



# MGH Research Overview

**Danish Association for Research Managers and Administrators**

*Presented by*

*Gary Smith*

*October 31, 2011*

# A Research Powerhouse Within a Hospital



MASSACHUSETTS  
GENERAL HOSPITAL

A drug's unintended use restores the gift of hearing - *Boston Globe*

Scientists find master heart cell - *Boston Globe*

Medical Breakthrough Spares Kidney Transplant Patients From Taking Anti-rejection Drugs - *AP*

Common Gene Variations Linked to Schizophrenia, Scientists Say - *Bloomberg News*

Report on protein test to predict heart attack sounds cautious note - *Boston Globe*

Harvard team grows heart muscle from stem cells - *Boston Globe*

Genes linked with hypertension identified - *Asia News International*

Biomarkers to predict brain tumour's response to therapy identified - *Asia News International*

Teaspoon of Blood May Show Cancer Severity - *Bloomberg News*

Research reveals some of Alzheimer's secrets - *Reuters*

Genes linked to risk of sudden cardiac death - *CBC News (Canada)*

Mass General researcher wins Nobel Prize - *Boston Business Journal*

Vitamin D, Not C, May Fight Colds, Flu - *Internet Broadcasting*

New way to make stem cells reported - *Boston Globe*

Gout chemical slows Parkinson's - *BBC News*

Early tests could identify heart risks - *The Independent (U.K.)*

Warning over 'third hand smoke' - *BBC News (U.K.)*

Study finds new evidence of autism's genetic ties - *Reuters Health*

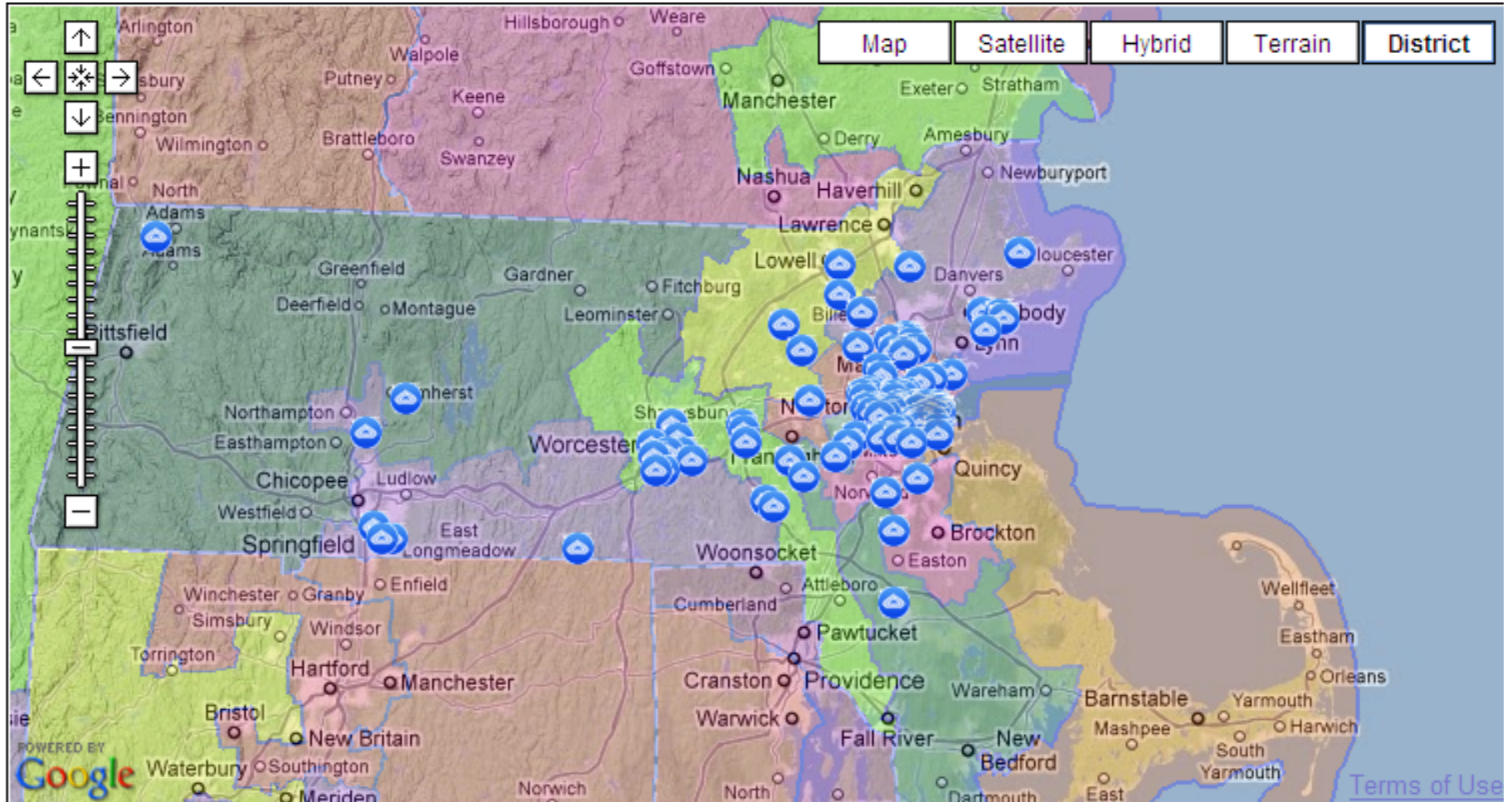
# Massachusetts in a Snapshot



- 122 Colleges and Universities
- Top five NIH funded hospitals in the U.S.
- Rank # 2 in NIH funding - 11% of awarded
- Biopharmaceutical companies - 48,000 jobs = \$4.6B in payroll
- 480 Biotech companies
- Massachusetts-headquartered companies account for about 10 percent of the U.S. drug development pipeline and 5 percent of the global pipeline
- 158 Nobel Prize recipients with connection to Boston area (8<sup>th</sup> Congressional District)

# NIH Funding in Massachusetts

FY 10 – 4,929 awards for \$2.5B



# FY 10 NIH Awards – Boston Area (Millions)



## Harvard and HMS Affiliates - \$1.47B

Beth Israel Deaconess Medical Center	\$ 133.2
Brigham and Women's Hospital	\$ 302.3
Children's Hospital Boston	\$ 105.2
Dana-Farber Cancer Institute	\$ 131.6
Harvard Medical School	\$ 214.9
Harvard Pilgrim Healthcare	\$ 3.4
Harvard School of Public Health	\$ 117.6
Harvard University	\$ 64.0
Joslin Diabetes Center	\$ 17.5
Judge Baker Children's Center	\$ 2.0
Massachusetts Eye and Ear Infirmary	\$ 17.2
Massachusetts General Hospital	\$ 331.8
McLean Hospital	\$ 23.3
Schepens Eye Research Institute	\$ 14.5
Spaulding Rehabilitation Hospital	\$ 1.7

## Others

Boston Biomedical Research Institute	\$ 9.3
Boston College	\$ 7.4
Boston Medical Center	\$ 35.1
Boston University	\$ 38.7
Boston University Medical Campus	\$ 115.6
Brandeis University	\$ 26.1
Draper Labs	\$ 2.4
Hebrew Rehabilitation Center	\$ 7.4
Massachusetts Institute of Technology	\$ 119.2
Northeastern University	\$ 26.5
St Elizabeth's Medical Center	\$ 2.1
Tufts Medical Center	\$ 26.0
Tufts University Boston	\$ 47.4
Tufts University Medford	\$ 12.4
University of Massachusetts - Boston	\$ 6.0
University of Massachusetts - Lowell	\$ 2.5
Whitehead Institute	\$ 18.7

- Founded in 1811 - third oldest general hospital in the United States and the oldest and largest in New England.
- First hospital to use ether as an anesthetic during surgery, in 1846.
- Ranked #2 – U.S. News and World Report Best Hospitals
- 22,000 employees – largest non-government employer in Boston.
- Each year the MGH admits almost 47,000 inpatients and about 1.4 million outpatient visits at the main hospital campus and four health centers.
- 907 beds in the hospital.
- 38,000 surgical cases per year.
- 88,000 Emergency Department visits per year.
- MGH Cancer Center is the largest provider of care to cancer patients in New England.
- Hold concurrent level 1 verification for adult and pediatric trauma and burn care.
- Largest hospital based research program in the country.

# MGH Research Facts

- Largest hospital based research program – FY 11 \$764M
- Ranked first or second in NIH support for the last 16 years
- Approx. 5,600 active research projects (funds)
- 1,514 sponsors
- 3,247 grant applications submitted in FY10
- Personnel
  - Total number of Investigators 1,485
  - Other Research Personnel 4,444
  - Total Research Personnel 5,929
- ARRA – 293 awards = \$137.5M
- Just under 1 million net sq. ft. in 2010 ( approx.17 acres)

# MGH Research Milestones

**1846**

The use of ether as an anesthetic is demonstrated at Mass General. Surgery performed without pain for the first time. *Ether Day!*

**1896**

Mass General creates the first X-ray exposure in U.S. just 30 days after the technique is discovered in Europe.

**1945**

Researcher at the Vincent Memorial Hospital, the gynecology service of Mass General, perfects use of Pap smear to detect cervical cancer.

**1960**

Proton beam therapy is first used to treat tumors of the eye, neck and brain.

**1962**

Mass General surgeons accomplish the first successful reattachment of a severed human limb.

**1970s**

Mass General pioneers PET (positron emission tomography) scanning.

**1974**

Mass General dermatologists introduce the field of photochemotherapy, which uses light and special medications to treat disorders such as psoriasis.



# MGH Research Milestones (cont')



**1979**

Mass General radiologists pioneer use of MRI (magnetic resonance imaging) to diagnose illness and injury.

**1981**

Mass General, MIT and Shriners Burns Institute researchers create the first artificial skin made from living cells.

**1987**

MGH Neurologists identify the first gene implicated in early-onset Alzheimer's disease – the amyloid precursor protein gene (APP)

**1991**

Researchers at the Mass General NMR (nuclear magnetic resonance) Center are the first to develop high-speed MRI scanning.

**1993**

Mass General researchers discover genes responsible for Huntington's disease, ALS (Lou Gehrig's disease) and neurofibromatosis Type 2 (NF2).

**1990s**

Researchers at Mass General are among the first to investigate combination therapy treatment for AIDS, using "cocktails" of several anti-HIV drugs to suppress viral reproduction.

# MGH Research Milestones (cont')



**1996**

Researchers in the Mass General Department of Molecular Biology identify and clone one of the first genes known to control aging in an animal.

**1998**

Mass General researchers publish two important studies of treatment with inhaled nitric oxide (NO) – a technique pioneered at the hospital. One shows NO treatment significantly improves the condition of infants with a life-threatening condition called persistent pulmonary hypertension. The other suggests that NO might treat or prevent painful sickle cell crises.

**2004**

Mass General researchers find that the expression levels of two genes in breast cancer tissue can identify whether tumors that are likely to be successfully treated with tamoxifen.

**2004**

Researchers from the Mass General Cancer Center and Dana-Farber Cancer Institute separately discover a marker that identifies lung cancer patients whose tumors will respond to treatment with the drug Iressa.

**2008**

MGH researchers report method of isolating tumor cells from blood using nanotechnology

# MGH Research Milestones (cont')



**2008**

Researchers at MGH report a high success rate in transplanting a donor's bone marrow along with the kidney and solving the problem of organ rejection, thus sparing patients a lifetime of powerful anti-rejection drugs.

**2009**

Jack W. Szostack, PhD from Molecular Biology the Center for Computational and Integrative Biology awarded the Nobel Prize in Physiology or Medicine.

# Congratulations!



**Nobel Prize Awarded to JACK SZOSTAK, PH.D, CCIB and Molecular Biology!**

## **Elected to the Institute of Medicine:**

### **2011**

- Jay Loeffler, M.D., Radiation Oncology
- James Thrall, M.D., Imaging

### **2010**

- David Altshuler, M.D. PH.D., Molecular Biology & CHGR
- Bruce Rosen, M.D., PH.D., Imaging

### **2009**

- Daniel Haber, M.D., PH.D., MGH Cancer Center
- Gary Ruvkun, PH.D., Molecular Biology
- Megan Sykes, M.D., TBRC, Surgery
- Bruce Walker, M.D., Ragon Institute
- Ralph Weissleder, M.D., PH.D., Center for Systems Biology
- Joan Reede, M.D., M.PH, HMS Dean for Diversity and Community Partnership, MGH Health Policy

**The Nations #1 Place to Work in Academia – *The Scientist* 2007**

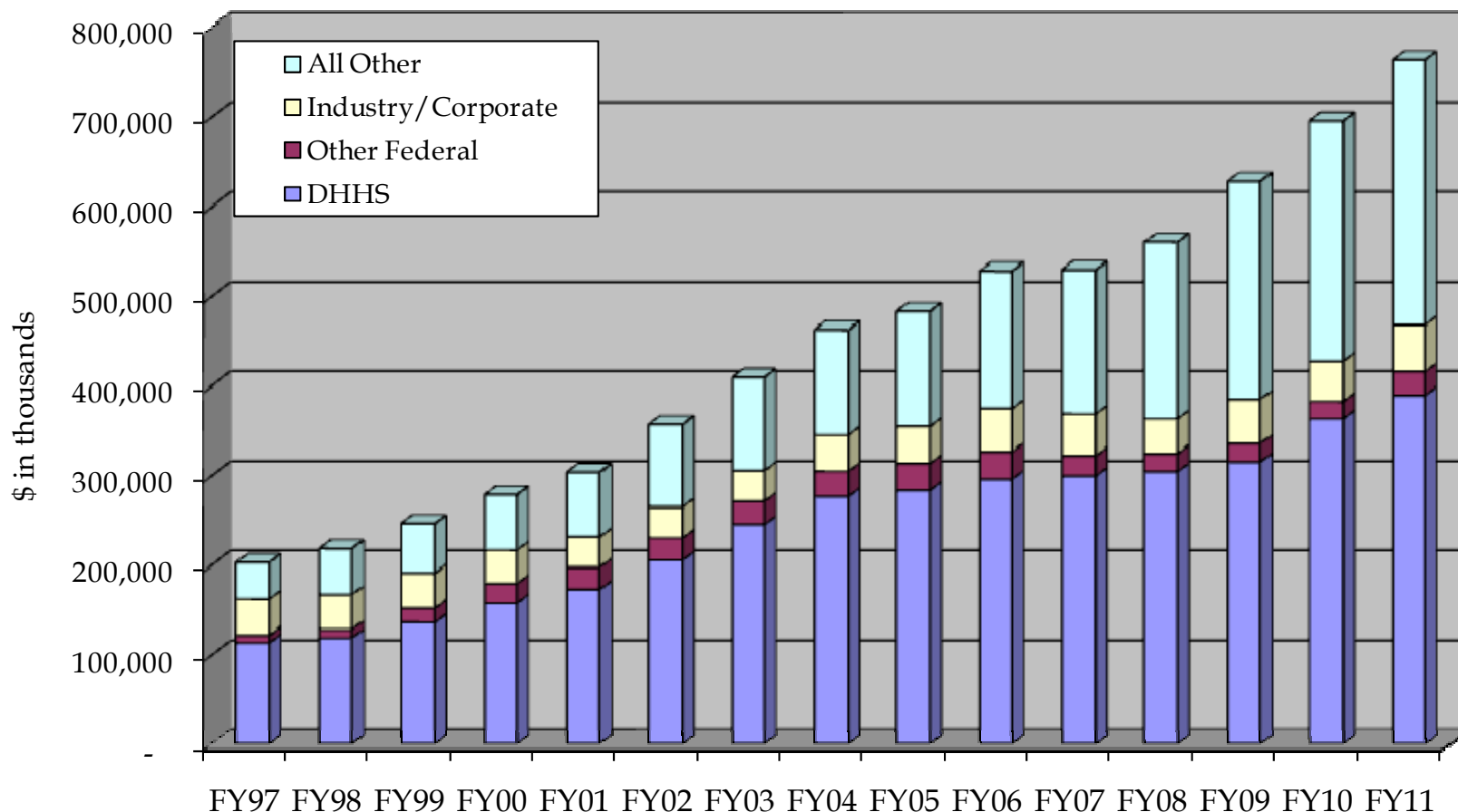
# “In the News”



- A study from the **MGH Cancer Center and Palliative Care Service** showed that early integration of palliative care – focused on helping patients with serious illness cope with the psychological and spiritual aspects of their disease – into treatment not only **improved the mood and quality of life** of patients with advanced lung cancer but also **extended their lives**.
- A team from the **MGH Cancer Center and Center for Engineering in Medicine** developed an improved second-generation version of the "**CTC-chip**," which **detects circulating tumor cells present in minute quantities in the bloodstream**. They also have entered a collaboration with Johnson & Johnson to develop another technology that may be more feasible for use in routine patient care.
- Investigators from the **Ragon Institute of MGH, MIT and Harvard** led a team that discovered how tiny variants in an important immune system protein may contribute to the **rare ability of some individuals to control HIV infection without medication**, knowledge that may someday lead to development of an effective HIV vaccine.
- **Successful kidney transplant without immunosuppressive drugs**, by creating immune system tolerance with a simultaneous bone marrow transplant. This will decrease the staggering amount of immunosuppressive drugs transplant patients must take to prevent organ rejection.

# MGH Total Research Revenue Trend

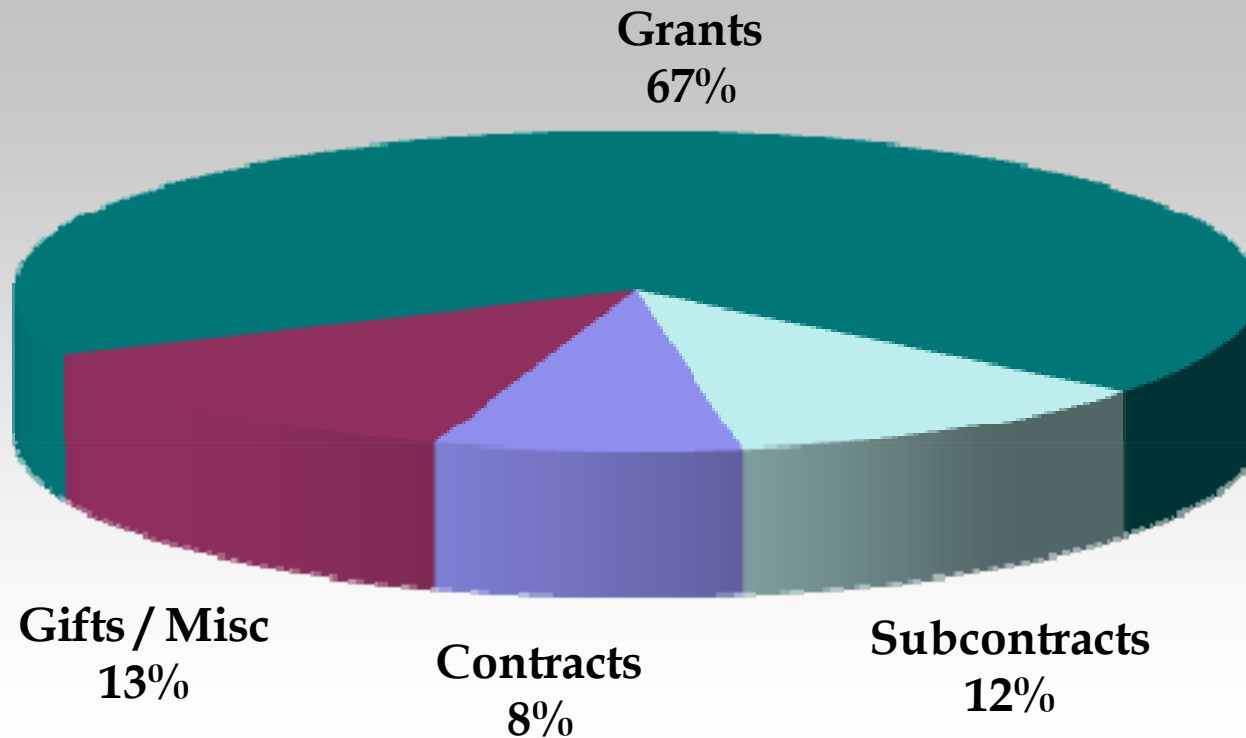
MGH total (Direct + Indirect) research revenue has grown 276% since FY97 to \$764M in FY11.



Note: DHHS includes ARRA revenue. Does not include P&L adjustments.

# MGH Total Research Revenue by Award

FY2011 Direct + Indirect Research Revenue by Award Type = \$764M

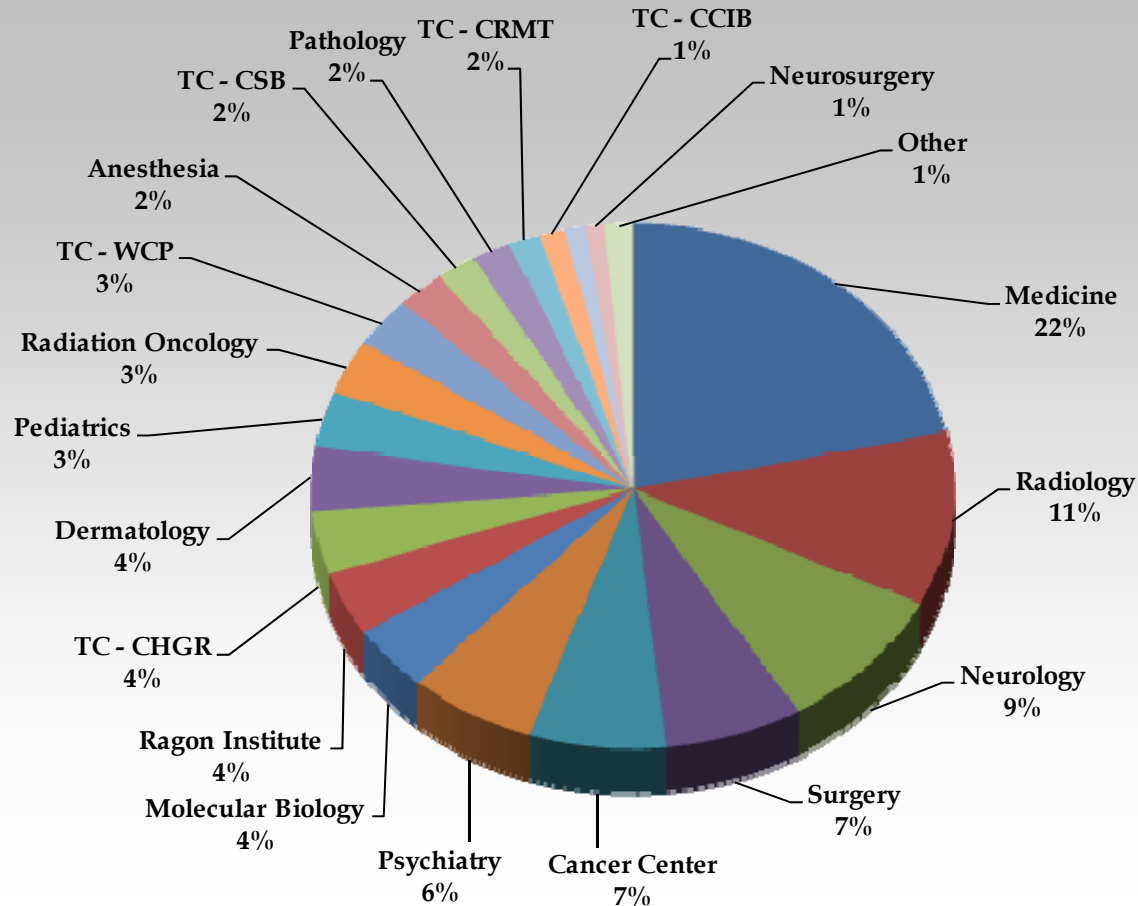


\* Does not include P&L adjustments.

# MGH Total Research Revenue by Department



FY2011 Direct + Indirect Research Revenue by Department = \$764M



\* Does not include P&L adjustments.



# FY06 - FY10 NIH Extramural Awards Ranking of All Institutions



MASSACHUSETTS  
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Rank					INSTITUTION	Total Awards					Percent Change					CAGR
FY06	FY07	FY08	FY09	FY10		FY 2006	FY 2007	FY 2008	FY2009*	FY2010*	05-06	06-07	07-08	08-09	09-10	06-10
1	1	1	1	1	JOHNS HOPKINS UNIV	\$598,052,267	\$618,693,716	\$616,195,365	\$603,366,684	\$610,467,293	-1.5%	3.5%	-0.4%	-2.1%	1.2%	0.5%
2	2	4	3	2	UNIV OF PENNSYLVANIA	\$454,729,954	\$455,453,542	\$443,130,629	\$454,903,123	\$481,559,772	-3.5%	0.2%	-2.7%	2.7%	5.9%	1.4%
4	4	3	2	3	UNIV OF CALIFORNIA S.F.	\$434,287,257	\$444,503,415	\$510,735,527	\$463,287,103	\$475,400,165	-4.0%	2.4%	14.9%	-9.3%	2.6%	2.3%
3	3	6	6	4	UNIV OF WASHINGTON	\$448,902,633	\$448,379,740	\$421,498,963	\$405,322,297	\$474,042,118	-2.8%	-0.1%	-6.0%	-3.8%	17.0%	1.4%
6	6	5	4	5	UNIV OF MICHIGAN	\$396,322,720	\$401,960,187	\$428,327,143	\$454,223,734	\$470,517,923	2.7%	1.4%	6.6%	6.0%	3.6%	4.4%
9	7	8	5	6	UNIV OF PITTSBURGH	\$376,752,242	\$394,089,198	\$381,585,933	\$418,043,822	\$424,154,899	-2.3%	4.6%	-3.2%	9.6%	1.5%	3.0%
12	13	13	10	7	UNIV OF CALIFORNIA S.D.	\$308,218,342	\$317,275,864	\$340,710,658	\$366,942,933	\$390,832,339	-0.4%	2.9%	7.4%	7.7%	6.5%	6.1%
8	8	7	8	8	WASHINGTON UNIVERSITY	\$377,939,741	\$380,510,969	\$386,938,115	\$382,454,992	\$386,470,071	-4.3%	0.7%	1.7%	-1.2%	1.0%	0.6%
10	11	10	11	9	YALE UNIVERSITY	\$338,665,115	\$368,538,724	\$368,854,935	\$357,363,798	\$378,805,446	0.6%	8.8%	0.1%	-3.1%	6.0%	2.8%
7	9	11	7	10	UNIV OF CALIFORNIA L.A.	\$388,359,250	\$376,350,532	\$368,169,149	\$384,430,456	\$368,854,137	0.7%	-3.1%	-2.2%	4.4%	-4.1%	-1.3%
5	5	9	9	11	DUKE UNIVERSITY	\$430,785,002	\$405,551,641	\$372,782,109	\$371,407,802	\$351,616,899	10.1%	-5.9%	-8.1%	-0.4%	-5.3%	-4.9%
14	12	12	13	12	UNIV OF NORTH CAROLINA	\$300,032,670	\$320,463,349	\$361,224,337	\$320,806,191	\$341,434,146	1.2%	6.8%	12.7%	-11.2%	6.4%	3.3%
11	15	16	14	13	STANFORD UNIVERSITY	\$315,818,379	\$306,562,868	\$299,450,296	\$306,735,227	\$339,893,354	3.4%	-2.9%	-2.3%	2.4%	10.8%	1.9%
13	14	14	12	14	MASS GENERAL	\$301,309,702	\$311,177,004	\$308,329,332	\$324,373,859	\$331,770,965	5.0%	3.3%	-0.9%	5.2%	2.3%	2.4%
17	16	15	15	15	VANDERBILT UNIVERSITY	\$273,288,791	\$298,797,774	\$304,479,657	\$303,839,718	\$322,051,798	2.6%	9.3%	1.9%	-0.2%	6.0%	4.2%
20	18	19	17	16	BRIGHAM & WOMEN'S	\$241,350,800	\$261,930,266	\$255,935,361	\$269,624,822	\$302,335,077	-4.7%	8.5%	-2.3%	5.3%	12.1%	5.8%
15	17	17	16	17	COLUMBIA UNIVERSITY	\$292,525,508	\$292,260,228	\$278,909,111	\$284,118,883	\$290,724,425	-11.6%	-0.1%	-4.6%	1.9%	2.3%	-0.2%
23	21	18	18	18	EMORY UNIVERSITY	\$223,379,192	\$245,856,492	\$259,478,379	\$252,865,938	\$262,572,191	0.7%	10.1%	5.5%	-2.5%	3.8%	4.1%
24	19	21	20	19	UNIV OF MN TWIN CITIES	\$219,606,071	\$258,654,244	\$249,803,520	\$241,122,973	\$255,160,166	-2.8%	17.8%	-3.4%	-3.5%	5.8%	3.8%
18	20	20	19	20	UNIV OF WISCONSIN	\$255,099,147	\$250,017,018	\$252,965,460	\$247,852,156	\$248,762,869	-0.8%	-2.0%	1.2%	-2.0%	0.4%	-0.6%
<hr/>																
2	2	2	1	1	PARTNERS HEALTHCARE	\$572,322,990	\$601,628,300	\$590,624,544	\$616,304,116	\$659,077,625	0.4%	5.1%	-1.8%	4.3%	6.9%	3.6%

\*FY09-FY10 Total NIH award data does not include contracts at this time. When this data is included, rankings and growth rates may change. Partners Healthcare figures include MGH, BWH, McL, and SRH. ARRA is not included.

# FY2006– FY2010 NIH Ranking of Independent Hospitals

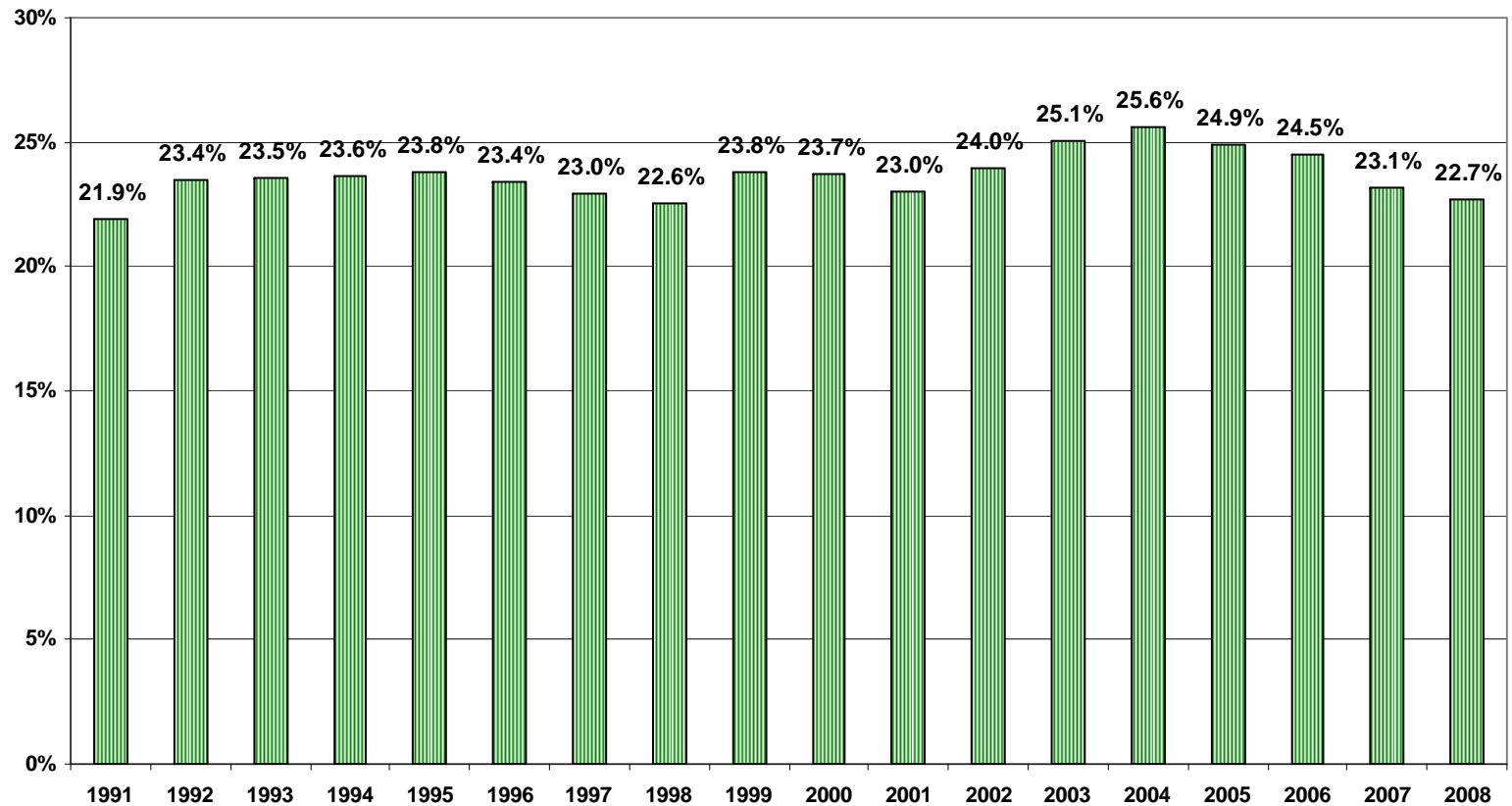


MASSACHUSETTS  
GENERAL HOSPITAL

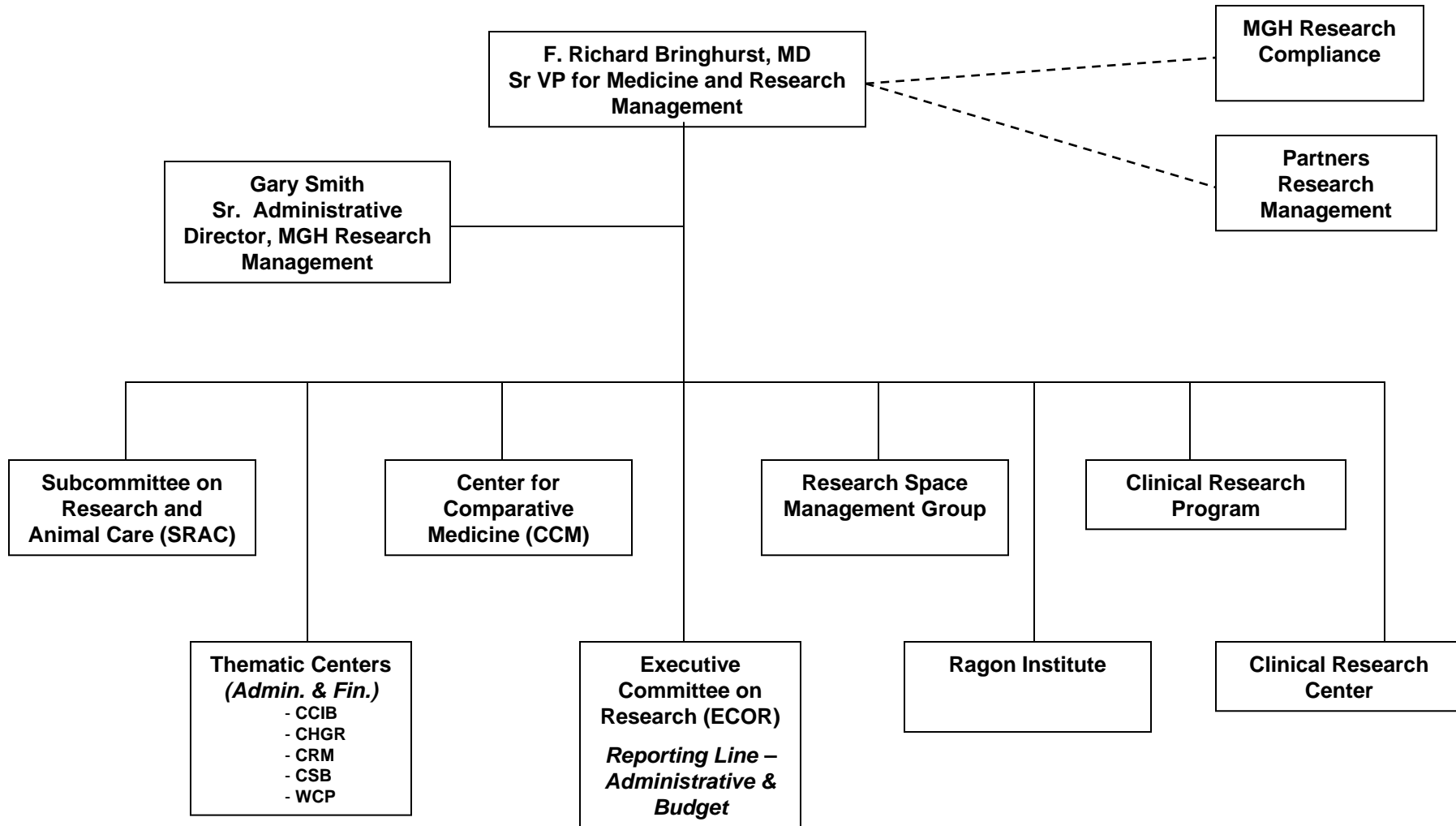
Rank					INSTITUTION	Total Awards					Percent Change					CAGR
FY06	FY07	FY08	FY09	FY10		FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	05-06	06-07	07-08	08-09	09-10	06-10
1	1	1	1	1	MASS GENERAL	\$301,309,702	\$311,177,004	\$308,329,332	\$324,373,859	\$331,770,965	5.0%	3.3%	-0.9%	5.2%	2.3%	2.4%
2	2	2	2	2	BRIGHAM & WOMEN'S	\$241,350,800	\$261,930,266	\$255,935,361	\$269,624,822	\$302,335,077	-4.7%	8.5%	-2.3%	5.3%	12.1%	5.8%
3	4	4	4	3	BETH ISRAEL DEACONESS	\$128,601,967	\$115,787,498	\$115,741,531	\$127,639,420	\$133,203,547	4.3%	-10.0%	0.0%	10.3%	4.4%	0.9%
4	3	3	3	4	DANA-FARBER	\$128,419,388	\$132,810,698	\$140,797,977	\$127,811,142	\$131,577,199	9.8%	3.4%	6.0%	-9.2%	2.9%	0.6%
5	5	5	5	5	CHILDREN'S (BOSTON)	\$92,355,391	\$102,360,961	\$100,342,553	\$96,381,705	\$105,213,019	-10.2%	10.8%	-2.0%	-3.9%	9.2%	3.3%
6	7	6	6	6	CHILDREN'S (CINCINNATI)	\$83,984,690	\$81,011,272	\$93,762,180	\$80,352,186	\$90,270,779	1.0%	-3.5%	15.7%	-14.3%	12.3%	1.8%
7	6	7	7	7	CHILDREN'S (PHILADELPHIA)	\$79,844,341	\$89,838,282	\$75,933,912	\$74,029,822	\$76,623,628	0.3%	12.5%	-15.5%	-2.5%	3.5%	-1.0%
8	8	8	8	8	ST. JUDE CHILDREN'S HOSP	\$59,204,861	\$74,863,715	\$65,465,984	\$55,560,134	\$64,842,049	0.2%	26.4%	-12.6%	-15.1%	16.7%	2.3%
9	9	9	9	9	NY PSYCHIATRIC INSTITUTE	\$50,607,554	\$50,828,882	\$50,789,662	\$45,531,708	\$48,152,004	2.1%	0.4%	-0.1%	-10.4%	5.8%	-1.2%
11	10	11	10	10	ROSWELL PARK	\$41,843,194	\$39,537,342	\$33,455,071	\$37,810,549	\$38,405,129	10.2%	-5.5%	-15.4%	13.0%	1.6%	-2.1%
10	13	12	14	16	TUFTS MEDICAL CENTER	\$46,619,967	\$33,043,527	\$31,584,610	\$31,340,462	\$25,969,675	-5.9%	-29.1%	-4.4%	-0.8%	-17.1%	-13.6%
13	15	16	17	17	MCLEAN HOSPITAL	\$28,115,918	\$28,012,376	\$24,600,630	\$21,003,427	\$23,296,348	-0.4%	-0.4%	-12.2%	-14.6%	10.9%	-4.6%
52	83	72	55	50	SPAULDING REHAB	\$1,546,570	\$508,654	\$587,221	\$1,302,008	\$1,675,235	-1.0%	-67.1%	15.4%	121.7%	28.7%	2.0%

Note: FY09-FY10 Total NIH award data does not include contracts at this time. When this data is included, rankings and growth rates may change. Excludes ARRA.

# MGH Research Revenue as a Percentage of Total MGH Operating Revenue FY 1991-FY 2008



# MGH Research Management Organizational Chart



# Executive Committee on Research (ECOR)



- Central body in MGH research governance
- Unique collaborative research management structure
- Responsible for providing:
  - Strategic guidance to MGH executives and Trustees on future research growth and priorities within MGH, across Partners and with affiliated external institutions
  - Faculty guidance on development and management of policies on human subjects, proposal review, animal care, animal studies, and research facilities and space
- Funds awards of nearly \$7.5 million a year, receiving and reviewing nearly 700 proposals and requests for support annually
- Established the MGH Thematic Centers
- Initiated the Office for Research Career Development
- Hosts MGH Research Council open to the entire research community

# Composition of ECOR

*A collaborative research management structure*



*Non-voting members of ECOR*

15 Contributing members

6 Subcommittee Chairs

# Thematic Centers



- Center for Computational and Integrative Biology
- Center for Human Genetic Research
- Center for Regenerative Medicine
- Center for Systems Biology
- Wellman Center for Photomedicine

- Total Research Space = 923,526 sq. ft.
  - Charlestown Navy Yard = 395,872 sq. ft.
  - MGH Main Campus = 253,776 sq. ft.
  - Charles River Park = 223,801 sq. ft.
  - Cambridge = 37,503 sq. ft.
  - Other = 12,574 sq. ft.



# Partners Research Management: Roles and Responsibilities



- Research Management – Grant Administration
  - Pre-award (grant application submission)
  - Post-award (support after the award is made)
  - Research Finance (billing, A/R, financial reporting)
  - Contracts (subcontracts/contracts)
  - Research Analytics (IDC negotiation, high level reporting)
  - Partners Clinical Research Office (PCRO)

# Partners Research Management: Roles and Responsibilities (cont')



- Research Ventures and Licensing (RVL)
  - Licensing, patents, royalties
- Human Research Protection Program
  - IRB; grant approval for human research
- Human Research Quality Improvement Program
  - Support to help ensure clinical research compliance
- Research Applications Group
  - IT systems supporting research
- Research Computing
  - Research IS support for the research community
- Human Embryonic Stem Cell Research Oversight Office
  - Provide institutional oversight of hESC research

# Other Research Related Support Offices



- Materials Management
  - A/P
  - Purchasing
- International Office
- Office of General Counsel
- Police and Security
- Safety Office
- Buildings and Grounds
- Environmental Services
- Real Estate