

DEPARTMENT OF HEALTH AND HUMAN SERVICES

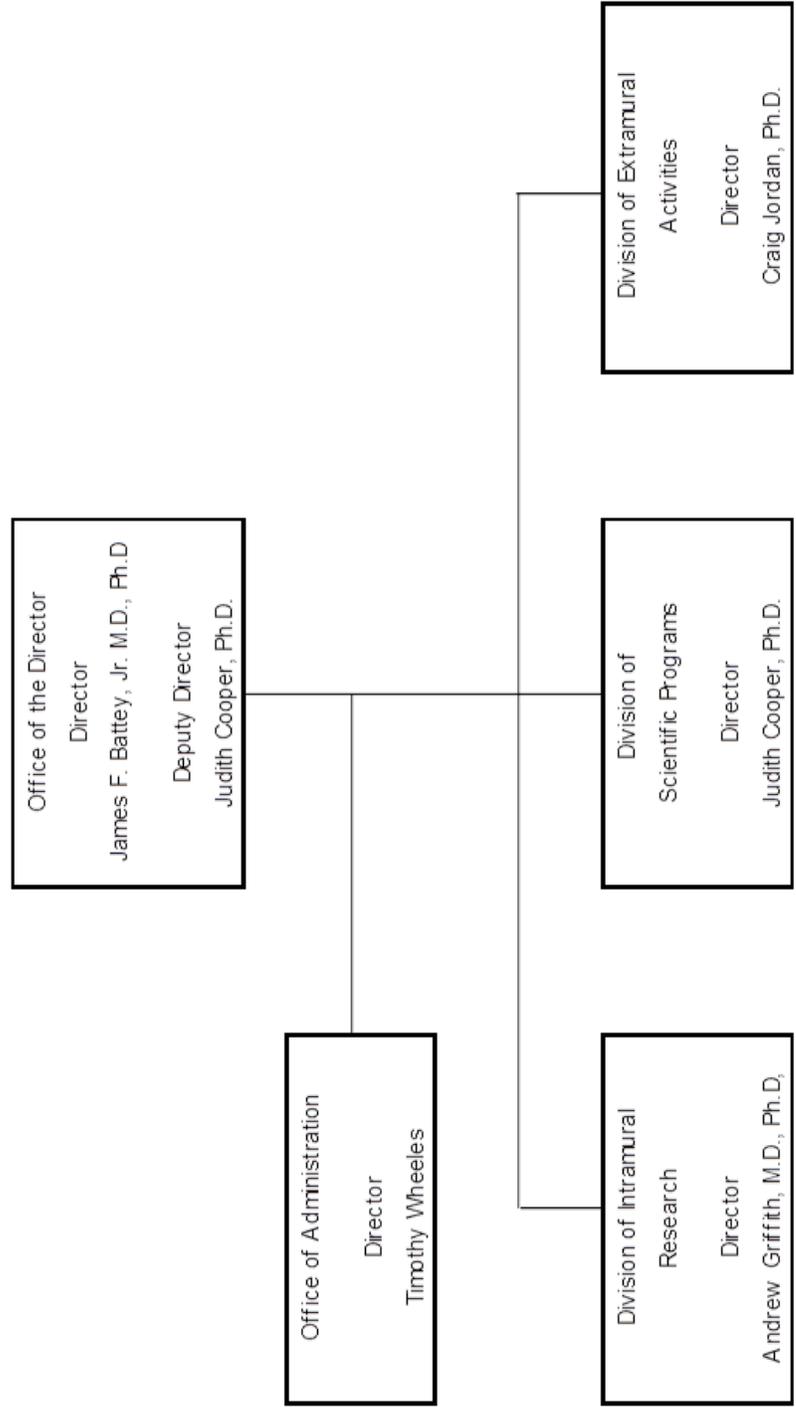
NATIONAL INSTITUTES OF HEALTH

National Institute on Deafness and Other Communication Disorders (NIDCD)

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NOTE: The FY 2016 Enacted funding amounts cited throughout this chapter reflect the effects of OAR HIV/AIDS Transfers.

NATIONAL INSTITUTES OF HEALTH  
National Institute on Deafness and Other Communication Disorders



NATIONAL INSTITUTES OF HEALTH

National Institute on Deafness and Other Communication Disorders

For carrying out section 301 and title IV of the PHS Act with respect to deafness and other communication disorders, [~~\$423,031,000~~]*\$416,146,000*.

**NATIONAL INSTITUTES OF HEALTH**  
**National Institute on Deafness and Other Communication Disorders**

**Amounts Available for Obligation<sup>1</sup>**  
(Dollars in Thousands)

Source of Funding	FY 2015 Actual	FY 2016 Enacted	FY 2017 President's Budget
Appropriation	\$405,302	\$423,031	\$422,936
Mandatory Appropriation: (non-add)			
<i>Type 1 Diabetes</i>	(0)	(0)	(0)
<i>Other Mandatory financing</i>	(0)	(0)	(6,790)
Rescission	0	0	0
Sequestration	0	0	0
FY 2015 First Secretary's Transfer	0	0	0
FY 2015 Second Secretary's Transfer	0	0	0
Subtotal, adjusted appropriation	\$405,302	\$423,031	\$422,936
OAR HIV/AIDS Transfers	-95	-95	0
National Children's Study Transfers	0	0	0
Subtotal, adjusted budget authority	\$405,207	\$422,936	\$422,936
Unobligated balance, start of year	0	0	0
Unobligated balance, end of year	0	0	0
Subtotal, adjusted budget authority	\$405,207	\$422,936	\$422,936
Unobligated balance lapsing	-39	0	0
Total obligations	\$405,168	\$422,936	\$422,936

<sup>1</sup> Excludes the following amounts for reimbursable activities carried out by this account:  
FY 2015 - \$2,192    FY 2016 - \$2,500    FY 2017 - \$2,500

**NATIONAL INSTITUTES OF HEALTH  
FY 2017 Congressional Justification  
NIDCD**

**Budget Mechanism - Total<sup>1</sup>**

(Dollars in Thousands)

MECHANISM	FY 2015 Actual		FY 2016 Enacted		FY 2017 President's Budget <sup>3</sup>		FY 2017 +/- FY 2016	
	No.	Amount	No.	Amount	No.	Amount	No.	Amount
<b>Research Projects:</b>								
Noncompeting	557	\$208,795	550	\$210,600	589	\$226,750	39	\$16,150
Administrative Supplements	(26)	1,375	(45)	2,500	(25)	1,500	(-20)	-1,000
<b>Competing:</b>								
Renewal	40	18,983	46	22,230	38	18,546	-8	-3,684
New Supplements	140	46,237	167	56,366	131	44,550	-36	-11,816
Subtotal, Competing	180	\$65,220	213	\$78,596	169	\$63,096	-44	-\$15,500
Subtotal, RPGs	737	\$275,390	763	\$291,696	758	\$291,346	-5	-\$350
SBIR/STTR	26	11,321	29	12,500	31	13,150	2	650
Research Project Grants	763	\$286,711	792	\$304,196	789	\$304,496	-3	\$300
<b>Research Centers:</b>								
Specialized/Comprehensive	18	\$16,396	15	\$16,600	8	\$13,740	-7	-\$2,860
Clinical Research		153		160		160		
Biotechnology		490						
Comparative Medicine								
Research Centers in Minority Institutions								
Research Centers	18	\$17,039	15	\$16,760	8	\$13,900	-7	-\$2,860
<b>Other Research:</b>								
Research Careers	43	\$7,973	48	\$9,000	48	\$9,000		
Cancer Education								
Cooperative Clinical Research								
Biomedical Research Support								
Minority Biomedical Research Support								
Other	24	5,019	17	2,800	19	2,250	2	-550
Other Research	67	\$12,991	65	\$11,800	67	\$11,250	2	-\$550
Total Research Grants	848	\$316,741	872	\$332,756	864	\$329,646	-8	-\$3,110
<b>Ruth L. Kirchstein Training Awards:</b>								
Individual Awards	112	\$4,894	130	\$5,850	127	\$5,850	-3	
Institutional Awards	160	7,633	153	7,400	150	7,400	-3	
Total Research Training	272	\$12,527	283	\$13,250	277	\$13,250	-6	
Research & Develop. Contracts <i>(SBIR/STTR) (non-add)<sup>2</sup></i>	30	\$19,102 <i>(95)</i>	30	\$18,750 <i>(100)</i>	30	\$21,000 <i>(100)</i>		\$2,250
Intramural Research	61	\$36,710	62	\$37,450	62	\$38,000		\$550
Res. Management & Support <i>Res. Management &amp; Support (SBIR Admin) (non-add)<sup>2</sup></i>	72	20,126	72	20,730	72	21,040		310
<i>Office of the Director - Appropriation<sup>2</sup></i>								
<i>Office of the Director - Other</i>								
<i>ORIP/SEPA (non-add)<sup>2</sup></i>								
<i>Common Fund (non-add)<sup>2</sup></i>								
<b>Buildings and Facilities</b>								
<i>Appropriation</i>								
Type 1 Diabetes								
Program Evaluation Financing								
Cancer Initiative Mandatory Financing								
Other Mandatory Financing						-6,790		-6,790
<b>Subtotal, Labor/HHS Budget Authority</b>		<b>\$405,207</b>		<b>\$422,936</b>		<b>\$416,146</b>		<b>-\$6,790</b>
Interior Appropriation for Superfund Res.								
<b>Total, NIH Discretionary B.A.</b>		<b>\$405,207</b>		<b>\$422,936</b>		<b>\$416,146</b>		<b>-\$6,790</b>
Type 1 Diabetes								
<b>Proposed Law Funding</b>								
Cancer Initiative Mandatory Financing								
Other Mandatory Financing						6,790		6,790
<b>Total, NIH Budget Authority</b>		<b>\$405,207</b>		<b>\$422,936</b>		<b>\$422,936</b>		
Program Evaluation Financing								
<b>Total, Program Level</b>		<b>\$405,207</b>		<b>\$422,936</b>		<b>\$422,936</b>		

<sup>1</sup> All Subtotal and Total numbers may not add due to rounding.

<sup>2</sup> All numbers in italics and brackets are non-add.

<sup>3</sup> Includes mandatory financing.

## **Major Changes in the Fiscal Year 2017 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 2017 President's Budget for NIDCD, which is equal to the FY 2016 Enacted level, for a total of \$422.936 million.

### Research Project Grants (+\$0.300 million; total \$304.496 million):

NIDCD will support a total of 789 Research Project Grant (RPG) awards in FY 2017, a decrease of three awards. Noncompeting projects will be supported at the full commitment level. The number of Competing RPGs will decrease by 44.

### Research Centers (-\$2.860 million; total \$13.900 million):

NIDCD will support a total of 8 Research Centers in FY 2017, a decrease of 7 – all of which are P30 Research Core Centers whose funding expired in FY 2016. The number of P50 Clinical Research Centers will be maintained at six.

### Research & Development Contracts (+\$2.250 million; total \$21.000 million):

Funds are included in R&D contracts to support an increase in Program Evaluation.

**NATIONAL INSTITUTES OF HEALTH**  
**National Institute on Deafness and Other Communication Disorders**

**Summary of Changes**

(Dollars in Thousands)

<b>FY 2016 Enacted</b>	\$422,936
<b>FY 2017 President's Budget</b>	\$422,936
<b>Net change</b>	\$0

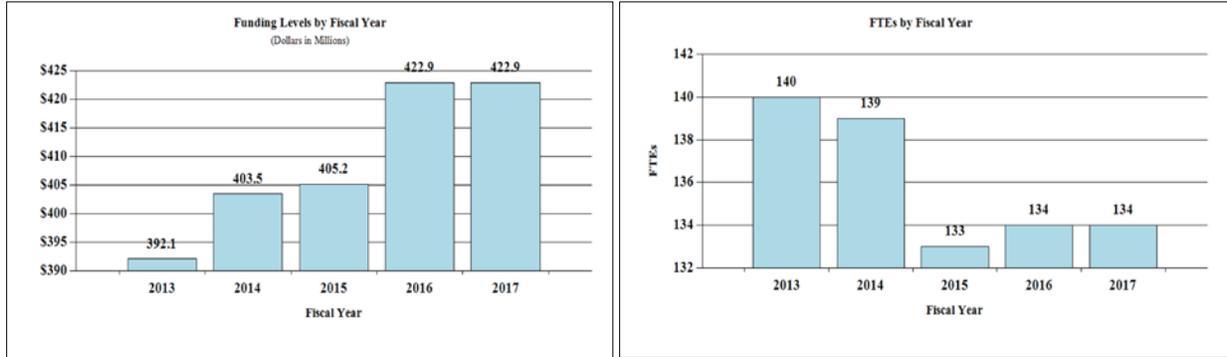
CHANGES	FY 2017 President's Budget <sup>1</sup>		Change from FY 2016	
	FTEs	Budget Authority	FTEs	Budget Authority
<b>A. Built-in:</b>				
<b>1. Intramural Research:</b>				
a. Annualization of January 2016 pay increase & benefits		\$11,984		\$54
b. January FY 2017 pay increase & benefits		11,984		161
c. Two less days of pay		11,984		-95
d. Differences attributable to change in FTE		11,984		0
e. Payment for centrally furnished services		5,991		146
f. Increased cost of laboratory supplies, materials, other expenses, and non-recurring costs		20,025		284
Subtotal				\$550
<b>2. Research Management and Support:</b>				
a. Annualization of January 2016 pay increase & benefits		\$11,355		\$52
b. January FY 2017 pay increase & benefits		11,355		155
c. Two less days of pay		11,355		-90
d. Differences attributable to change in FTE		11,355		0
e. Payment for centrally furnished services		2,333		57
f. Increased cost of laboratory supplies, materials, other expenses, and non-recurring costs		7,352		136
Subtotal				\$310
Subtotal, Built-in				\$860

CHANGES	FY 2017 President's Budget <sup>1</sup>		Change from FY 2016	
	No.	Amount	No.	Amount
<b>B. Program:</b>				
<b>1. Research Project Grants:</b>				
a. Noncompeting	589	\$228,250	39	\$15,150
b. Competing	169	63,096	-44	-15,500
c. SBIR/STTR	31	13,150	2	650
Subtotal, RPGs	789	\$304,496	-3	\$300
2. Research Centers	8	\$13,900	-7	-\$2,860
3. Other Research	67	11,250	2	-550
4. Research Training	277	13,250	-6	0
5. Research and development contracts	30	21,000	0	2,250
Subtotal, Extramural		\$363,896		-\$860
6. Intramural Research	<u>FTEs</u>	62	<u>FTEs</u>	0
		\$38,000		\$0
7. Research Management and Support	72	21,040	0	0
8. Construction		0		0
9. Buildings and Facilities		0		0
Subtotal, Program	134	\$422,936	0	-\$860
Total changes				\$0

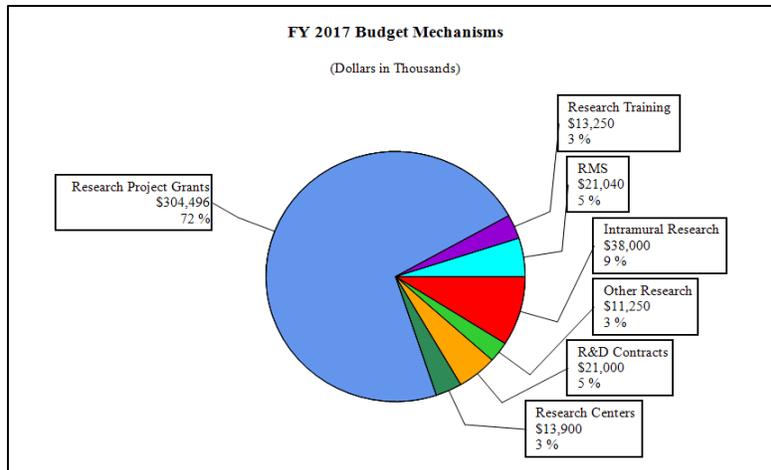
<sup>1</sup> Includes mandatory financing.

## Fiscal Year 2017 Budget Graphs

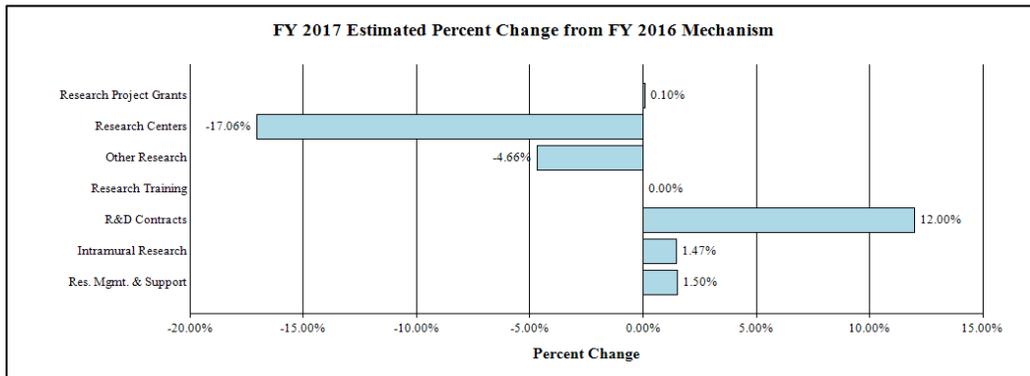
### History of Budget Authority and FTEs:



### Distribution by Mechanism:



### Change by Selected Mechanism:



**NATIONAL INSTITUTES OF HEALTH**  
**National Institute on Deafness and Other Communication Disorders**

**Budget Authority by Activity<sup>1</sup>**  
(Dollars in Thousands)

	FY 2015 Actual		FY 2016 Enacted		FY 2017 President's Budget <sup>2</sup>		FY 2017 +/- FY2016	
	<u>FTE</u>	<u>Amount</u>	<u>FTE</u>	<u>Amount</u>	<u>FTE</u>	<u>Amount</u>	<u>FTE</u>	<u>Amount</u>
<b><u>Extramural Research</u></b>								
<u>Detail</u>								
Hearing and Balance		\$202,806		\$212,345		\$211,844		-\$501
Taste and Smell		60,136		62,965		62,817		-148
Voice, Speech, and Language		85,428		89,446		89,235		-211
<b>Subtotal, Extramural</b>		<b>\$348,370</b>		<b>\$364,756</b>		<b>\$363,896</b>		<b>-\$860</b>
<b>Intramural Research</b>	<b>61</b>	<b>\$36,710</b>	<b>62</b>	<b>\$37,450</b>	<b>62</b>	<b>\$38,000</b>	<b>0</b>	<b>\$550</b>
<b>Research Management &amp; Support</b>	<b>72</b>	<b>\$20,126</b>	<b>72</b>	<b>\$20,730</b>	<b>72</b>	<b>\$21,040</b>	<b>0</b>	<b>\$310</b>
<b>TOTAL</b>	<b>133</b>	<b>\$405,207</b>	<b>134</b>	<b>\$422,936</b>	<b>134</b>	<b>\$422,936</b>	<b>0</b>	<b>\$0</b>

<sup>1</sup> Includes FTEs whose payroll obligations are supported by the NIH Common Fund.

<sup>2</sup> Includes mandatory financing.

**NATIONAL INSTITUTES OF HEALTH**  
**National Institute on Deafness and Other Communication Disorders**

**Authorizing Legislation**

	<b>PHS Act/ Other Citation</b>	<b>U.S. Code Citation</b>	<b>2016 Amount Authorized</b>	<b>FY 2016 Enacted</b>	<b>2017 Amount Authorized</b>	<b>FY 2017 President's Budget<sup>1</sup></b>
Research and Investigation	Section 301	42§241	Indefinite	\$422,936,000	Indefinite	\$416,146,000
National Institute on Deafness and Other Communication Disorders	Section 401(a)	42§281	Indefinite		Indefinite	
<b>Total, Budget Authority</b>				<b>\$422,936,000</b>		<b>\$416,146,000</b>

<sup>1</sup>Excludes mandatory financing.

**NATIONAL INSTITUTES OF HEALTH**  
**National Institute on Deafness and Other Communication Disorders**

**Appropriations History**

<b>Fiscal Year</b>	<b>Budget Estimate to Congress</b>	<b>House Allowance</b>	<b>Senate Allowance</b>	<b>Appropriation</b>
2007	\$391,556,000	\$391,556,000	\$395,188,000	\$393,458,000
Rescission				\$0
2008	\$393,682,000	\$400,305,000	\$402,680,000	\$394,138,000
Rescission				\$7,008,000
Supplemental				\$2,096,000
2009	\$395,047,000	\$408,587,000	\$406,000,000	\$407,259,000
Rescission				\$0
2010	\$413,026,000	\$422,308,000	\$414,755,000	\$418,833,000
Rescission				\$0
2011	\$429,007,000		\$428,331,000	\$418,833,000
Rescission				\$3,677,604
2012	\$426,043,000	\$426,043,000	\$410,482,000	\$417,061,000
Rescission				\$788,245
2013	\$417,297,000		\$418,562,000	\$416,272,755
Rescission				\$832,546
Sequestration				(\$20,894,030)
2014	\$422,936,000		\$420,125,000	\$404,049,000
Rescission				\$0
2015	\$403,933,000			\$405,302,000
Rescission				\$0
2016	\$416,241,000	\$412,366,000	\$424,860,000	\$423,031,000
Rescission				\$0
2017 <sup>1</sup>	\$422,936,000			

<sup>1</sup> Includes mandatory financing.

## Justification of Budget Request

### *National Institute on Deafness and Other Communication Disorders*

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

	FY 2015 Actual	FY 2016 Enacted	FY 2017 President's Budget	FY 2017 +/- FY 2016
BA	\$405,207,000	\$422,936,000	\$422,936,000	\$0
FTE	133	134	134	0

Program funds are allocated as follows: Competitive Grants/Cooperative Agreements; Contracts; Direct Federal/Intramural and Other.

### Director's Overview

Approximately one in six Americans will experience a communication disorder to some degree in his or her lifetime. For those individuals, the basic components of communication (sensing, interpreting, and responding to people and things in our environment) can be challenging. The National Institute on Deafness and Other Communication Disorders (NIDCD) manages a broad intramural and extramural portfolio of both basic and clinical research focused on human communication research and their associated disorders in three program areas: hearing and balance; taste and smell; and voice, speech, and language.

**NIDCD Research Advances:** Extraordinary research opportunities have led to scientific breakthroughs in the study of genes, proteins, sensory and supporting cells, motor function, and molecular processes that directly affect our understanding of communication disorders. These advances have been accompanied by substantial progress in behavioral studies that increase our understanding of how communication processes contribute to a person's health. In the past year, NIDCD has supported research activities in the following areas of communication science:

- **Foundations for Discoveries: Basic Research – Advances in Otitis Media Research:** Otitis media (OM) is an inflammation of the middle ear, usually caused by bacteria, which occurs when fluid builds up behind the eardrum. Five out of six children will have at least one ear infection by their third birthday. In fact, ear infections are the most common reason parents bring their child to a doctor. NIDCD-supported scientists have repurposed a drug that has long been used to treat stroke as a novel treatment for OM. They found that topical administration of the drug, vinpocetine, suppressed inflammation and the overproduction of mucus caused by bacterial infection. This discovery may lead to a non-antibiotic agent to combat OM with minimum side effects. In another NIDCD-supported study, an international group of scientists have identified a rare gene (*A2ML1*) mutation, which may predispose some children to frequent, painful OM. Scientists will

study how the normal form of the *A2ML1* gene appears to provide protective function of the middle ear during OM.<sup>1,2</sup>

- **The Promise of Precision Medicine – Twin Study Suggests Genetics Underlie Sweet Taste Perception:** Although we usually attribute having a “sweet tooth” to personal choice, new research by NIDCD-supported scientists suggests that how much sugar we choose to eat is influenced by our genes. The scientists compared sweetness sensitivity in pairs of twins who were raised together, thus having similar environmental exposure to foods. They compared preferences in identical twins – whose genes are nearly identical, to fraternal twins – who share only about half of their genes. By comparing twin pairs, the scientists were able to determine how much of an individual’s perception of sweetness is due to genes. Their data suggest that approximately 30 percent of the variation in sweetness perception is determined by genetic factors. This finding questions the popular belief that some people eat too much sugar because they were raised on a high-sugar diet. Instead, it seems that individuals who inherit a weak ability to perceive sweet taste may need more sugar than those who inherit a different set of genes for sweet taste in order to reach their desired level of sweetness.<sup>3</sup>
- **Foundations for Discoveries: Basic Research – Neuroscientists Identify Part of Brain Devoted to Processing Speech:** While neuroscientists have identified several areas of the brain that are involved in processing sound, they have long-wondered if there was a part of the brain exclusively dedicated to processing human speech. NIDCD-supported researchers used functional magnetic resonance imaging on multiple parts of the brain to measure individuals’ responses to speech compared to other natural environmental sounds. They found that one particular area called the superior temporal sulcus responded solely to speech. By identifying where in the brain human speech is analyzed, it allows for new ideas about how to identify, prevent, and possibly treat acquired and developmental hearing, speech, and language disorders, including dyslexia, auditory processing disorder, and specific language impairment.<sup>4</sup>

**NIDCD Plans, Priorities, and Challenges for the Future:** NIDCD continues its support of new and competing Research Project Grants from investigators who have innovative ideas and fresh perspectives. NIDCD is also working hard to prepare a diverse and talented biomedical research workforce focused on communication disorders, especially the research training and career development of emerging clinician-investigators. Driven by compelling public health needs along with recent scientific progress, NIDCD prioritizes its research investments to identify the most promising opportunities for human communication research, including:

- **Foundations for Discoveries: Basic Research – Translating Basic Research into Clinical Tools for Better Human Health:** NIDCD is currently funding projects aimed at delivering therapeutic drugs to the inner ear to treat diseases such as Ménière’s, sudden sensorineural hearing loss, and tinnitus; optimizing use of an agent (D-methionine) known to protect the ear from noise-induced hearing loss; developing brain-computer interfaces for individuals unable to speak due to injury or stroke; and testing technology

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<sup>1</sup> <http://www.ncbi.nlm.nih.gov/pubmed/26121085>

<sup>2</sup> <http://www.ncbi.nlm.nih.gov/pubmed/25972475>

<sup>3</sup> <http://www.ncbi.nlm.nih.gov/pubmed/26181574>

<sup>4</sup> <http://www.ncbi.nlm.nih.gov/pubmed/25984889>

to provide a sense of sound to individuals with damaged auditory nerves who cannot benefit from a cochlear implant.

- **Applying Big Data and Technology to Improve Health – Open Speech Signal Processing:** Today’s hearing aids provide limited improvements of speech intelligibility in noisy environments; this represents a critical need of the hearing aid user. NIDCD held a workshop in 2014 to discuss the potential value of a research tool that employs open design principles to provide continued enhancements in the computing power available in a portable device and to accelerate research and development of new types of acoustic signal processing for speech enhancement and noise reduction. Scientific experts considered the current research landscape, assessed barriers, and developed recommendations. As a result, NIDCD published two Funding Opportunity Announcements (FOAs) on “Open Design Tools for Speech Signal Processing”. These FOAs will support academic research projects and small business innovation research and development projects focused on facilitating movement of the new computing technology from the research laboratory into widespread use within research instruments, hearing aids, cochlear implants, and consumer electronics devices.

#### Overall Budget Policy:

The FY 2017 President’s Budget request for NIDCD is \$422.936 million, the same as the FY 2016 Enacted level. NIDCD will continue to support new and early stage investigators, and will maintain nearly the same total number of Research Project Grants (RPG’s), 789 in FY 2017 versus 792 in FY 2016. In FY 2017, NIDCD will support new investigators on R01 equivalent awards at success rates approximately equal to those of established investigators submitting new R01 equivalent applications. FY 2017 Noncompeting RPG’s will be funded at the full commitment level. In the Research Project Grants mechanism, an increase of \$1.821 million is requested for expanded NIDCD participation in the NIH BRAIN initiative.

NIDCD allocates a portion of the funds available for competing RPGs to High Program Priority (HPP) projects outside of the automatic pay line. NIDCD will continue emphasizing faculty, postdoctoral, and student training in our three program areas: hearing and balance; taste and smell; and voice, speech and language sciences. Postdoctoral fellows who show high promise as an emerging independent investigator will be encouraged to launch their careers through the Pathways to Independence (K99-R00) program. Stipend rates for predoctoral trainees and postdoctoral fellows increase by two percent.

In R&D Contracts, funds are provided to support an increase in Program Evaluation.

### **Program Descriptions and Accomplishments**

**Hearing and Balance Program:** Loss of hearing or balance imposes a significant social and economic burden upon individuals, their families, and the communities in which they live. Millions of Americans experience a hearing or balance disorder at some point in their life, especially as young children or older adults. Common examples include middle-ear infections (otitis media), noise-induced hearing loss, tinnitus, age-related hearing loss, dizziness, and vertigo. Hearing and balance disorders also decrease quality of life, and cross all ethnic and socioeconomic lines. Approximately 37.5 million American adults report some degree of

hearing loss and almost eight million adults report a chronic problem with balance.<sup>5,6</sup> In addition, about two to three out of every 1,000 children in the United States are born with a detectable level of hearing loss in one or both ears that can affect their speech, language, social, and cognitive development.<sup>7</sup> In 2014, one in six U.S. adults ages 18 and older reports trouble hearing without a hearing aid.<sup>8</sup> Accordingly, research projects within the NIDCD Hearing and Balance Program encompass over half of NIDCD's portfolio. To study normal and disordered functions of the auditory and vestibular systems, NIDCD employs a wide range of research approaches such as molecular genetics, cellular biology, biomedical imaging, nanotechnology, psychoacoustics, and structural and functional biology. NIDCD supports research that will lead to improved treatments for, and prevention of, hearing and balance disorders. To meet this need, NIDCD plans to continue its concerted effort to improve and expand its clinical trials program. For instance, NIDCD is supporting a clinical trial to use an auditory brainstem implant (ABI) in children who were born without an auditory nerve. An ABI, like a cochlear implant, consists of a microphone and transmitter worn on the side of the head, which convert sounds from the outside world into electrical signals. Those signals are transmitted to an internal receiver made up of electrodes, implanted on the brainstem (unlike a cochlear implant, which stimulates the auditory nerve). The auditory neurons are stimulated directly in the brain, bypassing the inner ear completely. If successful, physicians will have a viable treatment option for individuals born without an auditory nerve or those with a disorder of the auditory nerve.

#### Budget Policy:

The 2017 President's Budget for the Hearing and Balance program is \$211.844 million, a decrease of \$0.501 million or 0.2 percent compared to the FY 2016 Enacted level. In FY 2017, the program will continue emphasizing faculty, postdoctoral, and student training on hearing and balance sciences. Postdoctoral fellows who show high promise as emerging independent investigators will be encouraged to launch their careers through the Pathways to Independence (K99-R00) program. Making R01 awards to first-time and early-stage investigators in the area of hearing and balance sciences will be given funding priority.

#### **PROGRAM PORTRAIT: Applying Big Data and Technology to Improve Health – Enhancing Hearing Aids to Function Better in Noisy Environments**

FY 2016 Level: \$11.2 million

FY 2017 Level: \$11.2 million

Change: \$0.0 million

Approximately 15 percent of American adults (37.5 million) age 18 and over report some trouble hearing, making this one of the most prevalent disabling conditions in the United States. Hearing loss can be hereditary, or it can result from disease, trauma, medications, or long-term exposure to damaging noise. The condition can vary from a mild but important loss of sensitivity to a total loss of hearing.

Sensorineural hearing loss is caused by a problem in the cochlea or the auditory nerve, the parts of the ear that help sound impulses reach the brain. It affects people of all ages, in all segments of the population, and across all

<sup>5</sup> Blackwell DL, Lucas JW, Clarke TC. Summary health statistics for U.S. adults: National Health Interview Survey, 2012. National Center for Health Statistics. Vital Health Stat 10(260). 2014. .

<sup>6</sup> Based on prevalences from the 1994–95 Disability Supplement to the NHIS and current US population estimates.

<sup>7</sup> <http://www.ncbi.nlm.nih.gov/pubmed/20203554>, <http://www.ncbi.nlm.nih.gov/pubmed/12784222>

<sup>8</sup> Zelaya CE, Lucas JW, Hoffman HJ. Self-reported hearing trouble in adults aged 18 and over: United States, 2014. NCHS data brief, no 214. Hyattsville, MD: National Center for Health Statistics. 2015.

socioeconomic levels. It can interfere with an individual's physical, cognitive, behavioral, and social functions and hearing aids are the main form of treatment; however, among adults age 70 and older with hearing loss that could benefit from hearing aids, fewer than 30 percent has ever used them. Even fewer adults age 20 to 69 (approximately 16 percent) who could benefit from wearing hearing aids have ever used them.

A hearing aid works by amplifying sound to allow people to hear sounds that would not be audible. It can also be used to access "hearing loop" wireless signals that are beamed directly to the aid to bypass background noises in specially equipped movie theaters, lecture halls, and other areas. A vast array of hearing aid technology is available to provide additional features, such as the telecoil needed to pick up the hearing loop wireless signal. Devices range in cost upward from \$1,000.

Although the development of microelectronic components has enabled development of new digital hearing aid technology to replace earlier devices based on analog circuits, the underlying damage to the inner ear remains a limitation when the user is confronted by multiple speakers or background noise. Hearing aid users often complain of straining to focus on a single speech sound among competing sources at meetings, banquets, and sporting events. One solution to this problem is to move the hearing aid user closer to the person speaking and further from the noise sources. Directional microphones offer another approach to do the same thing simply by pointing a device.

NIDCD-supported scientists have studied the tiny fly, *Ormia ochracea*, which has such remarkable directional hearing that its design has inspired development of a novel directional microphone. The physics and biology behind this fly's abilities to localize sound was reverse engineered and provided engineers with strategies to improved directional microphones that are small enough to use in hearing aids and help focus the aid on one sound source at a time. These new principles were highlighted as an opportunity to improve hearing aids.

Capitalizing on the knowledge learned from studying *Ormia*, another group of NIDCD-supported scientists successfully completed design and testing of a novel microphone based on these design elements. The scientists used silicon microfabrication technology to reliably fabricate the critical sensing elements needed for a functional microphone based on this novel design, characterize its function, and prove it had the capability to provide performance gains over existing designs.

Other NIDCD-supported scientists have taken the prototype microphone to the next level by adapting the design into a form more readily incorporated in a commercial hearing aid. The scientists are the first to use piezoelectric materials which turn mechanical pressure into electrical signals, or voltage, and allow the hearing aid to operate with very little power. Because hearing aids rely on batteries, minimizing power consumption is a crucial design requirement.

NIDCD's research on hearing aids continues to improve the technology and provide devices that can increase the quality of life of millions of hearing-impaired Americans.

**Taste and Smell Program:** Each year, more than 200,000 people visit a physician for chemosensory problems such as taste and smell disorders.<sup>9</sup> Many more taste and smell disorders go unreported. NIDCD supports studies of the chemical senses known as taste, smell, and chemethesis (chemically provoked irritation) to enhance our understanding of how individuals communicate with their environment and how human chemosensory disorders can be diagnosed and treated. Taste and smell play important roles in preferences and aversions for aromas, specific foods, and flavors. By helping us understand why people prefer certain foods over others, research on taste and smell may help develop preventative and treatment strategies for obesity and diabetes. Taste preferences can also influence whether someone is willing to take a needed medication.

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<sup>9</sup> <http://www.nidcd.nih.gov/health/statistics/smelltaste/stquickstats.htm>.

The regenerative capability of the olfactory system declines with age, which negatively impacts olfactory function. Although the estimates of the prevalence of olfactory impairment vary, it is likely that more than one third of adults over the age of 70 have olfactory deficits. Since both taste and smell contribute to flavor, such olfactory deficits affect the flavor of foods and consequently food intake, diet and overall nutrition, and health status. NIDCD encourages further studies of this age-related decline in olfactory sensitivity including the development of better diagnostic tests to assess chemosensory loss as well as animal models for use in studying why this decline occurs and how to prevent it. Furthermore, NIDCD-supported scientists are trying to understand why one popular type of gastric bypass surgery (Roux-en-Y) not only causes weight loss but also changes an individual's taste preferences. After Roux-en-Y gastric bypass surgery, individuals often avoid sweet and fatty foods. The scientists theorize that surgery damages a part of the vagus nerve found in the gut that is responsible for conveying signals to the brain and changes how the brain encodes tastes. A better understanding of how the surgery causes avoidance of fattening food could lead to the development of obesity treatments that mimic the surgical side-effect without the need for surgery.

#### Budget Policy:

The 2017 President's Budget for the Taste and Smell program is \$62.817 million, a decrease of \$0.148 million or 0.2 percent compared to the FY 2016 Enacted level. In FY 2017, the program will continue emphasizing faculty, postdoctoral, and student training on smell and taste sciences. Postdoctoral fellows who show high promise as emerging independent investigators will be encouraged to launch their careers through the Pathways to Independence (K99-R00) program. Making R01 awards to first-time and early-stage investigators in the area of smell and taste sciences will be given funding priority.

**Voice, Speech, and Language Program:** Voice, speech, and language abilities allow us to share thoughts, ideas, and emotions. Disorders involving voice, speech, or language, as well as swallowing, can have a significant effect on an individual's health and quality of life; these disorders affect people of all ages with or without hearing impairment, including children with autism, those who stutter, and adults with aphasia or other speech disorders. Approximately 7.5 million people in the United States have trouble using their voice.<sup>10</sup> By the first grade, roughly five percent of children have noticeable speech disorders.<sup>11</sup> Between six and eight million people in the United States have some form of language impairment.<sup>12</sup>

NIDCD continues its commitment to develop effective diagnostic and intervention strategies for people with voice, speech, or language impairments. For example, NIDCD supports basic, clinical, and translational research studies focused on advancing scientific knowledge of the human larynx and human voice production in health and disease and optimal ways to prevent, evaluate, diagnose, and clinically manage voice disorders. Thousands of Americans each year lose their voice to injury or disease. NIDCD-supported scientists aim to develop a novel method to restore laryngeal function by using human adult-derived muscle stem cells and implanting

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<sup>10</sup> <http://www.nidcd.nih.gov/health/statistics/vsl.asp>.

<sup>11</sup> U.S. Preventive Services Task Force, Screening for Speech and Language Delay in Preschool Children, <http://www.ahrq.gov/clinic/uspstf06/speech/speechrev.htm>. Shriberg LD, Tomblin JB, McSweeney JL. Prevalence of speech delay in 6-Year-old children and comorbidity with language impairment. *J Speech Lang Hear Res* 42: 1461-1481, 1999.

<sup>12</sup> <http://www.nidcd.nih.gov/health/statistics/vsl.asp>.

them in animal models of vocal cord injury. This translational, regenerative-medicine approach could lead to improved surgical options for voice restoration.

Additionally, NIDCD supports research that aims to improve the understanding of the underlying neurobiology of language impairments such as aphasia. Using neuroimaging techniques, NIDCD-supported scientists have identified new brain areas associated with aphasia, the language problems typically associated with stroke. In one research study, scientists have discovered that completely different brain areas control word and sentence comprehension, respectively, in primary progressive aphasia, and not a single area as previously thought.<sup>13</sup> In another study, researchers used neuroimaging combined with behavioral assessment in individuals with aphasia to match-up brain lesions with corresponding symptoms.<sup>14</sup> These results helped scientists learn more about symptom diversity in individuals with language impairments, and these newly identified neural areas can serve as targets for diagnostic assessment and treatment interventions.

In collaboration with the Centers for Disease Control and Prevention (CDC), NIDCD published a Data Brief in 2015 based on information collected from the 2012 National Health Interview Survey entitled, “Communication Disorders and Use of Intervention Services Among Children age 3-17 Years: United States, 2012.”<sup>15</sup> The types of communication disorders surveyed were speech, language, voice, and swallowing problems. In the year the survey was conducted, one in twelve (7.7 percent) children age 3-17 years had a communication disorder during the past 12 months. The report also noted age, ethnicity, and gender differences in the prevalence of communication disorders as well as differences in the likelihood of receiving interventions services for their disorders. Ongoing surveillance may provide further insights into the health and wellbeing of this population.

**Budget Policy:**

The FY 2017 President’s Budget for the Voice, Speech, and Language program is \$89.235 million, a decrease of \$0.211 million or 0.2 percent compared to the FY 2016 Enacted level. In FY 2017, the program will continue emphasizing faculty, postdoctoral, and student training on voice, speech, and language sciences. Postdoctoral fellows who show high promise as emerging independent investigators will be encouraged to launch their careers through the Pathways to Independence (K99-R00) program. Making R01 awards to first-time and early-stage investigators in the area of voice, speech, and language sciences will be given funding priority.

**PROGRAM PORTRAIT: The Promise of Precision Medicine – Autism Center of Excellence – Non-Verbal Children with Autism Spectrum Disorders**

FY 2016 Level: \$1.7 million  
FY 2017 Level: \$1.7 million  
Change: \$0.0 million

Autism spectrum disorders (ASD) are a group of developmental disabilities that can cause significant social, communication, and behavioral challenges. ASDs affect each person in different ways and can range from very

<sup>13</sup> <http://www.ncbi.nlm.nih.gov/pubmed/26112340>  
<sup>14</sup> <http://www.ncbi.nlm.nih.gov/pubmed/25879574>  
<sup>15</sup> <http://198.246.124.29/nchs/data/databriefs/db205.pdf>

mild to severe. According to the CDC, about 1 in 68 children is diagnosed with an ASD.<sup>16</sup> NIDCD has identified a number of research needs and opportunities related to children with autism, and in particular, among the 25-30 percent of children with ASD who remain functionally non-verbal beyond five years of age – a subset under-represented in research.

NIDCD supports research that focuses on language acquisition in children with ASD and is committed to supporting research efforts to improve the diagnosis of ASD and the available treatments to address language deficits in children with the disorder. NIDCD recognized the need for increased research attention related to individuals who remain non-verbal and as a result, in 2010, NIDCD organized and led a multidisciplinary workshop, cosponsored by several other NIH Institutes, to analyze the state of empirical knowledge related to non-verbal children with ASD. The workshop resulted in consensus that novel methods in assessing cognition and language comprehension in non-verbal children with ASD were needed and further studies were needed to explain why some children do not acquire spoken language by school-age, in spite of exposure to evidence-based interventions. A follow-up workshop in 2011 focused on assessment of non-verbal children with ASD. The resulting recommendations from both workshops were published in 2013.<sup>17</sup>

As a result of these activities, and to address under-represented research needs among non-verbal children with ASD, NIDCD awarded an Autism Centers of Excellence (ACE) center grant to concentrate on why some children have such limited language abilities with the goal of helping these children to overcome this limitation.<sup>18</sup> In its first few years, the ACE center has made significant progress in understanding minimally verbal children with ASD, including: 1) there is no single explanation for the absence of fluent speech/language in their diverse study group; 2) assessing how much language is understood by these children with autism is improved using technology such as touch-screen computers and eye-tracking measures; 3) there are significant differences in how minimally verbal children process sounds and produce speech, which may underlie some of the language difficulties found; and 4) A promising and innovative new intervention, called auditory motor mapping training, a behavioral intervention that combines the use of singing and motor activities, appears to strengthen the language regions of the brain that may be abnormal in children with ASD.

ACE funding provides the opportunity for scientists to collaborate and improve our understanding of this population and develop more effective interventions that can help many children with ASD communicate and interact more successfully.

**Intramural Research Program (IRP):** IRP conducts basic and clinical research in human communication, with a primary focus on hearing. Research projects address the genetics of hearing and balance disorders in humans and mouse models; identifying molecules and genes important for inner ear development; observing hearing in action by neuroimaging and computer modeling of brain function; and describing how auditory nerve cells communicate. The Program's faculty also investigate other areas of communication, such as stuttering.

Approximately half of hearing loss detected in newborns is due to inheritance of a mutated gene. Recently, NIDCD intramural scientists used gene therapy in mice to correct one form of inherited deafness. Inheritance of a mutant gene for a protein called whirlin causes defects in the architecture and organization of sensory cells in the inner ear known as hair cells that detect sound. Mice with the mutation have severe hearing loss and balance problems, and their hair cells die after birth. In humans, the mutation may either cause deafness alone or Usher syndrome (both deafness and blindness). When the scientists treated mutant mice, the therapy restored the

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<sup>16</sup> Prevalence of Autism Spectrum Disorder Among Children Aged 8 Years — Autism and Developmental Disabilities Monitoring Network, 11 Sites, United States, 2010. CDC, March 28, 2014. <http://www.cdc.gov/mmwr/preview/mmwrhtml/ss6302a1.htm>.

<sup>17</sup> <http://www.ncbi.nlm.nih.gov/pubmed/24124067>

<sup>18</sup> [http://projectreporter.nih.gov/project\\_info\\_description.cfm?aid=8913120](http://projectreporter.nih.gov/project_info_description.cfm?aid=8913120)

architecture and organization and increased the survival of the hair cells in the treated ear. The therapy did not, however, prevent hearing loss in the mutant mice. The scientists' results are the first to demonstrate that gene therapy can rescue the architecture and organization and increase the survival of hair cells in one form of inherited deafness. Now they are eager to figure out why these improvements in the hair cells do not restore hearing ability.

NIDCD, NICHD, and NCATS are collaborating to improve understanding and treatment of individuals with Niemann-Pick C Disease (NPC), a type of lysosomal storage disorder. Lysosomes serve as the cell's recycling centers, breaking down unwanted or damaged cellular contents. If lysosomes aren't working properly, a buildup of cellular trash can damage or kill the cell. In NPC, fat molecules build up in the lysosomes and cause progressive neurological disease and eventually, death. NIDCD intramural scientists are participating in a Phase I clinical trial at the NIH Clinical Center to test a new drug, called cyclodextrin, to treat NPC. The researchers will focus on the hearing loss that results from NPC, as well as additional hearing loss that may be caused by the treatment (cyclodextrin). They will monitor hearing loss and help individuals with NPC adjust to it by providing hearing aids and other assistive devices.

Another communication disorder under investigation in NIDCD's intramural program also involves lysosomal storage problems. A team exploring the genetics of stuttering recently discovered that some forms of inherited stuttering are caused by a mutation on the same gene that causes a lysosomal storage disorder called mucopolysaccharidosis (ML). Depending upon the version of the mutation that a person inherits, they either stutter or suffer from ML type 2 or type 3. The scientists hypothesize that the different outcomes may be due to the fact that the mutation inherited by those who stutter has a less severe effect on the functioning of the gene's protein product than the mutations inherited by those with ML type 2 or 3. This research provides important information about how much of stuttering is due to inheritance of a mutated gene. It may also guide efforts to develop treatments for individuals who inherit any of these mutations.

#### Budget Policy:

The FY 2017 President's Budget for the Intramural Research program is \$38.000 million, an increase of \$0.550 million or 1.5 percent compared to the FY 2016 Enacted level. The NIDCD Intramural Research Program has been a leader in research on hereditary hearing impairment and has identified many genes whose mutation causes hearing loss. In FY 2017, NIDCD intramural scientists will continue their efforts in identifying mutation in genes, which impacts hearing, and identifying or studying additional genes involved in communication disorders in humans and animal models. The additional funds will cover pay increase and benefits, payments for centrally furnished services, and increase cost of laboratory supplies, materials, and other expenses.

**Research Management and Support (RMS) Program:** RMS activities provide administrative, budgetary, logistical, and scientific support in the review, award, and monitoring of research grants, training awards, and research and development contracts. RMS functions also include strategic planning, coordination, and evaluation of the Institute's programs, regulatory compliance, international coordination, and liaison with other Federal agencies, Congress, and the public. The NIDCD currently supports approximately 1,300 research grants, training awards, and R&D contracts.

NIDCD continues to expand its education and outreach of science to the public. For example, in 2015, NIDCD participated in four congressional visits from one House member, House and Senate staff, professional organization members, and advocacy group members. During the visits, NIDCD program staff and intramural scientists were able to have interactive discussions about NIDCD-sponsored research initiatives and intramural research programs. Visitors had unique opportunities to visit the NIDCD Audiology Unit in the NIH Clinical Research Center and view the hearing and balance measurement equipment used to assess individuals who are participating on NIH clinical research protocols. In the basic research laboratory setting, visitors were able to view science in action by visiting several of the intramural labs focused on genetics and sensory development and learned about the importance of animal models for human communication disorders.

Further, in 2015, NIDCD developed a Language Access Plan as a result of a presidential Executive Order. The Executive Order requires Federal Agencies to identify any need for services to individuals with limited English proficiency (LEP) and to develop and implement a plan to provide those individuals with meaningful access to them. The NIDCD plan is primarily focused on individuals with LEP having access to consumer-oriented health information and for study volunteers to access informed consent and other vital documents for participation in clinical research.

Budget Policy:

The FY 2017 President's Budget for the Research Management and Support program is \$21.040 million, an increase of \$0.310 million or 1.5 percent compared to the FY 2016 Enacted level. Additional funds will be utilized to cover increased costs of pay and central services, as well as scientific workshops, improved public online services, enhanced web-based information systems to improve scientific and administrative management, and strategic planning.

**NATIONAL INSTITUTES OF HEALTH**  
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**Budget Authority by Object Class<sup>1</sup>**

(Dollars in Thousands)

	<b>FY 2016 Enacted</b>	<b>FY 2017 President's Budget<sup>2</sup></b>	<b>FY 2017 +/- FY 2016</b>
Total compensable workyears:			
Full-time employment	134	134	0
Full-time equivalent of overtime and holiday hours	0	0	0
Average ES salary	\$183	\$186	\$3
Average GM/GS grade	12.4	12.4	0.0
Average GM/GS salary	\$108	\$110	\$2
Average salary, grade established by act of July 1, 1944 (42 U.S.C. 207)	\$108	\$110	\$2
Average salary of ungraded positions	\$170	\$173	\$3
<b>OBJECT CLASSES</b>	<b>FY 2016 Enacted</b>	<b>FY 2017 President's Budget<sup>2</sup></b>	<b>FY 2017 +/- FY 2016</b>
Personnel Compensation			
11.1 Full-Time Permanent	\$10,754	\$10,836	\$82
11.3 Other Than Full-Time Permanent	4,646	4,681	35
11.5 Other Personnel Compensation	307	309	2
11.7 Military Personnel	110	111	1
11.8 Special Personnel Services Payments	2,213	2,230	17
<b>11.9 Subtotal Personnel Compensation</b>	<b>\$18,030</b>	<b>\$18,167</b>	<b>\$137</b>
12.1 Civilian Personnel Benefits	\$5,021	\$5,120	\$99
12.2 Military Personnel Benefits	51	51	0
13.0 Benefits to Former Personnel	0	0	0
<b>Subtotal Pay Costs</b>	<b>\$23,102</b>	<b>\$23,339</b>	<b>\$237</b>
21.0 Travel & Transportation of Persons	\$354	\$361	\$6
22.0 Transportation of Things	56	57	1
23.1 Rental Payments to GSA	1	1	0
23.2 Rental Payments to Others	0	0	0
23.3 Communications, Utilities & Misc. Charges	173	176	3
24.0 Printing & Reproduction	0	0	0
25.1 Consulting Services	\$122	\$124	\$2
25.2 Other Services	3,015	3,069	54
25.3 Purchase of goods and services from government accounts	40,234	42,853	2,619
25.4 Operation & Maintenance of Facilities	\$990	\$1,008	\$18
25.5 R&D Contracts	1,644	1,673	30
25.6 Medical Care	335	345	9
25.7 Operation & Maintenance of Equipment	781	795	14
25.8 Subsistence & Support of Persons	0	0	0
<b>25.0 Subtotal Other Contractual Services</b>	<b>\$47,121</b>	<b>\$49,867</b>	<b>\$2,746</b>
26.0 Supplies & Materials	\$2,356	\$2,398	\$42
31.0 Equipment	3,773	3,841	68
32.0 Land and Structures	0	0	0
33.0 Investments & Loans	0	0	0
41.0 Grants, Subsidies & Contributions	346,000	342,896	-3,104
42.0 Insurance Claims & Indemnities	0	0	0
43.0 Interest & Dividends	0	0	0
44.0 Refunds	0	0	0
<b>Subtotal Non-Pay Costs</b>	<b>\$399,834</b>	<b>\$399,597</b>	<b>-\$237</b>
<b>Total Budget Authority by Object Class</b>	<b>\$422,936</b>	<b>\$422,936</b>	<b>\$0</b>

<sup>1</sup> Includes FTEs whose payroll obligations are supported by the NIH Common Fund.

<sup>2</sup> Includes mandatory financing.

**NATIONAL INSTITUTES OF HEALTH**  
**National Institute on Deafness and Other Communication Disorders**

**Salaries and Expenses**  
(Dollars in Thousands)

OBJECT CLASSES	FY 2016 Enacted	FY 2017 President's Budget	FY 2017 +/- FY 2016
<b>Personnel Compensation</b>			
Full-Time Permanent (11.1)	\$10,754	\$10,836	\$82
Other Than Full-Time Permanent (11.3)	4,646	4,681	35
Other Personnel Compensation (11.5)	307	309	2
Military Personnel (11.7)	110	111	1
Special Personnel Services Payments (11.8)	2,213	2,230	17
<b>Subtotal Personnel Compensation (11.9)</b>	<b>\$18,030</b>	<b>\$18,167</b>	<b>\$137</b>
Civilian Personnel Benefits (12.1)	\$5,021	\$5,120	\$99
Military Personnel Benefits (12.2)	51	51	0
Benefits to Former Personnel (13.0)	0	0	0
<b>Subtotal Pay Costs</b>	<b>\$23,102</b>	<b>\$23,339</b>	<b>\$237</b>
Travel & Transportation of Persons (21.0)	\$354	\$361	\$6
Transportation of Things (22.0)	56	57	1
Rental Payments to Others (23.2)	0	0	0
Communications, Utilities & Misc. Charges (23.3)	173	176	3
Printing & Reproduction (24.0)	0	0	0
<b>Other Contractual Services:</b>			
Consultant Services (25.1)	122	124	2
Other Services (25.2)	3,015	3,069	54
Purchases from government accounts (25.3)	24,876	25,333	456
Operation & Maintenance of Facilities (25.4)	990	1,008	18
Operation & Maintenance of Equipment (25.7)	781	795	14
Subsistence & Support of Persons (25.8)	0	0	0
<b>Subtotal Other Contractual Services</b>	<b>\$29,785</b>	<b>\$30,329</b>	<b>\$545</b>
Supplies & Materials (26.0)	\$2,356	\$2,398	\$42
<b>Subtotal Non-Pay Costs</b>	<b>\$32,724</b>	<b>\$33,321</b>	<b>\$598</b>
<b>Total Administrative Costs</b>	<b>\$55,825</b>	<b>\$56,660</b>	<b>\$835</b>

**NATIONAL INSTITUTES OF HEALTH**  
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**Detail of Full-Time Equivalent Employment (FTE)**

OFFICE/DIVISION	FY 2015 Actual			FY 2016 Est.			FY 2017 Est.		
	Civilian	Military	Total	Civilian	Military	Total	Civilian	Military	Total
Division of Extramural Activities									
Direct:	19	-	19	19	-	19	19	-	19
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	19	-	19	19	-	19	19	-	19
Division of Intramural Research Program									
Direct:	56	1	57	57	1	58	57	1	58
Reimbursable:	4	-	4	4	-	4	4	-	4
Total:	60	1	61	61	1	62	61	1	62
Division of Scientific Programs									
Direct:	15	-	15	15	-	15	15	-	15
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	15	-	15	15	-	15	15	-	15
Office of Administration									
Direct:	35	-	35	34	-	34	34	-	34
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	35	-	35	34	-	34	34	-	34
Office of the Director									
Direct:	3	-	3	4	-	4	4	-	4
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	3	-	3	4	-	4	4	-	4
<b>Total</b>	<b>132</b>	<b>1</b>	<b>133</b>	<b>133</b>	<b>1</b>	<b>134</b>	<b>133</b>	<b>1</b>	<b>134</b>
Includes FTEs whose payroll obligations are supported by the NIH Common Fund.									
FTEs supported by funds from Cooperative Research and Development Agreements.	0	0	0	0	0	0	0	0	0
<b>FISCAL YEAR</b>	<b>Average GS Grade</b>								
2013	12.4								
2014	12.4								
2015	12.4								
2016	12.4								
2017	12.4								

**NATIONAL INSTITUTES OF HEALTH**  
**National Institute on Deafness and Other Communication Disorders**

**Detail of Positions<sup>1</sup>**

GRADE	FY 2015 Actual	FY 2016 Enacted	FY 2017 President's Budget
Total, ES Positions	1	1	1
Total, ES Salary	179,994	182,622	185,544
GM/GS-15	22	22	22
GM/GS-14	19	19	19
GM/GS-13	15	16	16
GS-12	19	19	19
GS-11	9	9	9
GS-10	0	0	0
GS-9	10	10	10
GS-8	4	4	4
GS-7	2	2	2
GS-6	1	1	1
GS-5	0	0	0
GS-4	0	0	0
GS-3	0	0	0
GS-2	1	1	1
GS-1	0	0	0
Subtotal	102	103	103
Grades established by Act of July 1, 1944 (42 U.S.C. 207)	0	0	0
Assistant Surgeon General	0	0	0
Director Grade	0	0	0
Senior Grade	1	1	1
Full Grade	0	0	0
Senior Assistant Grade	0	0	0
Assistant Grade	0	0	0
Subtotal	1	1	1
Ungraded	43	43	43
Total permanent positions	101	102	102
Total positions, end of year	147	148	148
Total full-time equivalent (FTE) employment, end of year	133	134	134
Average ES salary	179,994	182,622	185,544
Average GM/GS grade	12.4	12.4	12.4
Average GM/GS salary	106,706	108,264	109,996