

DEPARTMENT OF HEALTH AND HUMAN SERVICES

NATIONAL INSTITUTES OF HEALTH

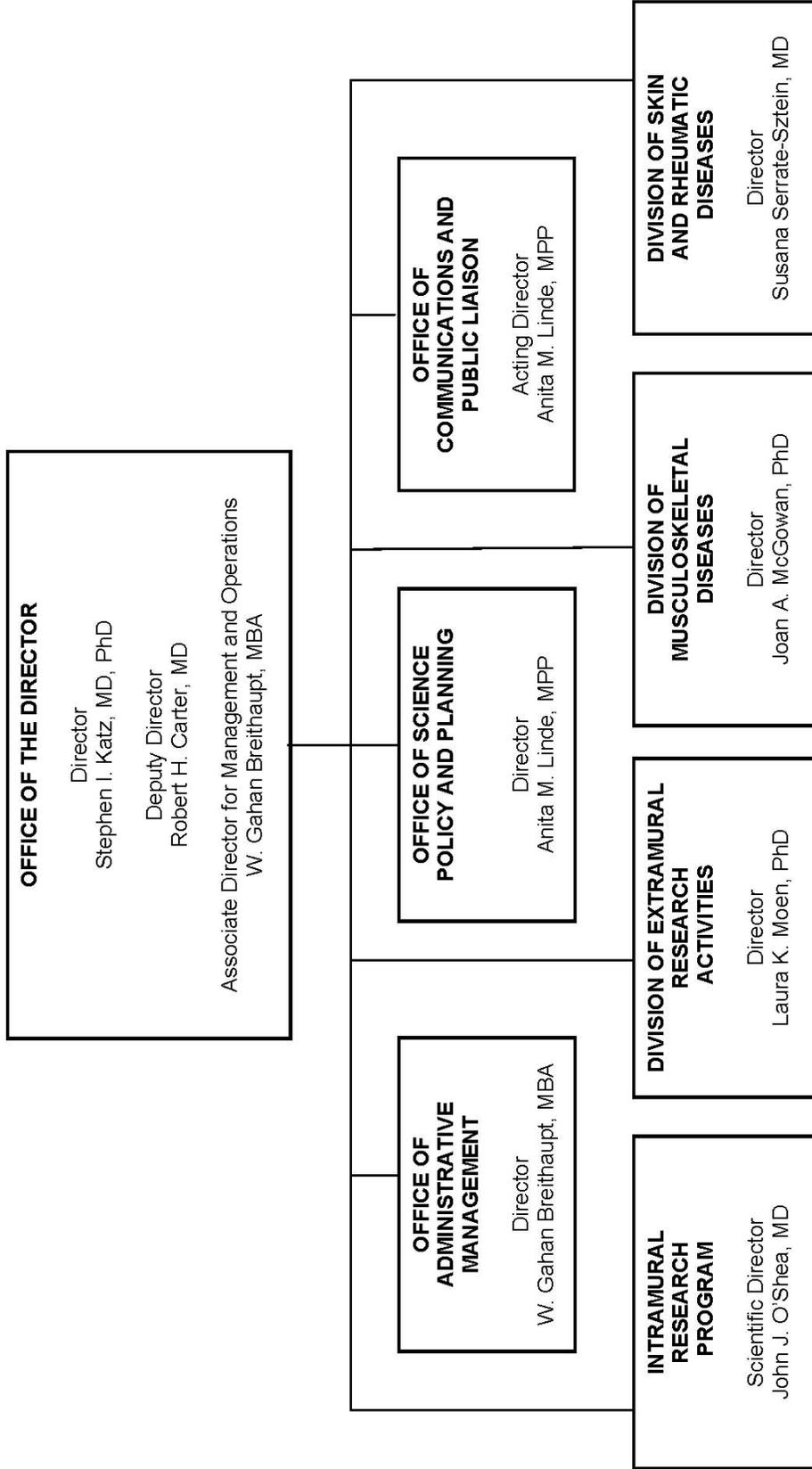
National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS)

<u>FY 2013 Budget</u>	<u>Page No.</u>
Organization Chart.....	2
Appropriation Language	3
Amounts Available for Obligation.....	4
Budget Mechanism Table	5
Major Changes in Budget Request	6
Summary of Changes	7
Budget Graphs	9
Budget Authority by Activity	10
Authorizing Legislation	11
Appropriations History	12
Justification of Budget Request	13
Budget Authority by Object Class	22
Salaries and Expenses	23
Detail of Full-Time Equivalent Employment (FTE)	24
Detail of Positions.....	25

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 PHS Act with respect to arthritis and musculoskeletal and skin diseases, [\$536,801,000] \$535,610,000. (*Department of Health and Human Services Appropriations Act, 2012.*)

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

Amounts Available for Obligation ¹
(Dollars in Thousands)

Source of Funding	FY 2011 Actual	FY 2012 Enacted	FY 2013 PB
Appropriation	539,082	536,801	535,610
Type 1 Diabetes	0	0	0
Rescission	(4,733)	(1,015)	0
Supplemental	0	0	0
Subtotal, adjusted appropriation	534,349	535,786	535,610
Real transfer under Secretary's transfer authority	0	(153)	0
Comparative Transfers for NCATS reorganization	0	0	0
Comparative Transfers to NCATS for Therapeutics and Rare and Neglected Diseases (TRND)	(440)	0	0
Comparative Transfers to NLM for NCBI and Public Access	(459)	(485)	0
Subtotal, adjusted budget authority	533,450	535,148	535,610
Unobligated balance, start of year	0	0	0
Unobligated balance, end of year	0	0	0
Subtotal, adjusted budget authority	533,450	535,148	535,610
Unobligated balance lapsing	(89)	0	0
Total obligations	533,361	535,148	535,610

¹ Excludes the following amounts for reimbursable activities carried out by this account:
FY 2011 - \$6,588 FY 2012 - \$11,400 FY 2013 - \$11,400

NATIONAL INSTITUTES OF HEALTH
National Institute of Arthritis and Musculoskeletal and Skin Diseases
Budget Mechanism - Total ^{1/}
(Dollars in Thousands)

MECHANISM	FY 2011 Actual		FY 2012 Enacted		FY 2013 PB		Change vs. FY 2012	
	No.	Amount	No.	Amount	No.	Amount	No.	Amount
Research Grants								
<u>Research Projects</u>								
Noncompeting	775	\$261,350	754	\$268,987	714	\$255,049	(40)	(\$13,938)
Administrative Supplements	19	1,242	19	1,242	19	1,242	0	0
Competing:								
Renewal	42	18,872	51	17,118	58	19,502	7	2,384
New	184	57,162	154	51,851	177	59,141	23	7,290
Supplements	2	928	2	845	3	955	1	110
Subtotal, Competing	228	\$76,962	207	\$69,814	238	\$79,598	31	\$9,784
Subtotal, RPGs	1,003	\$339,554	961	\$340,043	952	\$335,889	(9)	(\$4,154)
SBIR/STTR	27	\$12,572	27	\$13,345	27	\$13,791	0	\$446
Research Project Grants	1,030	\$352,126	988	\$353,388	979	\$349,680	(9)	(\$3,708)
<u>Research Centers</u>								
Specialized/Comprehensive	40	\$41,578	40	\$41,578	40	\$41,576	0	(\$2)
Clinical Research	0	0	0	0	0	0	0	0
Biotechnology	0	0	0	0	0	0	0	0
Comparative Medicine	0	29	0	29	0	29	0	0
Research Centers in Minority Institutions	0	0	0	0	0	0	0	0
Research Centers	40	\$41,607	40	\$41,607	40	\$41,605	0	(\$2)
<u>Other Research</u>								
Research Careers	155	\$19,480	155	\$19,480	155	\$19,479	0	(\$1)
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	1	264	1	264	0	0
Other	29	3,146	29	3,146	28	3,146	(1)	0
Other Research	184	\$22,626	185	\$22,890	184	\$22,889	(1)	(\$1)
Total Research Grants	1,254	\$416,359	1,213	\$417,885	1,203	\$414,174	(10)	(\$3,711)
<u>Research Training</u>								
Individual Awards	63	\$3,121	62	\$3,121	61	\$3,121	(1)	\$0
Institutional Awards	249	12,551	245	12,551	241	12,550	(4)	(1)
Total Research Training	312	\$15,672	307	\$15,672	302	\$15,671	(5)	(\$1)
Research & Development Contracts	51	\$19,195	51	\$19,456	51	\$23,630	0	\$4,174
<i>SBIR/STTR</i>	0	<i>\$19</i>	0	<i>\$19</i>	0	<i>\$19</i>	0	<i>\$0</i>
	<u>FTEs</u>		<u>FTEs</u>		<u>FTEs</u>		<u>FTEs</u>	
Intramural Research	129	\$54,438	129	\$54,438	128	\$54,438	(1)	\$0
Research Management and Support	105	27,786	105	27,697	104	27,697	(1)	0
Construction		0		0		0		0
Buildings and Facilities		0		0		0		0
Total, NIAMS	234	\$533,450	234	\$535,148	232	\$535,610	(2)	\$462

1/ All items in italics are "non-adds"; items in parenthesis are subtractions.

Major Changes in the Fiscal Year 2013 President's 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 2013 budget request for NIAMS, which is \$0.462 million more than the FY 2012 level, for a total of \$535.610 million.

Research Project Grants (-\$3.708 million; total \$349.680 million): NIAMS will support a total of 979 Research Project Grant (RPG) awards in FY 2013. Noncompeting awards will decrease by 40 awards and \$13.9 million. Competing RPGs will increase by 31 awards and \$9.8 million. NIH budget policy for RPGs in FY 2013 discontinues inflationary allowances and reduces the average cost of noncompeting and competing RPGs by one percent below the 2012 level. NIAMS continues to place a priority on support to new investigators.

Research Training (-\$0.001 million; total \$15.671 million): NIAMS will support 302 pre- and postdoctoral trainees in full-time training positions, a reduction of 5 trainees from the number funded in FY 2012. An across-the-board stipend increase of 2 percent has been provided in FY 2013. The increase in stipend levels will allow NIAMS to sustain the development of a highly qualified biomedical research workforce.

NATIONAL INSTITUTES OF HEALTH
National Institute of Arthritis and Musculoskeletal and Skin Diseases
Summary of Changes
(Dollars in Thousands)

FY 2012 Enacted				\$535,148
FY 2013 President's Budget				\$535,610
Net change				\$462
CHANGES	2013 President's Budget		Change from FY 2012	
	FTEs	Budget Authority	FTEs	Budget Authority
A. Built-in:				
1. Intramural Research:				
a. Annualization of January 2012 pay increase & benefits		\$17,685		\$1
b. January FY 2013 pay increase & benefits		17,685		54
c. One more day of pay		17,685		68
d. Annualization of PY net hires		17,685		0
e. Payment for centrally furnished services		9,502		0
f. Increased cost of laboratory supplies, materials, other expenses, and non-recurring costs		27,251		0
Subtotal				\$123
2. Research Management and Support:				
a. Annualization of January 2012 pay increase & benefits		\$14,562		\$1
b. January FY 2013 pay increase & benefits		14,562		45
c. One more day of pay		14,562		56
d. Annualization of PY net hires		14,562		0
e. Payment for centrally furnished services		4,695		0
f. Increased cost of laboratory supplies, materials, other expenses, and non-recurring costs		8,440		0
Subtotal				\$102
Subtotal, Built-in				\$225

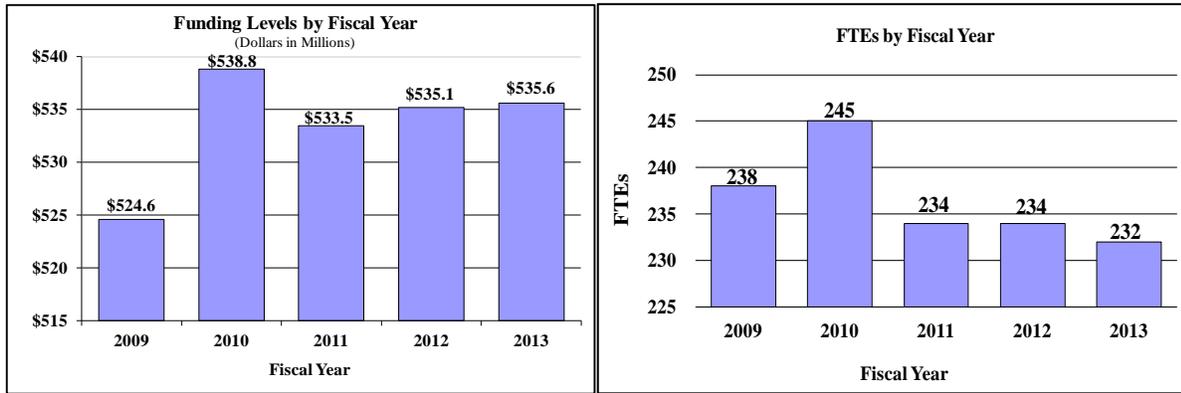
NATIONAL INSTITUTES OF HEALTH
National Institute of Arthritis and Musculoskeletal and Skin Diseases

Summary of Changes--continued

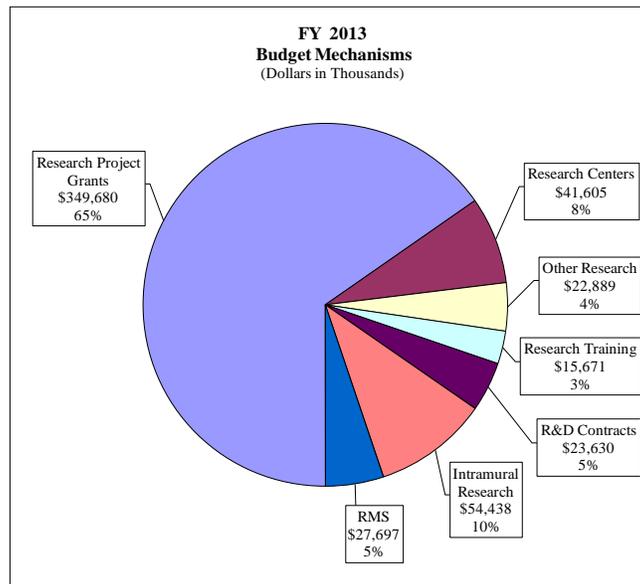
CHANGES	2013 President's Budget		Change from FY 2012	
	No.	Amount	No.	Amount
B. Program:				
1. Research Project Grants:				
a. Noncompeting	714	\$256,291	(40)	(\$13,938)
b. Competing	238	79,598	31	9,784
c. SBIR/STTR	27	13,791	0	446
Total	979	\$349,680	(9)	(\$3,708)
2. Research Centers	40	\$41,605	0	(\$2)
3. Other Research	184	22,889	(1)	(1)
4. Research Training	302	15,671	(5)	(1)
5. Research and development contracts	51	23,630	0	4,174
Subtotal, Extramural		\$453,475		\$462
	<u>FTEs</u>		<u>FTEs</u>	
6. Intramural Research	128	\$54,438	(1)	(\$123)
7. Research Management and Support	104	27,697	(1)	(102)
8. Construction		0		0
9. Buildings and Facilities		0		0
Subtotal, program	232	\$535,610	(2)	\$237
Total changes				\$462

Fiscal Year 2013 Budget Graphs

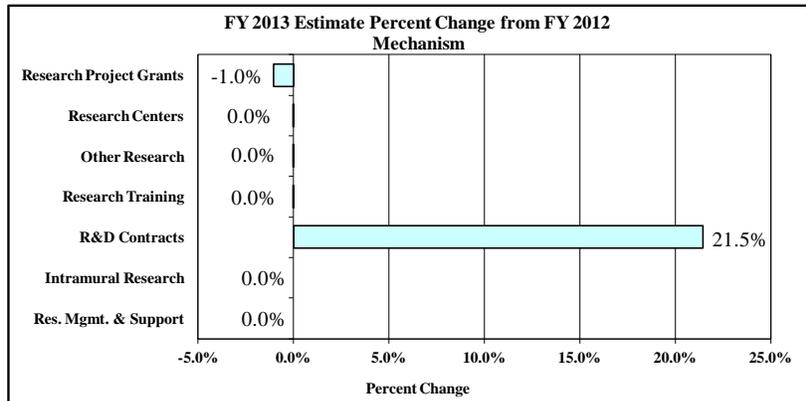
History of Budget Authority and FTEs:



Distribution by Mechanism:



Change by Selected Mechanisms:



NATIONAL INSTITUTES OF HEALTH
National Institute of Arthritis and Musculoskeletal and Skin Diseases
Budget Authority by Activity
(Dollars in Thousands)

	FY 2011 Actual		FY 2012 Enacted		FY 2013 PB		Change vs. FY 2012 Enacted	
	FTEs	Amount	FTEs	Amount	FTEs	Amount	FTEs	Amount
<u>Extramural Research</u>								
<u>Detail:</u>								
Arthritis and Rheumatic Diseases		\$115,044		\$115,499		\$115,618		119
Skin Biology and Diseases		68,360		68,631		68,700		69
Muscle Biology and Diseases		72,456		72,745		72,820		75
Musculoskeletal Biology and Diseases		123,666		124,154		124,280		126
Bone Biology and Diseases		71,700		71,984		72,057		73
Subtotal, Extramural		\$451,226		\$453,013		\$453,475		\$462
Intramural Research	129	\$54,438	129	\$54,438	128	\$54,438	(1)	\$0
Research Management & Support	105	\$27,786	105	\$27,697	104	\$27,697	(1)	\$0
TOTAL	234	\$533,450	234	\$535,148	232	\$535,610	(2)	\$462

1. Includes FTEs which are reimbursed from the NIH Common Fund.

2. Includes Real Transfers and Comparable Adjustments as detailed in the "Amounts Available for Obligation" table.

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

Authorizing Legislation

	PHS Act/ Other Citation	U.S. Code Citation	2012 Amount Authorized	FY 2012 Enacted	2013 Amount Authorized	FY 2013 PB
Research and Investigation	Section 301	42§241	Indefinite	\$535,148,000	Indefinite	\$535,610,000
National Institute of Arthritis and Musculoskeletal and Skin Diseases	Section 401(a)	42§281	Indefinite		Indefinite	
Total, Budget Authority				\$535,148,000		\$535,610,000

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
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	\$508,585,000	\$508,240,000
Rescission				\$0
2008	\$508,082,000	\$516,044,000	\$519,810,000	\$517,629,000
Rescission				(\$9,043,000)
Supplemental				\$2,705,000
2009	\$509,080,000	\$526,583,000	\$523,246,000	\$524,872,000
Rescission				\$0
2010	\$530,825,000	\$543,621,000	\$533,831,000	\$539,082,000
Rescission				\$0
2011	\$555,715,000		\$554,846,000	\$539,082,000
Rescission				(\$4,733,461)
2012	\$547,891,000	\$547,891,000	\$528,332,000	\$536,801,000
Rescission				(\$1,014,554)
2013	\$535,610,000			

**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.

Budget Authority:

	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Budget	FY 2013 +/- FY 2012
BA	\$533,450,000	\$535,148,000	\$535,610,000	+\$462,000
FTE	234	234	232	-2

DIRECTOR'S OVERVIEW

The National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS) supports a broad range of research, training, and information dissemination activities related to bone, joint, muscle, and skin diseases. Some are rare disorders, many are common. All have a major impact on the quality of people's lives. Conditions 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 and improving the treatment of many disorders. The primary Federal agency for conducting and supporting medical research into conditions of the bone, joint, muscle, and skin, NIAMS manages a portfolio that addresses immediate public health needs, while encouraging basic science research that may lead to improved health. Its efforts fill a void in our Nation's research and development pipeline by supporting studies that the commercial sector would not pursue because they may not be immediately profitable. As described below, many NIAMS activities and plans directly relate to the four themes of the NIH Director's Extraordinary Opportunities for FY 2013.

Theme 1: Investing in Basic Research

Much of the NIAMS budget supports basic research into the biological processes underlying health and disease. Many of these studies require investigators to grow specific types of cells in their laboratories. Over the past five years, researchers have been using or developing techniques to convert a relatively new type of stem cell, inducible pluripotent stem (iPS) cells, into different cell types for their experiments. This has provided opportunities for studying melanocytes (the cells that make freckles, cause tanning, or mutate to produce melanoma), and other skin cells or muscle cells that can be used to study disease-causing mutations.

Other basic research efforts are raising the possibility that existing medications might be useful treatments for additional diseases. Researchers studying a model of lupus nephritis, a severe form of systemic lupus erythematosus (SLE), recently discovered that activation of a certain type of immune cell damaged the animals' kidneys. This insight, combined with an understanding of

the basic mechanisms by which the asthma drug omalizumab prevents inflammation, prompted the team to plan a study of whether the drug is safe for people who have SLE.

Theme 2: Accelerating Discovery through Technology

Tissue engineering relies on technological advances that enable scientists to use cells, scaffolds, and biologically active molecules to produce healthy, functional tissues or organs. Recently, researchers have made progress toward being able to grow skin for people with a debilitating and life-threatening skin disease called recessive dystrophic epidermolysis bullosa (RDEB). They isolated cells from patients, corrected the molecular defect, and grew the modified cells into sheets of tissue that they transplanted onto mice. After successfully transplanting the modified skin on mice, they were able to quickly launch a clinical trial of adults affected by RDEB.

NIAMS also invests heavily in the development of imaging tools for studies or diagnosis of a variety of diseases and conditions. Some NIAMS investigators are developing x-ray techniques and computer algorithms to better assess a person's risk of fracture, with the goal of enabling physicians to better determine which patients require treatment. Others are testing magnetic resonance imaging strategies to examine muscle or joint tissue. One group is exploring the utility of two office-based tests—electrical impedance myography and quantitative ultrasound—for quick, painless monitoring of people with muscle diseases who are participating in clinical trials.

NIAMS-funded researchers also are developing methods to deliver drugs to patients in clinical studies and, ultimately, in clinical care. One group is creating a microneedle injection system that they can use to test a potential treatment for people who have pachyonychia congenita, an ultra-rare skin disorder that manifests as painful calluses and blisters on the soles of the feet. Although the therapy showed promise in an earlier trial funded through the NIAMS Small Business Innovation Research (SBIR) program, the pain associated with the original injection system prompted the investigators to pursue a method that is more patient-friendly.

Theme 3: Advancing Translational Sciences

As NIAMS looks toward FY 2013, it is exploring ways to help researchers optimize small molecule drugs for the treatment of inflammatory and chronic degenerative diseases, such as rheumatoid arthritis (see example in the Intramural Research Program, below). In 2011, NIAMS funded its first grants under a new effort to support smaller and shorter studies on which larger clinical trials could be based. In addition to encouraging the research community to translate basic research findings and animal studies into clinical trials, NIAMS also supports efforts to verify preliminary clinical observations with larger studies. Recently, researchers demonstrated that teriparatide, a parathyroid hormone derivative already approved for older women who have osteoporosis, restored cartilage in mouse joints that resembled the knees of post-traumatic osteoarthritis (OA) patients. This finding is a classic example of how clinical observations can inform basic research questions: the researchers designed their animal studies after colleagues noted that people who had OA and were taking parathyroid hormone for osteoporosis had less arthritis pain. If subsequent studies show that teriparatide has a favorable risk-benefit profile and stimulates cartilage regeneration in patients, it would be the first disease-reversing drug to be available for the millions of Americans who are plagued by OA.

Theme 4: Encouraging New Investigators and New Ideas

NIAMS uses a combination of institutional training grants and individual fellowships to ensure a continuing supply of well-trained scientists prepared to conduct cutting-edge research related to musculoskeletal, skin, and rheumatic diseases. At the NIH Clinical Center, the NIH Rheumatology Fellowship Training Program, which NIAMS leads, is dedicated to the clinical and research training of physicians who wish to pursue careers in biomedical or translational research related to rheumatic diseases. The program is accredited by the Accreditation Council for Graduate Medical Education (ACGME), and graduates are eligible to undergo the certifying examination in the subspecialty of rheumatology.

To encourage promising new researchers around the country to study arthritis and musculoskeletal and skin diseases and injuries, NIAMS offers a grant program specifically for investigators who have not previously been funded by the NIH. The NIAMS Small Grant Program for New Investigators provides successful applicants with up to three years of funding to develop the pilot data that would make them competitive for a full, independent project.

Overall Budget Policy: The FY 2013 President's Budget request for NIAMS is \$535.610 million or 0.09 percent over the FY 2012 Enacted level. Investigator-initiated research project grants and research conducted by new scientists continue to be the Institute's highest priorities. As part of this effort, NIAMS is committed to training and supporting a diverse biomedical research community that will continue to make advances for generations to come.

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 inflammatory arthritis and other rheumatic diseases. It utilizes new insights in the fields of genetics, genomics, proteomics, immunology, and imaging to understand how the immune system interacts with various tissues in normal and pathological conditions and to ensure a continuous supply of new targets on which therapies can be based. Scleroderma, one of the rheumatic diseases within the NIAMS mission, was a main topic at the Institute's 2011 scientific planning retreat, as an increasing number of discoveries related to the immune system's role in the disease are providing new research opportunities related to potential therapeutic targets (see Program Portrait: Studies of the Immune Response Reveal Link with Fibrosis). In FY 2011, NIAMS awarded a new five-year Center for Research Translation (CORT) grant to conduct multidisciplinary research to better understand systemic sclerosis, a form of scleroderma affecting multiple organ systems. The Institute also funded a new CORT to uncover genetic and environmental factors contributing to Sjögren's syndrome, an autoimmune disease in which a person's disease-fighting cells attack the glands that produce tears and saliva, as well as other tissues. As part of its FY 2012 planning process, NIAMS conducted a roundtable discussion with approximately a dozen arthritis biology researchers. At the meeting, participants discussed basic and translational research opportunities that might lead to promising therapies for diseases, such as rheumatoid arthritis and juvenile idiopathic arthritis.

Budget Policy: The FY 2013 President's Budget request for this program is \$115.618 million, an increase of \$0.119 million or 0.10 percent over the FY 2012 Enacted level. In FY 2013,

NIAMS will continue to support genome-wide association studies and in-depth follow-up analyses in rheumatic diseases, such as SLE and juvenile idiopathic arthritis. These studies will provide insights into genetic risk for these conditions, and identify potential therapeutic targets. In follow-up to a FY 2011 roundtable discussion on the early warning signs of autoimmune diseases, the Institute will encourage research into fundamental pathologic processes that might lead to strategies to impede or arrest disease progression. Ongoing efforts to use existing resources from large clinical projects to further understand disease mechanisms also will continue.

Program Portrait: Studies of the Immune Response Reveal Link with Scleroderma

FY 2012 Level: \$10.535 million

FY 2013 Level: \$10.535 million

Difference: \$0.000 million

Scleroderma is a rare, severe, and heterogeneous autoimmune disease that involves progressive hardening of the skin and of internal organs. The characteristic hardening is due to fibrosis (the abnormal growth of the connective tissue that supports the skin and internal organs). Recent discoveries on the role of the innate and adaptive immune systems—the areas of research recognized by the 2011 Nobel Prize in Physiology or Medicine—are opening new avenues for understanding the underlying cause of fibrosis in scleroderma. NIAMS staff and outside experts discussed these discoveries and their applications in future scleroderma research at the NIAMS 2011 scientific planning retreat.

Molecular components of the innate immune system—the body’s “first responder” to invading pathogens—are recently-discovered triggers of dermal fibrosis that may be transmitting signals from environmental factors that influence inflammation. Building on NIAMS investments in understanding the molecular and cellular mechanisms that contribute to fibrosis, researchers are investigating how disease-associated variations in innate immune function may feed into these dysfunctional pathways. The findings may help to connect disease-associated genetic variation in scleroderma patients to pathogenic mechanisms that can become therapeutic targets. In addition, immune components may emerge as potential molecular indicators, or biomarkers, of the disease that could be used to characterize subgroups of patients with different forms of scleroderma.

In FY 2011, NIAMS awarded a new five-year Center for Research Translation grant to conduct multidisciplinary research to better understand systemic sclerosis, a form of scleroderma affecting multiple organ systems. The project will focus on the development of clinical biomarkers to monitor the progression and complications associated with the disease, setting the stage for targeted therapies to treat at-risk individuals.

Musculoskeletal Biology and Diseases: This 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 (OA). It funds research on the causes and treatment of acute and chronic injuries, including repetitive stress and sports injuries, and is supporting a long-term study into the effectiveness of various treatments for patients who have low back pain. Some of its grants are comparing surgical approaches to repairing torn knee ligaments, suggesting how existing surgical techniques could be improved, or examining conditioning regimens that may protect young female athletes from knee injuries. The program also supports the development of technologies—such as bone and joint imaging, tissue engineering, and regenerative medicine—to improve the diagnosis and treatment of skeletal disorders, or to facilitate repair of damage caused by trauma to otherwise healthy tissue. In FY 2011, NIAMS funded a new five-year effort to translate some of these cutting-edge imaging strategies into clinical tools that will enhance disease management and outcomes in people with OA.

Budget Policy: The FY 2013 President's Budget request for this program is \$124.280 million, an increase of \$0.126 million or 0.10 percent over the FY 2012 Enacted level. Program plans for FY 2013 include encouraging research into the risk factors for and the pathophysiology of OA, with the goal of advancing the development and testing of interventions for OA. As a leader of the Osteoarthritis Initiative (OAI), a public-private partnership to create a resource that any researcher can use to identify and evaluate OA markers, NIAMS intends to intensify its efforts to educate members of the research community about the availability and potential utility of OAI clinical data and images that can complement or provide a basis for their research. Other activities include partnering with the National Institute on Aging on an effort to solicit grant applications to explore the mechanisms of OA that develop during aging.

Bone Biology and Diseases: The program covers a broad spectrum of research designed to better understand the build-up and break down of bone. It supports studies of the genetic and cellular mechanisms involved in regulating bone remodeling and bone formation, resorption, and mineralization processes, and the effects of hormones, growth factors, and cytokines on bone cells and on other organ systems (see Program Portrait: Integrative Physiology of Bone and Muscle, below). It oversees several large epidemiologic cohorts to characterize the development and progression of osteoporosis, and for identification of genetic and environmental risk factors that contribute to fractures. Through the Bone Biology and Diseases Program, the Institute leads the Federal Working Group on Bone Diseases—an interagency committee that offers a forum for sharing information and facilitating the development of collaborative bone research activities based on each agency's mission. Recent working group topics have included NIH collaborations with the military to understand severe bone problems that impair the recovery of people who have been injured by improvised explosive devices; evidence linking viruses to Paget's disease of bone; and emerging findings that are influencing the labeling and prescribing of osteoporosis drugs.

Program Portrait: Understanding Bone and Muscle Interactions with Each Other and with Other Tissues

FY 2012 Level: \$6.751 million

FY 2013 Level: \$6.750 million

Difference: -\$\$.001 million

A series of basic and clinical findings are substantially changing the way we think about bone and skeletal muscle, and their roles in health. For example, researchers assumed that communication between the two tissues was primarily mechanical, until a recent study demonstrated that developing bones release proteins that may affect muscle development. Likewise, a series of clinical observations and basic research findings suggest that adult skeletal muscle produces compounds that promote fracture healing. During repeated contraction and relaxation cycles of physical activity, muscle releases compounds that may contribute to exercise's positive effects on liver, fat, immune, and other cell types. It generates heat to maintain body temperature, stores nutritional protein, and contributes to the regulation of glucose metabolism. Similarly, mouse studies have revealed that bone also secretes proteins that act on the pancreas to control blood glucose levels. Patients with restricted mobility due to injury or disease experience muscle atrophy and bone loss, which further alter their metabolism and contribute to mortality.

The processes by which bone and muscle regulate physiology through communication with each other and with other organ systems are ripe for exploration. They are generating considerable excitement among the research community as investigators recognize that common health problems, such as diabetes, heart disease, and osteoporosis, are not independent phenomena. As the research community's interest in the influence of bone and skeletal muscle on the health of other organ systems grows, NIAMS expects to receive an increasing number of grant applications on this topic. Already, NIAMS' investment in basic research into how molecules released by bone cells act at distant tissues is showing promise for new and better treatments: a discovery involving bone's communication with the kidneys has led NIH-supported scientists to a potential treatment for a form of rickets called X-linked hypophosphatemia (XLH), a genetic disease characterized by defective bones and teeth.

Budget Policy: The FY 2013 President's Budget request for this program is \$72.057 million, an increase of \$0.073 million or 0.10 percent over the FY 2012 Enacted level. NIAMS recognizes the unprecedented opportunities that genome-wide association studies hold for identifying genetic changes that influence bone health. The discovery of genetic variants that protect against osteoporosis or increase a person's risk of having low bone mass is likely to suggest targets for the development of drugs that prevent fragility fractures. Moreover, investigators could use genetic markers to identify appropriate participants for clinical trials. Institute plans for FY 2013 include encouraging exploration in this area by advertising the availability of a new genetic database for musculoskeletal disorders, funded by the American Recovery and Reinvestment Act.

Muscle Biology and Diseases: This program supports a wide range of basic, translational, and clinical research projects in skeletal muscle biology and diseases. It focuses on the fundamental biology of muscle development, muscle physiology, and muscle imaging. Its overarching objective is to explain the role that muscle plays in health and, ultimately, to treat or prevent skeletal muscle diseases and disorders, including muscular dystrophies, inflammatory myopathies, muscle ion channel diseases, disuse atrophy, skeletal muscle injury, and loss of muscle mass associated with aging and diseases. As part of its FY 2011 scientific planning process, the Institute organized a discussion on how it might capitalize on the burgeoning number of basic discoveries that could potentially be translated into therapies for people who have muscle diseases. In this same vein, the NIAMS-funded researchers are preparing to launch a clinical trial for people who have limb-girdle muscular dystrophy.

Budget Policy: The FY 2013 President's Budget request for this program is \$72.820 million, an increase of \$0.075 million or 0.10 percent over the FY 2012 Enacted level. For FY 2013, the Institute will continue to participate in the Senator Paul D. Wellstone Muscular Dystrophy Cooperative Research Centers Program. It will continue to support a Center for Research Translation grant to assess a strategy to repair the genetic defect that causes Duchenne muscular dystrophy. The Center is focusing on a series of small molecules that target different disease causing mutations, with the goal of developing drugs that health care providers could choose from based on an individual's genetic information. Other plans include fostering research into the role skeletal muscle plays in influencing the health of other organ systems (see Program Portrait: Understanding of Bone and Muscle Interactions Moves Beyond Locomotion, above).

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 tools for skin regeneration, and imaging technologies for diagnosis and tracking progression of skin diseases. The 2011 NIAMS scientific planning retreat had a session on research advances and opportunities of the innate immune system—the body's first line of defense against infectious agents in skin (see Program Portrait: Studies of the Immune Response Reveal Link with Fibrosis, above). New avenues of research that are ripe for investigation include the impact of methicillin-resistant *Staphylococcus aureus* (MRSA) infections on skin, as well as the effect of the skin's commensal bacteria on MRSA infections. The Institute held a roundtable discussion in FY 2012 on the research needs, challenges, and opportunities in pediatric dermatology, and in related diseases such as atopic dermatitis (eczema), alopecia areata, rare genetic diseases (e.g., epidermolysis bullosa, ichthyoses), and acne. NIAMS continued its support in FY 2011 for the development of a multi-institutional and multidisciplinary research network to evaluate treatments for psoriasis across a large population.

Budget Policy: The FY 2013 President's Budget request for this program is \$68.700 million, an increase of \$0.069 million or 0.10 percent over the FY 2012 Enacted level. In FY 2013, NIAMS will continue to support skin research into the effects of chemicals from accidents or terrorist attacks, toward the development of potential countermeasures. NIAMS will fund ongoing studies on the molecular and cellular factors regulating skin and hair follicle development and regeneration, which can also inform regenerative medicine efforts in other organ systems. The Institute will also encourage further investigation on the role of immune system genes in skin diseases, based on findings from genome-wide association studies. This knowledge can augment NIAMS's standing research program in skin immunology and autoimmunity, to facilitate translation of laboratory findings to clinical care.

Intramural Research Program: The program's mission is to conduct innovative basic, translational, and clinical research relevant to the health concerns of the Institute, and to provide training for investigators who are interested in related research careers. Scientists perform clinical studies on the genetics, etiology, pathogenesis, and treatment of a variety of rheumatic, autoimmune, inflammatory, joint, skin, and muscle diseases. The program has recently expanded its research and training capacity by establishing a Laboratory of Regenerative Medicine and a Laboratory of Oral Connective Tissue Biology. The addition of these two accomplished research teams will spur collaborations with fields that complement the expertise

of the NIAMS researchers. Meanwhile, ongoing partnerships within and outside of NIH continue. In collaboration with researchers around the world, the NIAMS scientists are exploring large genetic databases that provide insights into the immune-system defects that underlie rare inflammatory diseases such as ankylosing spondylitis (a progressive arthritis affecting the spine). Others are working closely with the private sector to move their fundamental discoveries into clinical trials. For example, an intramural investigator's discovery of an immune system protein led to the identification of therapeutic targets for several rheumatic conditions. As a result of this advance and subsequent work facilitated by two Cooperative Research and Development Agreements (CRADAs) between NIH and industry, a new drug is in clinical trials and may be available to rheumatoid arthritis patients by the end of 2012.

Budget Policy: The FY 2013 President's Budget request for this program is \$54.438 million, the same as the FY 2012 Enacted level. NIAMS plans for FY 2013 include maintaining its 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 underpinnings. NIAMS will also continue its multidisciplinary training of rheumatology research fellows, giving them a foundation in biomedical research and experience in treating patients with diverse rheumatic diseases in a real-life community healthcare setting (see Program Portrait: *The NIAMS Community Health Center*). The Institute's intramural research program anticipates enhancing its recent collaborative scientific and programmatic activities throughout its portfolio. This effort mimics the continued research partnerships that NIAMS scientists have with experts around the world, including those in private industry, which have led to fundamental insights into the genetics and mechanisms of disease, and helped identify new targets for novel treatments and interventions.

Program Portrait: The NIAMS Community Health Center

FY 2012 Level: \$.447 million

FY 2013 Level: \$.447 million

Difference: \$.000 million

The NIAMS Intramural Research Program and Washington, D.C. area community stakeholders have partnered to support the NIAMS Community Health Center (CHC) for the past decade. At the CHC, NIAMS investigators gain knowledge about health disparities in rheumatic diseases, while providing specialty care to a traditionally underserved patient population. Recently, the CHC began connecting uninsured patients with a drug assistance program that allows them to continue to receive their expensive biologic medications at no charge if they choose to leave the study or receive care elsewhere.

Since the program's inception, patients have visited the CHC for nearly 10,000 appointments. More than 2,000 people participate in the Natural History of Rheumatic Disease in Minority Communities study, which is helping NIAMS scientists better understand diseases, such as rheumatoid arthritis, lupus, and scleroderma, and providing insights about why many of these diseases affect people in certain minority populations more often and more severely. Researchers from across the NIH, such as those at the NIH Clinical Center Department of Nursing and Department of Bioethics, also have partnered with the CHC. Numerous abstracts and scientific presentations have resulted from these studies, and added to the research community's knowledge base about health disparities in rheumatic diseases.

In addition, the NIAMS CHC offers a practical and unique experience for physicians in the NIH Rheumatology Fellowship Training Program. Since 2003, 29 doctors have completed the two-year program, which provides a balance of both academic and clinical training, and fulfills all requirements for certification by the American Board of Internal Medicine in Rheumatology.

Research Management and Support (RMS): The RMS program supports the scientific, administrative management, and information technology activities associated with day-to-day operations. In FY 2011, the Institute managed more than 1,254 research grants and centers, as well as 51 research and development contracts and 312 individual and institutional full-time research training positions. NIAMS funded 508 clinical research studies, including 61 clinical trials. In FY 2011, the Institute hosted the NIAMS 25th Anniversary Scientific Symposium: Improving Lives Through Discovery. The meeting brought together a broad array of senior and early-stage NIAMS-supported investigators, whose descriptions of research advances and promising new areas of exploration were complemented by personal stories from patients who are challenged by arthritis, musculoskeletal, and skin diseases. As evidence of its continued commitment to information dissemination, the newly redesigned NIAMS webpage scored among the top ranked federal websites in a national survey of customer satisfaction. In addition, the Institute's use of social media has grown significantly, marked by the development of a widely utilized Twitter account that has been used to highlight research advances, Institute events, and new materials for the public.

Budget Policy: The FY 2013 President's Budget request for this program is \$27.697 million, the same as the FY 2012 level. In FY 2013, NIAMS will continue its efforts to improve access to, and availability of, meaningful health information for racial and ethnic minority populations through its Multicultural Outreach Initiative (MCOI). Using feedback from MCOI focus groups, NIAMS is developing resources for patients and the public in the form of "health planners" that people can use to organize medical appointments and other health-related activities. Soon, community partners will assess the effectiveness of these materials through field testing, which will help NIAMS refine the products and create an electronic toolkit that partner organizations can use to customize the materials. 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
(Dollars in Thousands)

	FY 2012 Enacted	FY 2013 PB	Increase or Decrease
Total compensable workyears:			
Full-time employment	234	232	(2)
Full-time equivalent of overtime and holiday hours	0	0	0
Average ES salary (<i>in dollars</i>)	\$179,700	\$180,600	\$900
Average GM/GS grade	11.6	11.6	0.0
Average GM/GS salary (<i>in dollars</i>)	\$91,626	\$92,085	\$459
Average salary, grade established by act of July 1, 1944 (42 U.S.C. 207) (<i>in dollars</i>)	\$85,740	\$87,455	\$1,715
Average salary of ungraded positions (<i>in dollars</i>)	117,233	117,819	586
OBJECT CLASSES	FY 2012 Enacted	FY 2013 PB	Increase or Decrease
Personnel Compensation:			
11.1 Full-time permanent	\$14,458	\$14,484	\$26
11.3 Other than full-time permanent	8,052	8,074	22
11.5 Other personnel compensation	704	705	1
11.7 Military personnel	355	361	6
11.8 Special personnel services payments	1,883	1,889	6
Total, Personnel Compensation	\$25,452	\$25,513	\$61
12.0 Personnel benefits	\$6,556	\$6,546	(\$10)
12.2 Military personnel benefits	290	289	(1)
13.0 Benefits for former personnel	0	0	0
Subtotal, Pay Costs	\$32,298	\$32,348	\$50
21.0 Travel and transportation of persons	\$743	\$685	(\$58)
22.0 Transportation of things	152	152	0
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	571	571	0
24.0 Printing and reproduction	36	36	0
25.1 Consulting services	1,403	1,414	11
25.2 Other services	4,389	4,394	5
25.3 Purchase of goods and services from government accounts	47,992	52,516	4,524
25.4 Operation and maintenance of facilities	145	145	0
25.5 Research and development contracts	9,490	9,132	(358)
25.6 Medical care	3,359	3,359	0
25.7 Operation and maintenance of equipment	907	907	0
25.8 Subsistence and support of persons	0	0	0
25.0 Subtotal, Other Contractual Services	\$67,685	\$71,867	\$4,182
26.0 Supplies and materials	\$3,849	\$3,849	\$0
31.0 Equipment	4,257	4,257	0
32.0 Land and structures	0	0	0
33.0 Investments and loans	0	0	0
41.0 Grants, subsidies and contributions	425,557	421,845	(3,712)
42.0 Insurance claims and indemnities	0	0	0
43.0 Interest and dividends	0	0	0
44.0 Refunds	0	0	0
Subtotal, Non-Pay Costs	\$502,850	\$503,262	\$412
Total Budget Authority by Object	\$535,148	\$535,610	\$462

Includes FTEs which are reimbursed from the NIH Common Fund.

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

Salaries and Expenses
(Dollars in Thousands)

OBJECT CLASSES	FY 2012 Enacted	FY 2013 PB	Increase or Decrease
Personnel Compensation:			
Full-time permanent (11.1)	\$14,458	\$14,484	\$26
Other than full-time permanent (11.3)	8,052	8,074	22
Other personnel compensation (11.5)	704	705	1
Military personnel (11.7)	355	361	6
Special personnel services payments (11.8)	1,883	1,889	6
Total Personnel Compensation (11.9)	\$25,452	\$25,513	\$61
Civilian personnel benefits (12.1)	\$6,556	\$6,546	(\$10)
Military personnel benefits (12.2)	290	289	(1)
Benefits to former personnel (13.0)	0	0	0
Subtotal, Pay Costs	\$32,298	\$32,348	\$50
Travel (21.0)	\$743	\$685	(\$58)
Transportation of things (22.0)	152	152	0
Rental payments to others (23.2)	0	0	0
Communications, utilities and miscellaneous charges (23.3)	571	571	0
Printing and reproduction (24.0)	36	36	0
Other Contractual Services:			
Advisory and assistance services (25.1)	1,403	1,414	11
Other services (25.2)	4,389	4,394	5
Purchases from government accounts (25.3)	33,274	33,840	566
Operation and maintenance of facilities (25.4)	145	145	0
Operation and maintenance of equipment (25.7)	907	907	0
Subsistence and support of persons (25.8)	0	0	0
Subtotal Other Contractual Services	\$40,118	\$40,700	\$582
Supplies and materials (26.0)	\$3,848	\$3,848	\$0
Subtotal, Non-Pay Costs	\$45,468	\$45,992	\$524
Total, Administrative Costs	\$77,766	\$78,340	\$574

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

Details of Full-Time Equivalent Employment (FTEs)

OFFICE/DIVISION	FY 2011 Actual			FY 2012 Enacted			FY 2013 PB		
	Civilian	Military	Total	Civilian	Military	Total	Civilian	Military	Total
Office of the Director									
Direct:	59	0	59	59	0	59	58	0	58
Reimbursable:	0	0	0	0	0	0	0	0	0
Total:	59	0	59	59	0	59	58	0	58
Extramural Program									
Direct:	44	2	46	44	2	46	44	2	46
Reimbursable:	0	0	0	0	0	0	0	0	0
Total:	44	2	46	44	2	46	44	2	46
Intramural Research Program									
Direct:	127	2	129	127	2	129	126	2	128
Reimbursable:	0	0	0	0	0	0	0	0	0
Total:	127	2	129	127	2	129	126	2	128
Total	230	4	234	230	4	234	228	4	232
Includes FTEs which are reimbursed from the NIH Common Fund.									
FTEs supported by funds from Cooperative Research and Development Agreements	0	0	0	0	0	0	0	0	0
FISCAL YEAR	Average GS Grade								
2009	11.7								
2010	11.6								
2011	11.6								
2012	11.6								
2013	11.6								

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

Detail of Positions

GRADE	FY 2011 Actual	FY 2012 Enacted	FY 2013 PB
Total, ES Positions	1	1	1
Total, ES Salary	179,700	179,700	179,700
GM/GS-15	16	16	16
GM/GS-14	31	31	31
GM/GS-13	43	43	42
GS-12	24	24	23
GS-11	9	9	9
GS-10	0	0	0
GS-9	11	11	11
GS-8	11	11	11
GS-7	11	11	11
GS-6	3	3	3
GS-5	2	2	2
GS-4	5	5	5
GS-3	1	1	1
GS-2	0	0	0
GS-1	0	0	0
Subtotal	167	167	165
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	1	1	1
Full Grade	2	2	2
Senior Assistant Grade	0	0	0
Assistant Grade	0	0	0
Subtotal	4	4	4
Ungraded	72	72	72
Total permanent positions	165	165	165
Total positions, end of year	244	244	242
Total full-time equivalent (FTE) employment, end of year	234	234	232
Average ES salary	179,700	179,700	180,600
Average GM/GS grade	11.6	11.6	11.6
Average GM/GS salary	91,626	91,626	92,085

Includes FTEs which are reimbursed from the NIH Common Fund.