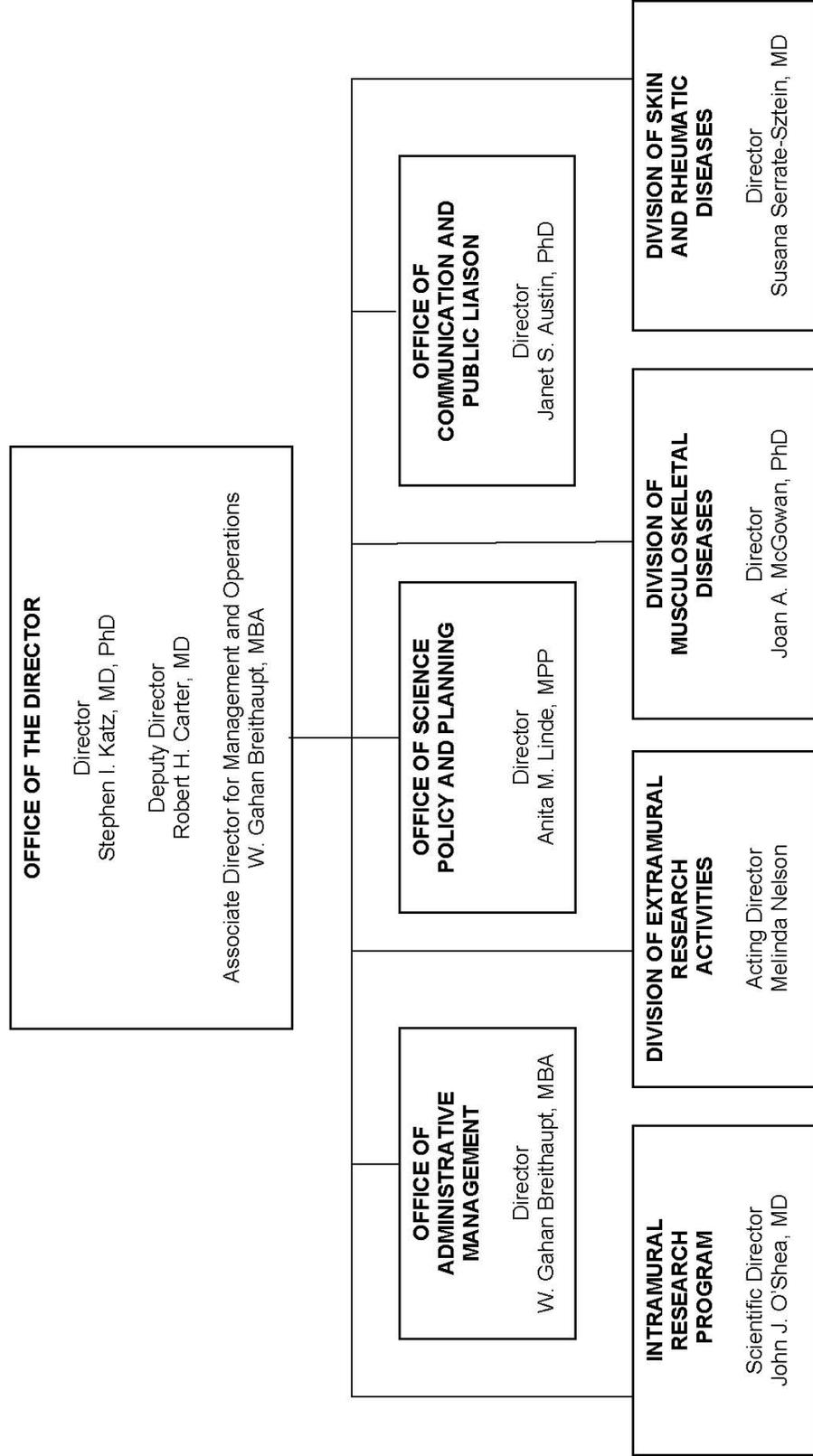
National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS)

<u>FY 2010 Budget</u>	<u>Page No.</u>
Organization chart.....	2
Appropriation language.....	3
Amounts available for obligation .....	4
Budget mechanism table.....	5
Budget authority by activity.....	6
Major changes in budget request.....	7
Summary of changes.....	8
Budget graphs .....	10
Justification narrative.....	11
Budget authority by object.....	21
Salaries and expenses.....	22
Authorizing legislation.....	23
Appropriations history.....	24
Detail of full-time equivalent employment (FTE).....	25
Detail of positions.....	26
New positions requested.....	27

**NATIONAL INSTITUTES OF HEALTH**

**National Institute of Arthritis and Musculoskeletal and Skin Diseases**

**Organizational Structure**



**NATIONAL INSTITUTES OF HEALTH**

National Institute of Arthritis and Musculoskeletal and Skin Diseases

For carrying out section 301 and title IV of the Public Health Services Act with respect to  
arthritis and musculoskeletal and skin diseases [\$524,872,000] *\$530,825,000*

(Department of Health and Human Services Appropriation Act, 2009)

**National Institutes of Health  
National Institute of Arthritis and Musculoskeletal and Skin Diseases**

**Amounts Available for Obligation 1/**

Source of Funding	FY 2008 Actual	FY 2009 Estimate	FY 2010 PB
Appropriation	\$517,629,000	\$524,872,000	\$530,825,000
Rescission	-9,043,000	0	0
Supplemental	2,705,000	0	0
Subtotal, adjusted appropriation	511,291,000	524,872,000	530,825,000
Real transfer under Director's one-percent transfer authority (GEI)	-866,000	0	0
Comparative transfer under Director's one-percent transfer authority (GEI)	866,000	0	0
Subtotal, adjusted budget authority	511,291,000	524,872,000	530,825,000
Unobligated balance, start of year	0	0	0
Unobligated balance, end of year	0	0	0
Subtotal, adjusted budget authority	511,291,000	524,872,000	530,825,000
Unobligated balance lapsing	-67,000	0	0
<b>Total obligations</b>	<b>511,224,000</b>	<b>524,872,000</b>	<b>530,825,000</b>

1/ Excludes the following amounts for reimbursable activities carried out by this account:  
 FY 2008 - \$702,000    FY 2009 Estimate - \$1,000,000    FY 2010 Estimate - \$1,000,000  
 Excludes \$68,015 Actual in FY 2008; Estimate \$100,000 in FY 2009 and Estimate \$100,000 in FY 2010 for royalties.

**NATIONAL INSTITUTES OF HEALTH**  
**National Institute of Arthritis and Musculoskeletal and Skin Diseases**  
(Dollars in Thousands)  
Budget Mechanism - Total

MECHANISM	FY 2008 Actual		FY 2009 Estimate		FY 2010 PB		Change	
	No.	Amount	No.	Amount	No.	Amount	No.	Amount
<b>Research Grants:</b>								
<b>Research Projects:</b>								
Noncompeting	758	\$241,710	756	\$253,336	721	\$246,855	(35)	-\$6,481
Administrative supplements	(28)	1,661	(28)	1,661	(28)	1,661	(0)	0
Competing:								
Renewal	70	28,420	66	27,491	73	30,940	7	3,449
New	172	48,683	162	47,092	179	53,000	17	5,908
Supplements	11	1,719	10	1,663	11	1,871	1	208
Competing	253	78,822	238	76,246	263	85,811	25	9,565
Subtotal, RPGs	1,011	322,193	994	331,243	984	334,327	(10)	3,084
SBIR/STTR	46	11,983	46	12,084	46	12,212	0	128
Subtotal, RPGs	1,057	334,176	1,040	343,327	1,030	346,539	(10)	3,212
<b>Research Centers:</b>								
Specialized/comprehensive	39	40,759	39	41,167	39	41,785	0	618
Clinical research	0	0	0	0	0	0	0	0
Biotechnology	0	0	0	0	0	0	0	0
Comparative medicine	0	0	0	0	0	0	0	0
Research Centers in Minority Institutions	0	0	0	0	0	0	0	0
Subtotal, Centers	39	40,759	39	41,167	39	41,785	0	618
<b>Other Research:</b>								
Research careers	158	19,031	158	19,602	158	19,896	0	294
Cancer education	0	0	0	0	0	0	0	0
Cooperative clinical research	0	0	0	0	0	0	0	0
Biomedical research support	0	0	0	0	0	0	0	0
Minority biomedical research support	0	0	0	0	0	0	0	0
Other	21	2,958	21	3,047	21	3,093	0	46
Subtotal, Other Research	179	21,989	179	22,649	179	22,989	0	340
<b>Total Research Grants</b>	<b>1,275</b>	<b>396,924</b>	<b>1,258</b>	<b>407,143</b>	<b>1,248</b>	<b>411,313</b>	<b>(10)</b>	<b>4,170</b>
<b>Research Training:</b>	<b>FTEs</b>		<b>FTEs</b>		<b>FTEs</b>			
Individual awards	64	2,927	65	3,006	65	3,036	0	30
Institutional awards	259	12,262	263	12,593	263	12,719	0	126
Total, Training	323	15,189	328	15,599	328	15,755	0	156
Research & development contracts (SBIR/STTR)	58	21,531	60	22,697	60	23,069	0	372
	(0)	(29)	(0)	(29)	(0)	(29)	(0)	(0)
	<b>FTEs</b>		<b>FTEs</b>		<b>FTEs</b>		<b>FTEs</b>	
Intramural research	135	52,915	135	54,132	138	54,944	3	812
Research management and support	91	24,732	91	25,301	93	25,744	2	443
Construction		0		0		0		0
Buildings and Facilities		0		0		0		0
Total, NIAMS	226	511,291	226	524,872	231	530,825	5	5,953

Includes FTEs which are reimbursed from the NIH Roadmap for Medical Research

**NATIONAL INSTITUTES OF HEALTH**  
**National Institute of Arthritis and Musculoskeletal and Skin Diseases**  
**BA by Program**  
(Dollars in thousands)

<u>Extramural Research</u> <u>Detail:</u>	FY 2006		FY 2007		FY 2008		FY 2008		FY 2009		FY 2010		Change	
	<u>FTEs</u>	<u>Amount</u>	<u>FTEs</u>	<u>Amount</u>	<u>FTEs</u>	<u>Amount</u>	<u>Comparable</u>	<u>Estimate</u>	<u>FTEs</u>	<u>Amount</u>	<u>FTEs</u>	<u>Amount</u>	<u>FTEs</u>	<u>Amount</u>
Arthritis and Rheumatic Diseases		\$139,329		\$135,318		\$119,670		\$119,909		\$123,171		\$124,470		1,299
Skin Biology and Diseases		64,202		66,783		59,808		59,928		61,558		62,207		649
Muscle Biology and Diseases		71,527		73,242		71,189		71,331		73,272		74,044		772
Musculoskeletal Biology and Diseases		74,394		90,877		116,720		116,954		120,134		121,402		1,268
Bone Biology and Diseases		83,443		66,210		65,391		65,522		67,304		68,014		710
<b>Subtotal, Extramural</b>		<b>432,895</b>		<b>432,430</b>		<b>432,778</b>		<b>433,644</b>		<b>445,439</b>		<b>450,137</b>		<b>4,698</b>
<b>Intramural research</b>	<b>133</b>	<b>51,075</b>	<b>131</b>	<b>50,862</b>	<b>135</b>	<b>52,915</b>	<b>135</b>	<b>52,915</b>	<b>135</b>	<b>54,132</b>	<b>138</b>	<b>54,944</b>	<b>3</b>	<b>812</b>
<b>Res. management &amp; support</b>	<b>78</b>	<b>23,613</b>	<b>84</b>	<b>24,000</b>	<b>91</b>	<b>24,732</b>	<b>91</b>	<b>24,732</b>	<b>91</b>	<b>25,301</b>	<b>93</b>	<b>25,744</b>	<b>2</b>	<b>443</b>
<b>TOTAL</b>	<b>211</b>	<b>507,583</b>	<b>215</b>	<b>507,292</b>	<b>226</b>	<b>510,425</b>	<b>226</b>	<b>511,291</b>	<b>226</b>	<b>524,872</b>	<b>231</b>	<b>530,825</b>	<b>5</b>	<b>5,953</b>

Includes FTEs which are reimbursed from the NIH Roadmap for Medical Research  
Reflects internal reorganization in FY 2008

## **Major Changes in the Fiscal Year 2010 Budget Request**

Major changes by budget mechanism and/or budget activity detail are briefly described below. Note that there may be overlap between budget mechanism and activity detail and these highlights will not sum to the total change for the FY 2010 budget request for NIAMS, which is +\$5.953 million more than the FY 2009 estimate, for a total of \$530.825 million.

Research Project Grants (+\$3.212 million; total \$346.539 million): NIAMS will support a total of 1,030 Research Project Grant (RPG) awards in FY 2010. Noncompeting awards will decrease by 35 awards and \$6.481 million. Competing RPGs will increase by 25 awards and \$9.565 million. The NIH budget policy for RPGs in FY 2010 is to provide an inflationary increase of 2% in noncompeting awards and allow a 2% increase in the average cost of competing RPGs. NIAMS will continue to support new investigators and to maintain an adequate number of competing RPGs. In addition, there will be increased emphasis on cancer research as it relates to NIAMS' mission areas.

Intramural Research (+\$0.812 million; total \$54.944 million): Intramural Research will receive an increase to help cover the costs of pay and other increases. NIAMS will continue to identify areas of potential savings within the Intramural Research Program which will allow us to achieve our program goals and accomplishments. As outlined in the Justification Narrative for the Intramural Research Program area, NIAMS will also pursue new opportunities in clinical and translational research.

**NATIONAL INSTITUTES OF HEALTH**  
**National Institute of Arthritis and Musculoskeletal and Skin Diseases**  
**Summary of Changes**

FY 2009 estimate		\$524,872,000	
FY 2010 estimated budget authority		530,825,000	
Net change		5,953,000	
CHANGES	2009 Current Estimate Base	Change from Base	
	FTEs	Budget Authority	FTEs Budget Authority
A. Built-in:			
1. Intramural research:			
a. Annualization of January 2009 pay increase			
		\$20,006,000	\$239,000
b. January FY 2010 pay increase			
		20,006,000	300,000
c. Zero less days of pay			
		20,006,000	0
d. Payment for centrally furnished services			
		8,897,000	178,000
e. Increased cost of laboratory supplies, materials, and other expenses			
		25,229,000	441,000
Subtotal		1,158,000	
2. Research management and support:			
a. Annualization of January 2009 pay increase			
		\$11,618,000	\$139,000
b. January FY 2010 pay increase			
		11,618,000	174,000
c. Zero less days of pay			
		11,618,000	0
d. Payment for centrally furnished services			
		4,302,000	86,000
e. Increased cost of laboratory supplies, materials, and other expenses			
		9,381,000	173,000
Subtotal		572,000	
Subtotal, Built-in		1,730,000	

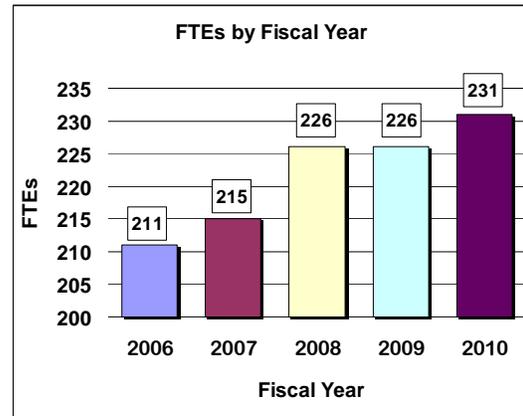
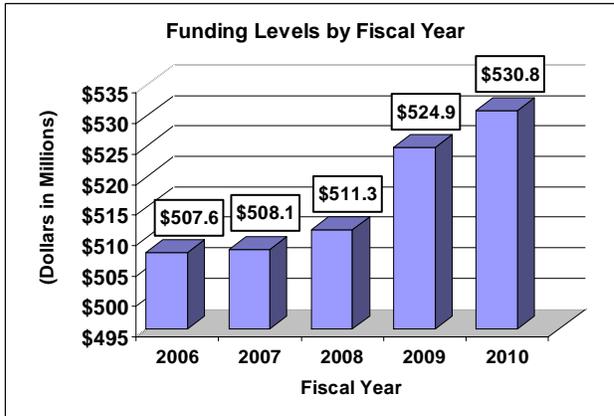
**NATIONAL INSTITUTES OF HEALTH**  
**National Institute of Arthritis and Musculoskeletal and Skin Diseases**

**Summary of Changes--continued**

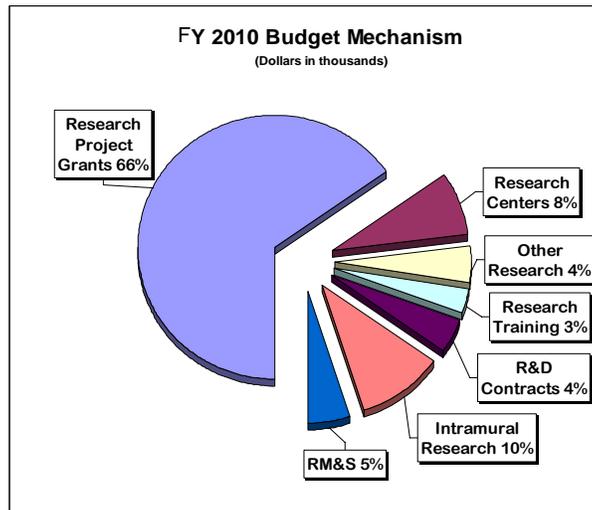
CHANGES	2009 Current Estimate Base		Change from Base	
	No.	Amount	No.	Amount
<b>B. Program:</b>				
1. Research project grants:				
a. Noncompeting	756	\$254,997,000	(35)	(\$6,481,000)
b. Competing	238	76,246,000	25	9,565,000
c. SBIR/STTR	46	12,084,000	0	128,000
Total	1,040	343,327,000	(10)	3,212,000
2. Research centers	39	41,167,000	0	618,000
3. Other research	179	22,649,000	0	340,000
4. Research training	328	15,599,000	0	156,000
5. Research and development contracts	60	22,697,000	0	372,000
Subtotal, extramural				4,698,000
6. Intramural research	<u>FTEs</u> 135	54,132,000	<u>FTEs</u> 3	(346,000)
7. Research management and support	91	25,301,000	2	(129,000)
8. Construction		0		0
9. Buildings and Facilities		0		0
Subtotal, program		524,872,000		4,223,000
Total changes	226		5	5,953,000

## Fiscal Year 2010 Budget Graphs

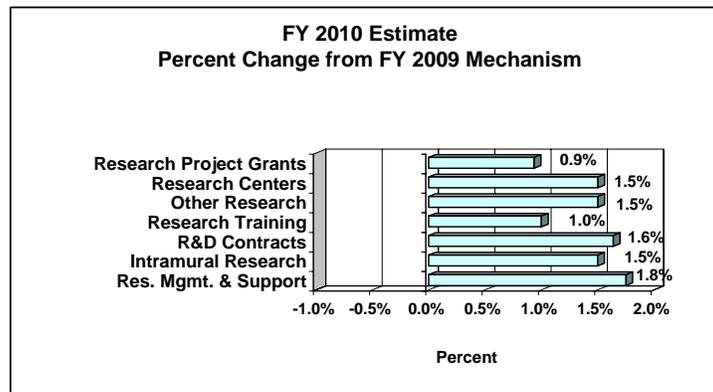
### History of Budget Authority and FTEs:



### Distribution by Mechanism:



### Change by Selected Mechanisms:



**Justification of Budget Request  
National Institute of Arthritis and Musculoskeletal and Skin Diseases**

Authorizing Legislation: Section 301 and title IV of the Public Health Service Act, as amended.

	FY 2008 <u>Appropriation</u>	FY 2009 <u>Omnibus</u>	FY 2009 Recovery <u>Act</u>	FY 2010 President's <u>Budget</u>	FY 2010 +/- 2009 <u>Omnibus</u>
BA	\$511,291,000	\$524,872,000	\$132,726,000	\$530,825,000	+\$5,953,000
FTE	226	226	--	231	+5

This document provides justification for the Fiscal Year (FY) 2010 activities of the National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS), including HIV/AIDS activities. Details of the FY 2010 HIV/AIDS activities are in the "Office of AIDS Research (OAR)" Section of the Overview. Details on the Common Fund are located in the Overview, Volume One. Program funds are allocated as follows: Competitive Grants/Cooperative Agreements; Contracts; Direct Federal/Intramural and Other.

In FY 2009, a total of \$132,726,000 American Recovery and Reinvestment Act (ARRA) funds were transferred from the Office of the Director. These funds will be used to support scientific research opportunities that help support the goals of the ARRA. The ARRA allows NIH to execute these funds via any NIH funding mechanism. Funds are available until September 30, 2010. These funds are not included in the FY 2009 Omnibus amounts reflected in this document.

**DIRECTOR'S OVERVIEW**

**Institute Mission**

The National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS) supports a broad range of research, training, and information dissemination activities related to arthritis, musculoskeletal, and skin diseases. Some are rare disorders, but many are very common, while all have a major influence on the quality of people's lives. Diseases addressed by NIAMS affect individuals of all ages, of all racial and ethnic backgrounds, and across all economic strata; many disproportionately affect women and minorities. Over the years, NIAMS-funded research teams have made significant progress in uncovering the causes of many disorders of the bones, muscles, joints, and skin.

**Recent Progress**

Seeking to build on a formal evaluation of the success of postdoctoral trainees who received support through the Institute's extramural research training and career

development awards program, the NIAMS invited leading extramural researchers who oversee training programs and mentor early-stage investigators to participate in the NIAMS FY 2008 scientific planning retreat. Discussion focused on ways to change the review criteria to better encourage and reward integrated and interdepartmental approaches, foster innovation, and support interdisciplinary mentorship in applications. Similar to other NIH training and career development activities, the NIAMS program is intended to help ensure that a diverse and highly trained workforce is available to assume leadership roles related to biomedical and behavioral research. To this end, the NIAMS is particularly interested in encouraging applicants to engage in more diverse and innovative training experiences.

Also at the FY 2008 scientific planning retreat, the NIAMS explored approaches for managing its extramural centers programs to enhance its success, productivity, and efficiency. Centers grants are a significant NIAMS investment that sustains core infrastructure and translational and multidisciplinary clinical research—activities that may not be as easily supported through traditional, investigator-initiated project funding.

On the NIH campus, the NIAMS intramural research program has taken a leadership role in the NIH Center for Human Immunology, Autoimmunity, and Inflammation. Begun in 2008, the Center fosters an integrated basic, clinical, epidemiologic, and educational approach to understanding, preventing, and treating diseases associated with defective immune or inflammatory responses.

On behalf of the communications and public liaison offices across the NIH, the NIAMS continues to coordinate activities for the Trans-NIH American Indian and Alaska Native Health Communications and Information Workgroup. The Workgroup is partnering with the Indian Health Service for quarterly distribution of NIH fact sheets, posters, and other health promotion materials to approximately 1700 community health representatives.

## **Future Directions**

NIAMS plans for FY 2010 include encouraging investigators to design experiments that will use existing resources. One effort will focus on enhancing cost-effective studies based on resources developed through its considerable investment in large clinical trials. While NIAMS continues an FY 2008 initiative to promote genome-wide association analyses of well-characterized data sets, it also is considering recommendations from a spring 2008 roundtable on how to further leverage resources from and translate initial findings of genetic association into the biological insights that could lead to predictive, diagnostic, and therapeutic advances. Researchers from the NIAMS intramural research program and elsewhere have made considerable progress in identifying genes and genetic variants that influence the risks of individuals for developing specific diseases. Continued investment in this field is expected to furnish new insights into the molecular mechanisms of disease and lead to improved diagnosis and treatment.

The NIAMS also expects to continue to expand its tissue engineering and regenerative medicine (TE/RM) portfolio. Building on the FY 2007 scientific planning retreat and subsequent meetings with members of professional societies, the NIAMS reached out to small businesses that could bring musculoskeletal and skin TE/RM research into the market place. The NIAMS also expanded an FY 2007 effort to award grants to teams of TE/RM researchers and developmental biologists, with the expectation that comparing the repair of mature tissues with the formation of musculoskeletal tissues and skin during development and growth could yield insights that can be translated into TE/RM therapeutic approaches.

Consistent with the NIH policy to double NIH-wide cancer research spending, NIAMS plans to increase its efforts in these areas by supporting investigator-initiated research projects across the United States. Specific areas of interest include the effects of anti-cancer therapies on bone quality and muscle strength, and cellular mechanisms associated with autoimmune diseases and cancer. Furthermore, NIAMS staff will continue to explore partnerships with National Cancer Institute colleagues to support high quality projects that relate directly to diseases and organ systems within the NIAMS mission, particularly the bones and the skin.

Recognizing that the scale and complexity of today's biomedical research problems demand that scientists move beyond their individual disciplines and explore new organizational models for team science, the NIAMS initiated a new research supplement in FY 2008 to promote interdisciplinary partnerships. These awards provided up to one year of research supplements to active NIAMS grants to establish collaborations among groups of investigators with expertise in specific NIAMS mission-relevant areas that develop new interdisciplinary collaborations among funded projects in different disciplines. Because the initial round of supplements generated productive collaborations, the NIAMS reissued this funding opportunity for FY 2010 with an expanded scientific scope.

Building on a Memorandum of Understanding that the NIAMS spearheaded in FY 2007 on behalf of the NIH in partnership with the National Aeronautics and Space Administration (NASA), the NIAMS continues to lead a trans-NIH effort to encourage biomedical researchers to develop projects that could be conducted in the microgravity environment of the International Space Station (ISS). The ISS provides a unique setting where researchers can explore fundamental questions about human health issues, including how the body heals itself, fights infection, or develops diseases such as osteoporosis. When the ISS becomes fully operational in 2011, the U.S. segment will have laboratory space, data processing capabilities, and crew time available for experiments such as those that could be designed by the biomedical research community.

**Overall Budget Policy:** Investigator-initiated research project grants and research conducted by new scientists continue to be the Institute's highest priorities. The NIAMS will continue its policy of not accepting unsolicited applications for new program project

grants, and competing continuation applications for program project grants will only be considered for a second competing award for a total project period of up to 10 years. As in previous years, the NIAMS will reserve a portion of its budget to support high priority research or meritorious applications beyond the established payline. Particular priority will be given to new investigators and first time renewals.

## **Program Descriptions and Accomplishments**

**Arthritis and Rheumatic Diseases:** The goals of this program are to advance high-quality basic, translational, and clinical biomedical and biopsychosocial research to treat, cure, and prevent arthritis and rheumatic diseases. It utilizes new insights in the fields of genetics, genomics, proteomics, and imaging. The NIAMS is committed to pursuing new opportunities that identify risk factors for these disorders, to enhance disease prediction, and advance prevention strategies.

In FY 2008, the NIAMS sponsored a roundtable meeting with outside experts to address the needs and opportunities for developing future generations of physician scientists who will play a critical role in rheumatic diseases research. The Institute also organized a session at its annual scientific retreat to explore critical issues related to chronic pain, a common complication of many rheumatic diseases. In addition, NIAMS continues to lead the Lupus Federal Working Group, which coordinates Federal efforts in lupus research and education.

### **Portrait of a Program: Future Directions in Lupus Research**

FY 2009 Level: \$34.353 million  
FY 2010 Level: \$34.731 million  
Change: \$ 0.378 million

Systemic lupus erythematosus (SLE, or lupus) is an inflammatory, disabling, and sometimes deadly autoimmune disease that affects multiple organ systems. Approximately 240,000 Americans have lupus, and female patients outnumber male patients, nine-to-one. The search for effective treatments for this complex disorder requires a cross-disciplinary approach, and the NIAMS has led the collaboration of multiple NIH Institutes and Centers, as well as other federal agencies and voluntary organizations, through the Lupus Federal Working Group and the development of a plan to identify opportunities, priorities, and needs in lupus research. The report, "The Future Directions of Lupus Research," was released in August, 2007, in response to the FY2005 House Appropriations Committee report language, directing the NIH to develop a plan to guide the nation's investment in lupus research. The main themes of the plan include causes, mechanisms of disease, epidemiology, and diagnosis and treatment. NIAMS-supported researchers have made significant progress recently in understanding the genetic underpinnings of human lupus. In 2008, they reported several ground-breaking discoveries of lupus susceptibility genes that set the stage for developing targeted therapies. NIAMS-supported scientists have also created animal models recently, for studying disease pathways and testing therapeutic approaches. In addition, they have identified several lupus biomarkers, which are of tremendous interest, for their use in precise diagnosis of the disease, identification of disease severity and progression, and response to treatment. The Lupus Biomarkers Consortium includes representatives from federal agencies, industry, and the academic research community, and NIAMS aided in the development of the Consortium's current plans for validation of candidate biomarkers. With the identification of disease pathways, biomarkers, and therapeutic targets, the NIAMS is poised for future efforts in developing diagnostic tools and new treatments.

Budget Policy: The FY 2010 budget estimate for this program is \$124.470 million, an increase of \$1.299 million or 1.1 percent over the FY 2009 estimate. NIAMS plans for FY 2010 include continued support of pain research, as it relates to arthritis and rheumatic diseases, including active participation in two trans-NIH initiatives: the NIH Pain Consortium and the NIH Roadmap's Patient-Reported Outcomes Measurement Information System. The NIAMS will also support ancillary studies to larger clinical projects, such as analysis of patient samples from parent clinical trials, to understand molecular mechanisms and therapeutic responses for the range of diseases in the Institute's mission, including rheumatic autoimmune diseases. The Institute will enhance recent advances in genome-wide association studies (GWAS) in rheumatoid arthritis and lupus through an initiative for the replication of GWAS results and fine-mapping of identified gene associations, which will inform further research in disease susceptibility and therapeutic development.

**Musculoskeletal Biology and Diseases:** The program focuses on understanding the fundamental biology of tissues that constitute the musculoskeletal system, and on translating and applying this knowledge to a variety of diseases and conditions including osteoarthritis. It studies the causes and treatment of acute and chronic injuries -- including carpal tunnel syndrome, repetitive stress injury, and low back pain. The program supports the development of new technologies, such as methods for imaging bone and cartilage to improve the diagnosis and treatment of skeletal disorders, or to facilitate repair of damage caused by trauma to otherwise healthy musculoskeletal tissue.

In FY 2008, the NIAMS further integrated its basic and clinical research portfolios on cartilage and connective tissue. It also solicited applications for three Core Centers for Musculoskeletal Biology and Medicine, an ongoing program to improve efficiency and accelerate the pace of musculoskeletal research by providing shared facilities and services to groups of investigators. Another activity of note includes a June 2008 meeting to highlight the accomplishments of the Osteoarthritis Initiative -- a public-private partnership to provide an unparalleled state-of-the-art database showing both the natural progression of osteoarthritis and information on its risk factors -- and to discuss plans for a possible extension of the effort.

Budget Policy: The FY 2010 budget estimate for this program is \$121.402 million, an increase of \$1.268 million or 1.1 percent over the FY 2009 estimate. Program plans for FY 2010 include a new effort to encourage fundamental research on connective tissue on repair mechanisms of tendons, ligaments, and their interfaces with bone and muscle. The NIAMS also intends to promote the use of the Osteoarthritis Initiative data and images by fostering collaborations between the broader scientific community and Osteoarthritis Initiative researchers.

**Bone Biology and Diseases:** The program covers a broad spectrum of research designed to better understand genetic and cellular mechanisms involved in the build-up

and break down of bone. It studies regulation of bone remodeling; bone formation, bone resorption, and mineralization; and effects of hormones, growth factors, and cytokines on bone cells. It supports several large epidemiologic cohorts for characterization of the natural history of osteoporosis, and for identification of genetic and environmental risk factors that contribute to bone disease.

In FY 2008 and 2009, the NIAMS undertook several activities to unite members of the bone research community, health care providers, and members of the public. In addition to funding conferences where investigators discussed recent basic advances that have therapeutic relevance to a variety of bone diseases, the Institute collaborated with patient and professional societies as an advisor to the 2008 Summit for a National Action Plan for Bone Health, an effort to build on and disseminate key messages from the Surgeon General's 2004 Report on Bone Health and Osteoporosis. The NIAMS continues to organize the Federal Working Group on Bone Diseases, which provides a forum for NIH components and other government agencies to share information on bone-related research.

**Portrait of a Program: Genome-Wide Association Studies**

FY 2009 Level: \$10.100 million

FY 2010 Level: \$10.200 million

Change: \$ 0.100 million

Many health problems are influenced by complex effects originating in regions throughout the human genome. Over the last few years, the ability of genome-wide association approaches to home in on gene variants related to disease risk has matured from an intriguing concept to a widely used scientific tool. NIAMS-funded researchers, for example, recently have discovered clues about the genetic underpinnings of risks for alopecia areata, ankylosing spondylitis, rheumatoid arthritis, and systemic lupus erythematosus. Other studies have provided valuable information about locations of genes that convey disease risk, but have not pinpointed discrete sequences. And, for other conditions such as Behcet's disease, sample collection for genomic analyses is underway. NIAMS plans for FY 2010 include encouraging researchers to capitalize on these activities by identifying individual gene variations responsible for a disease or trait. Insights into specific molecular mechanisms of disease that fine-mapping studies will offer ultimately are expected to improve diagnosis and treatment.

Genome-wide association studies of continuously variable traits, such as bone mass, present special challenges. Bone mass, while closely related to fracture risk, does not lend itself readily to a dichotomy between people who are at risk of fracture and those who have strong, healthy bones. Over the years, NIAMS-funded investigators have recruited thousands of people into studies where, as a matter of protocol, their bone mineral density and other relevant clinical parameters (including the incidence of fractures) have been characterized rigorously. If high-density genotype information can be added to the rich phenotypic data sets, these cohorts could constitute a valuable resource for studies to identify genetic risk factors, as well as new targets for therapeutic intervention. To that end, the NIAMS is exploring ways in which it can integrate genomic information about its study populations and encourage researchers to analyze the data.

Budget Policy: The FY 2010 budget estimate for this program is \$68.014 million, an increase of \$710 thousand or 1.1 percent over the FY 2009 estimate. Program plans for FY 2010 include continued support of several epidemiologic studies of fracture risk

in women and men—the Osteoporotic Fractures in Men study (Mr. OS), the Framingham Osteoporosis Study and the Rochester Epidemiology Osteoporosis Study—which have provided much of what is known about the medical and demographic characteristics that are associated with low bone mass and potential fracture risk. The NIAMS plans to build upon the findings of these and other large population study samples by encouraging researchers to apply the data to genome-wide association studies of bone mass and fracture risk and by expanding access for additional studies through the NIH-wide genotype-phenotype database dbGaP.

**Muscle Biology and Diseases:** The program supports a wide range of basic, translational, and clinical research projects in skeletal muscle biology and diseases. It focuses on fundamental biology of muscle development, physiology, and muscle imaging. Its overarching objective is to advance the understanding of, and, ultimately, prevent and treat the muscular dystrophies, inflammatory myopathies, muscle ion channel diseases, and muscle disorders such as disuse atrophy and age-related loss of muscle mass.

Program activities in FY 2008 included funding a new Senator Paul D. Wellstone Muscular Dystrophy Cooperative Research Center. The Institute also cosponsored a meeting to facilitate information exchange regarding research progress in basic biology of muscle and therapeutics for muscle diseases, and continues to collaborate with the National Institute of Neurological Disorders and Stroke on solicitations to encourage translational research on muscular dystrophies. One such initiative is a new Cooperative Program in Translational Research for Neuromuscular Disease.

Budget Policy: The FY 2010 budget estimate for this program is \$74.044 million, an increase of \$772 thousand or 1.1 percent over the FY 2009 estimate. For FY 2010, the program plans to recommit to an ongoing effort to support training and career development in muscular dystrophies including, but not limited to, Duchenne, myotonic, facioscapulohumeral, and congenital disease. As clinical investigators are sorely needed to translate an ever increasing number of basic research findings into medical applications, the Institute will emphasize its interest in supporting junior investigators who have clinical experience. The NIAMS also expects to continue to promote basic and clinical research on the mechanisms of muscular dystrophies, characterization of disease phenotypes, management of disease complications, and development of new therapies. Other FY 2010 activities include continued funding for the Senator Paul D. Wellstone Muscular Dystrophy Cooperative Research Centers, which were awarded in FY 2005 and FY 2008. Furthermore, the NIAMS remains committed to supporting research on non-dystrophic skeletal muscle diseases such as channelopathies and inflammatory and mitochondrial myopathies, and on muscle wasting resulting from disuse or systemic diseases.

**Skin Biology and Diseases:** This program supports a broad portfolio of basic, translational, and clinical research in skin, including work on the developmental and molecular biology of skin, the study of skin as an immune organ, and the genetics of

skin diseases. The Institute is pursuing opportunities in developing artificial skin, and imaging technologies for diagnosis and tracking progression of skin diseases.

In FY 2008, the Institute sponsored a roundtable discussion with outside experts on genome-wide association studies, to ensure the potential of this new scientific approach is realized in the NIAMS mission areas, including skin diseases. It also organized a session on gene therapy at its annual scientific retreat, to explore opportunities for advancing this area to improve future treatments for skin diseases and other disorders.

Budget Policy: The FY 2010 budget estimate for this program is \$62.207 million, an increase of \$649 thousand or 1.1 percent over the FY 2009 estimate. NIAMS plans for FY 2010 include continued support for studies focused on the repair of mature skin, and the formation of skin during development and growth, which will contribute to the translation of laboratory discoveries into novel therapeutic approaches. It will continue to invest in research on molecular mechanisms underlying certain skin cancers, including the consequences of exposure to ultraviolet radiation. In addition, the Institute will stimulate tissue engineering and regenerative medicine projects in small business endeavors, which will promote the migration of research findings in tissue engineering and regenerative medicine to clinical applications, scale-up, and commercialization. The NIAMS also plans to explore opportunities to enhance gene therapy trials to treat skin diseases.

**Intramural Research Program:** The mission of this program is to conduct innovative basic, translational, and clinical research relevant to the health concerns of the Institute, and to provide training for investigators interested in related careers. The program conducts clinical studies on the genetics, etiology, pathogenesis, and treatment of a variety of rheumatic, autoimmune, inflammatory, joint, skin, and muscle diseases.

Over the past year, the program has continued to add clinical staff with expertise in pediatric rheumatology, an area that remains a high priority for the Institute. In FY 2008, the Institute co-sponsored an international conference on autoinflammatory diseases, including Behcet's disease, to help shape the development of a research program focused on the application of current technology to better understand the origin and development of these disorders. In addition, NIAMS is playing a leadership role in the new multidisciplinary, trans-NIH Center for Human Immunology, Autoimmunity, and Inflammation, which will bring together scientists from several NIH institutes who are using common approaches to study multiple disease systems.

Budget Policy: The FY 2010 budget estimate for this program is \$54.944 million, an increase of \$812 thousand or 1.5 percent over the FY 2009 estimate. NIAMS plans for FY 2010 include a continued focus on translational research, in order to facilitate patient-oriented studies in the areas of arthritis, musculoskeletal, and skin diseases, including their genetic, inflammatory, and immune mechanisms. NIAMS will also continue its commitment to multidisciplinary training of rheumatology research fellows, including interactions with other NIH intramural training programs with common

scientific interests, to strengthen the pipeline of highly qualified physician-scientists in this field. The launch of the trans-NIH Center for Human Immunology, Autoimmunity, and Inflammation will offer cross-training of fellows in multiple fields, towards the development of the new field of clinical immunology. The Institute's intramural research program also anticipates building upon its recent ground-breaking, collaborative studies, to uncover more information on the genetic underpinnings of autoinflammatory diseases, such as Behcet's disease, that can broaden the knowledge base needed to identify therapeutic targets.

#### **Portrait of a Program: NIAMS Intramural Research Program**

FY 2009 Level: \$54.132 million

FY 2010 Level: \$54.944 million

Change: \$ 0.812 million

The NIAMS Intramural Research Program has pioneered a number of clinical and translational research successes during the Institute's history, including ground-breaking work on the genetic underpinnings of chronic, autoimmune, inflammatory diseases. The NIAMS has also conducted landmark translational research to understand and treat debilitating autoinflammatory diseases, such as neonatal onset multisystem inflammatory disease (NOMID) and familial Mediterranean fever. The researchers in the Intramural Research Program have also made widely-recognized, fundamental discoveries in autoimmunity, which will contribute to the development of new therapies. The NIAMS will continue to enhance its program in clinical and translational research in the Institute's mission. The patients with known and as-yet-undiagnosed autoinflammatory diseases are seen frequently at the NIH Clinical Research Center, and its unique clinical and laboratory resources, combined with the Institute's ability to apply cutting-edge basic research approaches, position the NIAMS to continue its success in scientific breakthroughs in this group of diseases. This focus will advance the medical research community's ability to diagnose and treat these specific conditions, and increase general understanding of inflammation. A 2008 conference organized by the NIAMS, the National Institute of Allergy and Infectious Diseases, and NIH Office of Rare Diseases brought together scientists and clinicians to discuss new therapies for three rare, autoinflammatory disorders: chronic recurrent osteomyelitis (CRMO), synovitis, acne, pustulosis, hyperostosis, and osteitis (SAPHO) syndrome, and Behcet's disease, which is inflammation of the blood vessels that may result in mouth and skin sores, arthritis, or blood clots. Building on insights from this meeting, the NIAMS will pursue research projects to improve the treatment of such autoinflammatory diseases through genome-wide association studies that can broaden the knowledge base needed to identify therapeutic targets.

**Research Management and Support (RMS):** NIAMS' RMS supports the scientific, administrative management, and information technology expenses associated with day-to-day operations. It supports long-term investments in the research enterprise, including the review and financial management of applications for grants and contracts, and dissemination of research results to the American public. In FY 2008, the Institute managed more than 1,275 research grants and centers, as well as 58 research and development contracts and 323 individual and institutional full-time research training positions. NIAMS supports 510 clinical research studies, including 90 clinical trials.

The NIAMS is developing a new Long-Range Plan for FY 2010-2014 to provide a broad outline of scientific opportunities and needs, and to guide the Institute's priority-setting process. In early FY 2009, the NIAMS solicited input and guidance about aspects of the

five extramural program areas, noted above, that the NIAMS should highlight in the new plan. To ensure that the diverse interests of the Institute's constituents were represented, the NIAMS held several roundtable meetings with researchers, healthcare providers, and patient advocates, and used a Request for Comments to encourage all interested persons to provide input through the NIAMS Web site.

Budget Policy: The FY 2010 budget estimate for this program is \$25.744 million, an increase of \$443 thousand or 1.7 percent over the FY 2009 estimate. NIAMS plans for FY 2010 include activities in support of NIH-wide efforts to enhance the peer review system. It will continue to develop and maintain accurate, science-based resources and health information for patients, health care providers, and the general public on numerous topics, including the effects some cancer therapies can have on bone health. The Institute also will continue to sponsor roundtable discussions and a scientific retreat with extramural investigators and lay representatives to inform the research priority-setting and strategic planning process.

**NATIONAL INSTITUTES OF HEALTH**  
**National Institute of Arthritis and Musculoskeletal and Skin Diseases**

**Budget Authority by Object**

	FY 2009 Estimate	FY 2010 PB	Increase or Decrease
Total compensable workyears:			
Full-time employment	226	231	5
Full-time equivalent of overtime and holiday hours	0	0	0
Average ES salary	\$179,605	\$184,274	\$4,669
Average GM/GS grade	11.5	11.6	0.1
Average GM/GS salary	\$86,447	\$88,962	\$2,515
Average salary, grade established by act of July 1, 1944 (42 U.S.C. 207)	\$75,872	\$77,845	\$1,973
Average salary of ungraded positions	120,496	123,578	3,082
<b>OBJECT CLASSES</b>	<b>FY 2009 Estimate</b>	<b>FY 2010 Estimate</b>	<b>Increase or Decrease</b>
Personnel Compensation:			
11.1 Full-time permanent	\$14,004,000	\$14,690,000	\$686,000
11.3 Other than full-time permanent	7,585,000	7,958,000	373,000
11.5 Other personnel compensation	547,000	574,000	27,000
11.7 Military personnel	247,000	259,000	12,000
11.8 Special personnel services payments	2,925,000	3,069,000	144,000
<b>Total, Personnel Compensation</b>	<b>25,308,000</b>	<b>26,550,000</b>	<b>1,242,000</b>
12.0 Personnel benefits	5,975,000	6,268,000	293,000
12.2 Military personnel benefits	341,000	358,000	17,000
13.0 Benefits for former personnel	0	0	0
<b>Subtotal, Pay Costs</b>	<b>31,624,000</b>	<b>33,176,000</b>	<b>1,552,000</b>
21.0 Travel and transportation of persons	757,000	718,000	(39,000)
22.0 Transportation of things	145,000	140,000	(5,000)
23.1 Rental payments to GSA	0	0	0
23.2 Rental payments to others	0	0	0
23.3 Communications, utilities and miscellaneous charges	645,000	617,000	(28,000)
24.0 Printing and reproduction	75,000	69,000	(6,000)
25.1 Consulting services	830,000	771,000	(59,000)
25.2 Other services	4,300,000	4,103,000	(197,000)
25.3 Purchase of goods and services from government accounts	45,146,000	45,631,000	485,000
25.4 Operation and maintenance of facilities	265,000	248,000	(17,000)
25.5 Research and development contracts	14,179,000	14,510,000	331,000
25.6 Medical care	233,000	225,000	(8,000)
25.7 Operation and maintenance of equipment	1,262,000	1,217,000	(45,000)
25.8 Subsistence and support of persons	0	0	0
<b>25.0 Subtotal, Other Contractual Services</b>	<b>66,215,000</b>	<b>66,705,000</b>	<b>490,000</b>
26.0 Supplies and materials	4,597,000	4,432,000	(165,000)
31.0 Equipment	4,694,000	4,522,000	(172,000)
32.0 Land and structures	0	0	0
33.0 Investments and loans	0	0	0
41.0 Grants, subsidies and contributions	416,120,000	420,446,000	4,326,000
42.0 Insurance claims and indemnities	0	0	0
43.0 Interest and dividends	0	0	0
44.0 Refunds	0	0	0
<b>Subtotal, Non-Pay Costs</b>	<b>493,248,000</b>	<b>497,649,000</b>	<b>4,401,000</b>
<b>Total Budget Authority by Object</b>	<b>524,872,000</b>	<b>530,825,000</b>	<b>5,953,000</b>

Includes FTEs which are reimbursed from the NIH Roadmap for Medical Research

**NATIONAL INSTITUTES OF HEALTH**  
**National Institute of Arthritis and Musculoskeletal and Skin Diseases**

**Salaries and Expenses**

OBJECT CLASSES	FY 2009 Estimate	FY 2010 PB	Increase or Decrease
<b>Personnel Compensation:</b>			
Full-time permanent (11.1)	\$14,004,000	\$14,690,000	\$686,000
Other than full-time permanent (11.3)	7,585,000	7,958,000	373,000
Other personnel compensation (11.5)	547,000	574,000	27,000
Military personnel (11.7)	247,000	259,000	12,000
Special personnel services payments (11.8)	2,925,000	3,069,000	144,000
<b>Total Personnel Compensation (11.9)</b>	<b>25,308,000</b>	<b>26,550,000</b>	<b>1,242,000</b>
Civilian personnel benefits (12.1)	5,975,000	6,268,000	293,000
Military personnel benefits (12.2)	341,000	358,000	17,000
Benefits to former personnel (13.0)	0	0	0
<b>Subtotal, Pay Costs</b>	<b>31,624,000</b>	<b>33,176,000</b>	<b>1,552,000</b>
Travel (21.0)	757,000	718,000	(39,000)
Transportation of things (22.0)	145,000	140,000	(5,000)
Rental payments to others (23.2)	0	0	0
Communications, utilities and miscellaneous charges (23.3)	645,000	617,000	(28,000)
Printing and reproduction (24.0)	75,000	69,000	(6,000)
<b>Other Contractual Services:</b>			
Advisory and assistance services (25.1)	830,000	771,000	(59,000)
Other services (25.2)	4,300,000	4,103,000	(197,000)
Purchases from government accounts (25.3)	31,604,000	32,074,000	470,000
Operation and maintenance of facilities (25.4)	265,000	248,000	(17,000)
Operation and maintenance of equipment (25.7)	1,262,000	1,217,000	(45,000)
Subsistence and support of persons (25.8)	0	0	0
<b>Subtotal Other Contractual Services</b>	<b>38,261,000</b>	<b>38,413,000</b>	<b>152,000</b>
Supplies and materials (26.0)	4,594,000	4,429,000	(165,000)
<b>Subtotal, Non-Pay Costs</b>	<b>44,477,000</b>	<b>44,386,000</b>	<b>(91,000)</b>
<b>Total, Administrative Costs</b>	<b>76,101,000</b>	<b>77,562,000</b>	<b>1,461,000</b>

**NATIONAL INSTITUTES OF HEALTH**  
**National Institute of Arthritis and Musculoskeletal and Skin Diseases**

Authorizing Legislation						
	PHS Act/ Other Citation	U.S. Code Citation	2009 Amount Authorized	FY 2009 Estimate	2010 Amount Authorized	FY 2010 PB
Research and Investigation	Section 301	42§241	Indefinite		Indefinite	
National Institute of Arthritis and Musculoskeletal and Skin Diseases	Section 402(a)	42§281	Indefinite	\$524,872,000	Indefinite	\$530,825,000
<b>Total, Budget Authority</b>				<b>524,872,000</b>		<b>530,825,000</b>

**NATIONAL INSTITUTES OF HEALTH**  
**National Institute of Arthritis and Musculoskeletal and Skin Diseases**

**Appropriations History**

Fiscal Year	Budget Estimate to Congress	House Allowance	Senate Allowance	Appropriation
2001	363,479,000 <u>2/</u>	400,025,000	401,161,000	396,604,000
Rescission				(144,000)
2002	443,565,000	440,144,000	460,202,000	448,865,000
Rescission				(617,000)
2003	485,851,000	485,851,000	489,324,000	489,324,000
Rescission				(3,181,000)
2004	502,778,000	502,778,000	505,000,000	504,300,000
Rescission				(3,234,000)
2005	515,378,000	515,378,000	520,900,000	515,378,000
Rescission				(4,221,000)
2006	513,063,000	513,063,000	525,758,000	513,063,000
Rescission				(5,131,000)
2007	504,533,000	504,533,000	508,583,000	508,240,000
2008	508,082,000	516,044,000	519,810,000	508,586,000
Rescission				(9,043,000)
2009	509,080,000	526,583,000	523,246,000	524,872,000
2010	530,825,000			

1/ Reflects enacted supplementals, rescissions, and reappropriations.

2/ Excludes funds for HIV/AIDS research activities consolidated in the NIH Office of AIDS Research.

**NATIONAL INSTITUTES OF HEALTH**  
**National Institute of Arthritis and Musculoskeletal and Skin Diseases**

**Details of Full-Time Equivalent Employment (FTEs)**

OFFICE/DIVISION	FY 2008 Actual	FY 2009 Estimate	FY 2010 PB
Office of the Director	53	53	54
Extramural Program	38	38	39
Intramural Research Program	135	135	138
<b>Total</b>	<b>226</b>	<b>226</b>	<b>231</b>
Includes FTEs which are reimbursed from the NIH Roadmap for Medical Research			
FTEs supported by funds from Cooperative Research and Development Agreements	(0)	(0)	(0)
FISCAL YEAR	Average GM/GS Grade		
2006	11.0		
2007	11.6		
2008	11.6		
2009	11.6		
2010	11.6		

**NATIONAL INSTITUTES OF HEALTH**  
**National Institute of Arthritis and Musculoskeletal and Skin Diseases**

**Detail of Positions**

GRADE	FY 2008 Actual	FY 2009 Estimate	FY 2010 PB
Total, ES Positions	1	1	1
Total, ES Salary	\$172,200	\$179,605	\$184,274
GM/GS-15	15	15	15
GM/GS-14	24	24	25
GM/GS-13	28	28	29
GS-12	34	34	34
GS-11	22	22	22
GS-10	0	0	0
GS-9	9	9	9
GS-8	7	7	7
GS-7	13	13	13
GS-6	3	3	3
GS-5	2	2	2
GS-4	0	0	0
GS-3	0	0	0
GS-2	1	1	1
GS-1	1	1	1
Subtotal	159	159	161
Grades established by Act of July 1, 1944 (42 U.S.C. 207):			
Assistant Surgeon General	0	0	0
Director Grade	1	1	1
Senior Grade	0	0	0
Full Grade	1	1	1
Senior Assistant Grade	1	1	1
Assistant Grade	0	0	0
Subtotal	3	3	3
Ungraded	83	83	86
Total permanent positions	162	162	167
Total positions, end of year	246	246	251
Total full-time equivalent (FTE) employment, end of year	226	226	231
Average ES salary	\$172,200	\$179,605	\$184,274
Average GM/GS grade	11.5	11.5	11.6
Average GM/GS salary	\$83,159	\$86,447	\$88,962

Includes FTEs which are reimbursed from the NIH Roadmap for Medical Research.

**NATIONAL INSTITUTES OF HEALTH  
National Institute of Arthritis and Musculoskeletal and Skin Diseases**

**New Positions Requested**

	FY 2010		
	Grade	Number	Annual Salary
Health Science Administrator	GS-14	1	\$103,000
Program Analyst	GS-13	1	87,000
Principal Investigator	AD	1	150,000
Research Fellow	AD	1	50,000
Staff Scientist	AD	1	85,000
<b>Total Requested</b>		<b>5</b>	