

2018-2019 Research Report to UKRF Board of Directors

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**Professor, Department of Pharmacology and Nutritional
Sciences**

Vice President for Research

Format

- Progress on the Research Strategic Plan
- Presentation of FY19/20 budget

Research Strategic Plan

Expand our scholarship, creative endeavors, and research across the full range of disciplines to focus on the most important challenges of the Commonwealth, our nation, and the world.

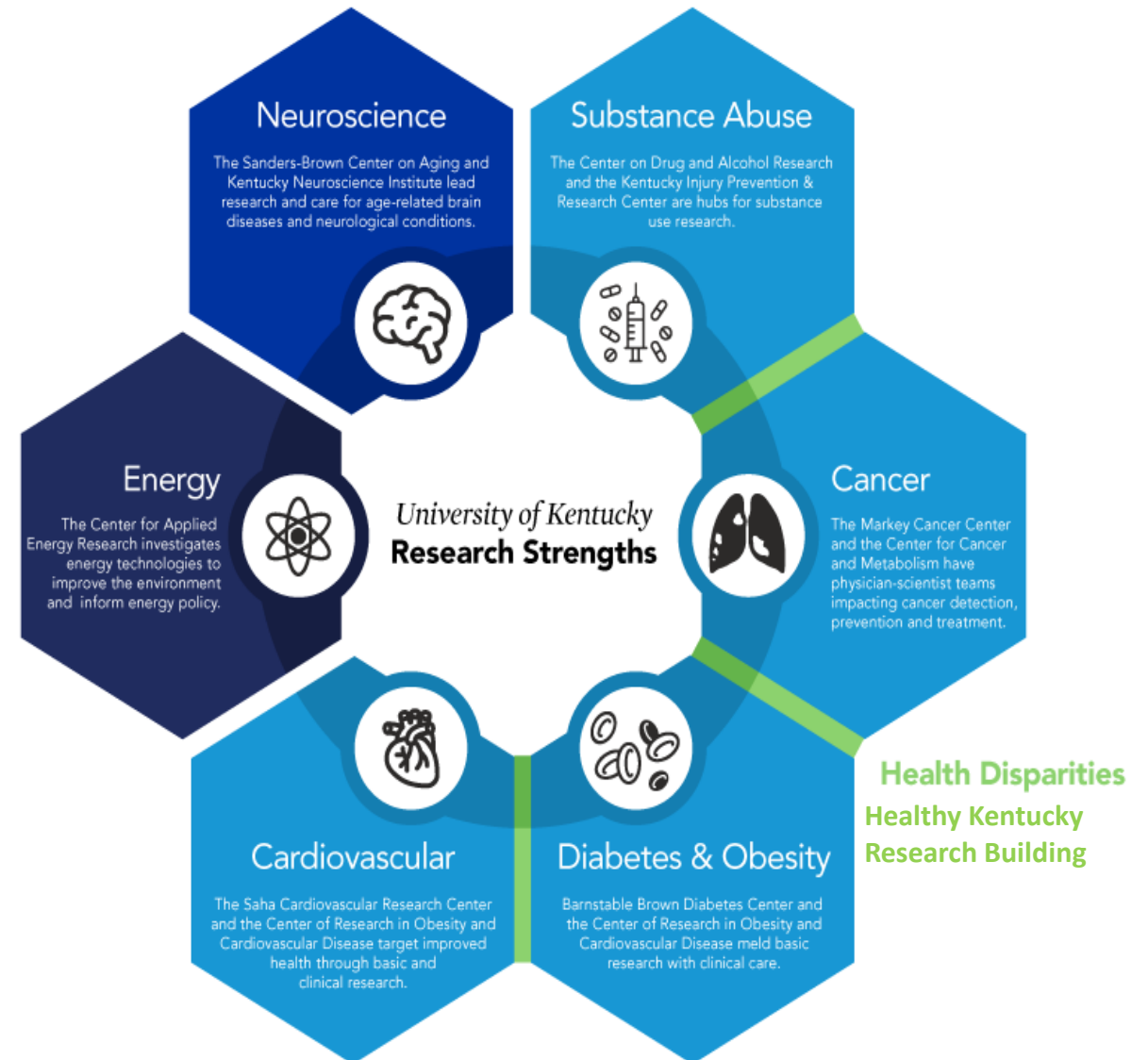
- I. Invest in UK's existing strengths and areas of growth in selected focus areas that benefit and enrich the lives of the citizens of the Commonwealth and beyond.
- II. Recruit and retain outstanding faculty, staff and students that support our research and scholarship across the range of disciplines at the University.
- III. Improve the quality of the research infrastructure across campus.
- IV. Strengthen engagement efforts and translation of research and creative work for the benefit of the Commonwealth of Kentucky, the nation and the world.

Research Priority Areas (RPA): Supporting research strengths that impact the Commonwealth

- I. Invest in UK's existing strengths and areas of growth in selected focus areas that benefit and enrich the lives of the citizens of the Commonwealth and beyond.

Criteria for Selection:

- **Local relevance** of the research, global impact
- **Existing faculty strength** and research leadership
- **Disciplinary research diversity**
- Potential interconnections of research with **educational opportunities**
- **Impact** (economic, health, etc) of research on UK and the Commonwealth
- **Sustainability** of research

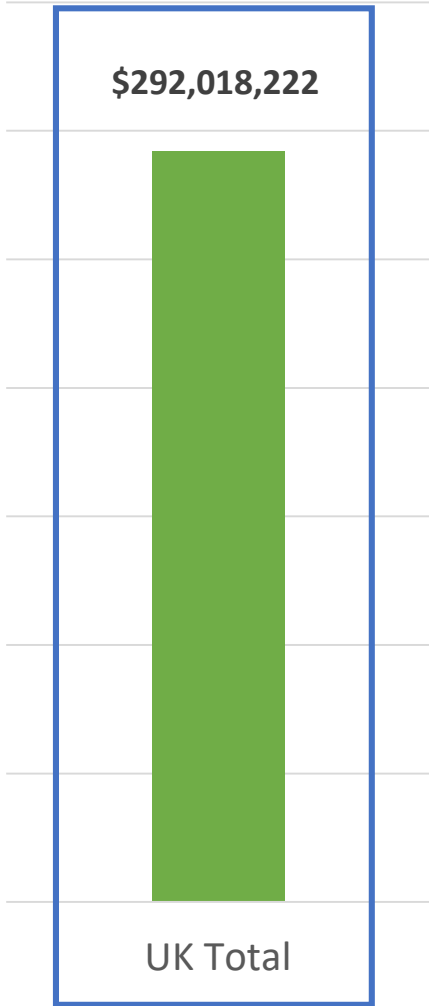


Criteria: Local relevance

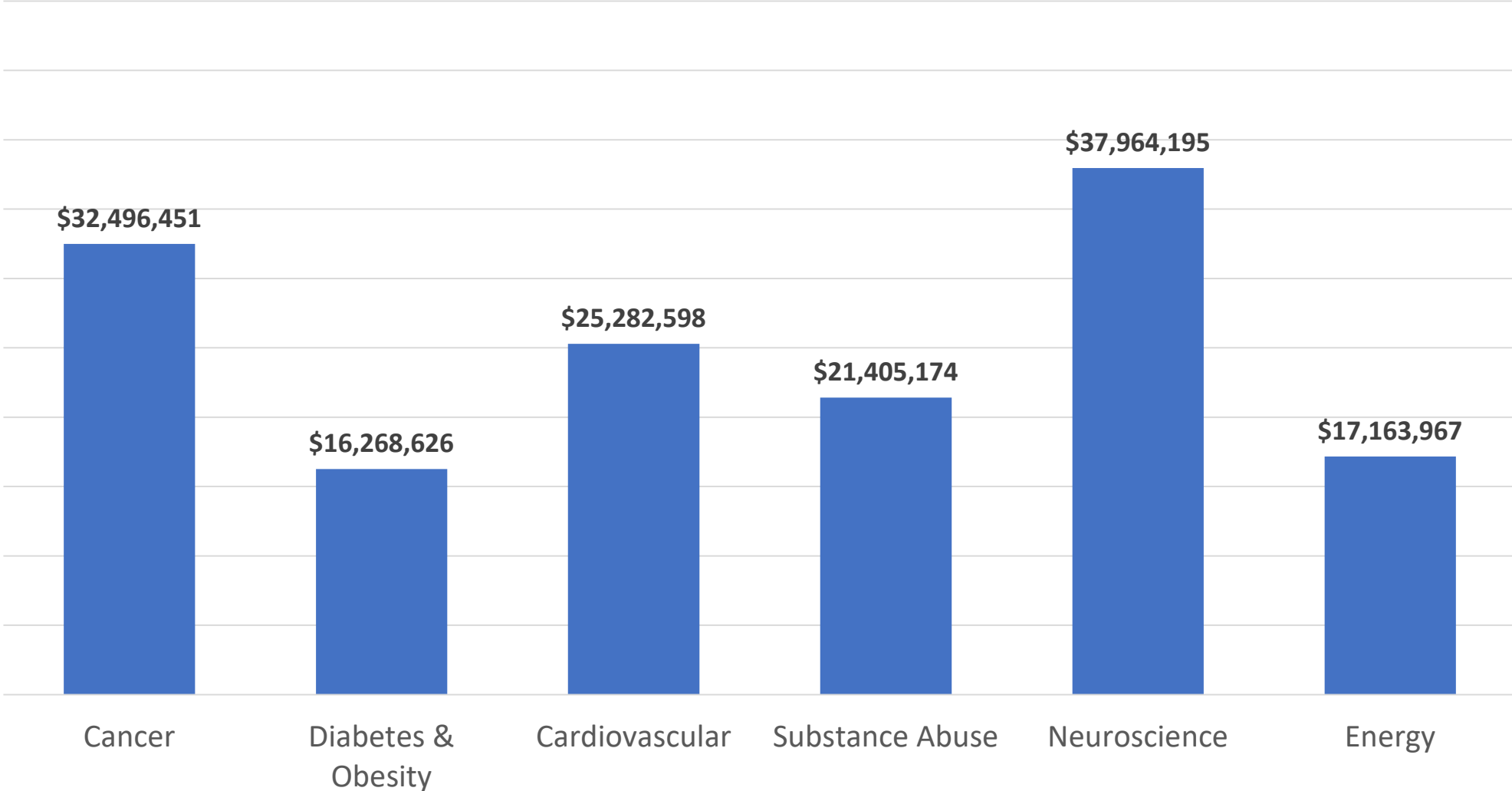
Health Disparity	KY 2017 Ranking (50 is worst)
Drug Deaths	49
Obesity	44
Cancer deaths	50
Cardiovascular deaths	44
Diabetes	46
All health outcomes	46

America's Health Rankings, 2017

Criteria: Existing strength defined by extramural funding (2017)



The two graphs are not at the same scale.



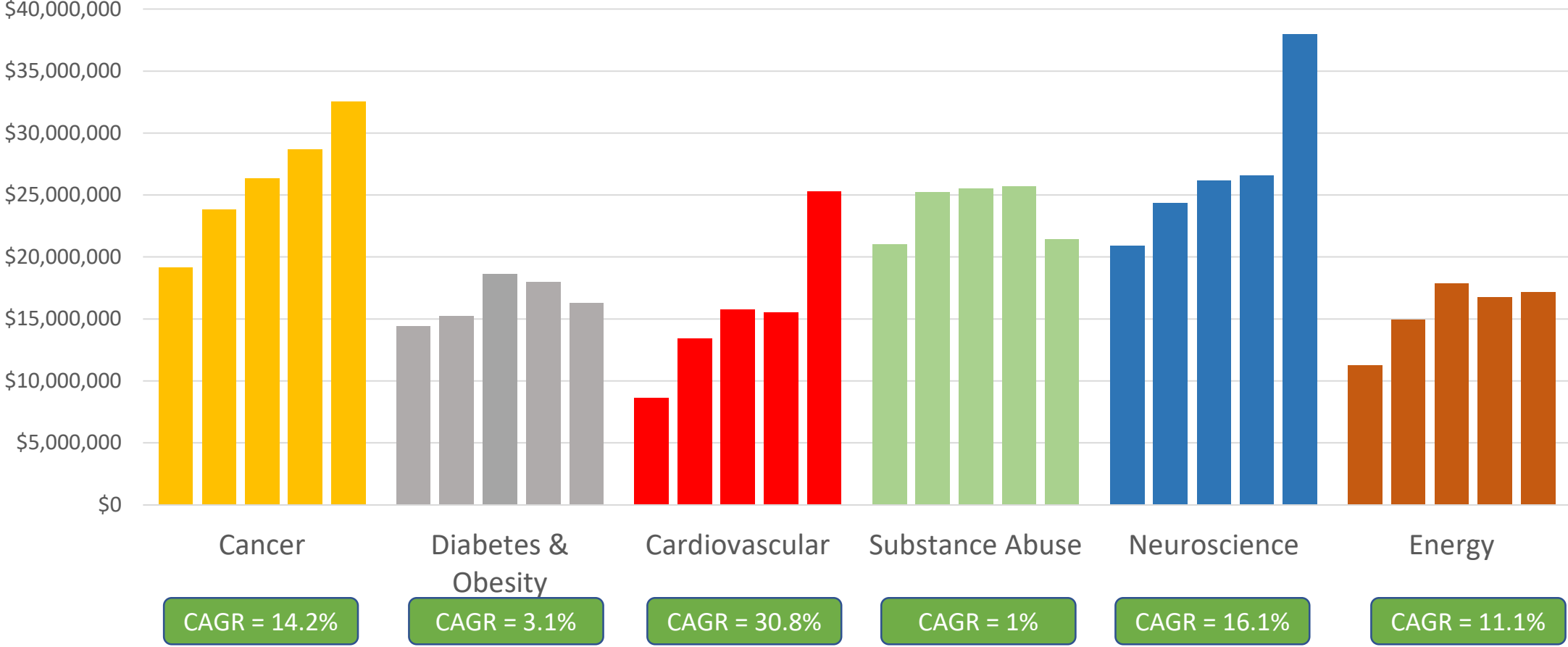
Note: Expenditures for each thematic area are not mutually exclusive. Projects may be represented in one or more areas. Additionally, expenditures are based on keyword searches and may not include all related projects and may contain some projects that aren't specific to that area of research.

Criteria: Existing strength in research scholarship

Strength	Scholarly Output	Citations	Citations/ publication	Field-weighted citations	% Publications in top tier journals
Cancer	4,715	63,120	13.4	1.73	50
Cardiovascular	3,282	39,658	12.2	1.71	50
Diabetes/obesity	2,709	38,383	14.2	1.80	52
Energy	4,268	47,518	11.1	1.65	48
Neuroscience	6,592	75,839	11.5	1.66	48
Substance Abuse	1,974	19,481	9.9	1.40	42

Source: SciVal by Elsevier. 2012 through 2018

Criteria: Research sustainability



Note: Expenditures for each thematic area are not mutually exclusive. Projects may be represented in one or more areas. Additionally, expenditures are based on keyword searches and may not include all related projects and may contain some projects that aren't specific to that area of research.

Criteria: Disciplinary research diversity

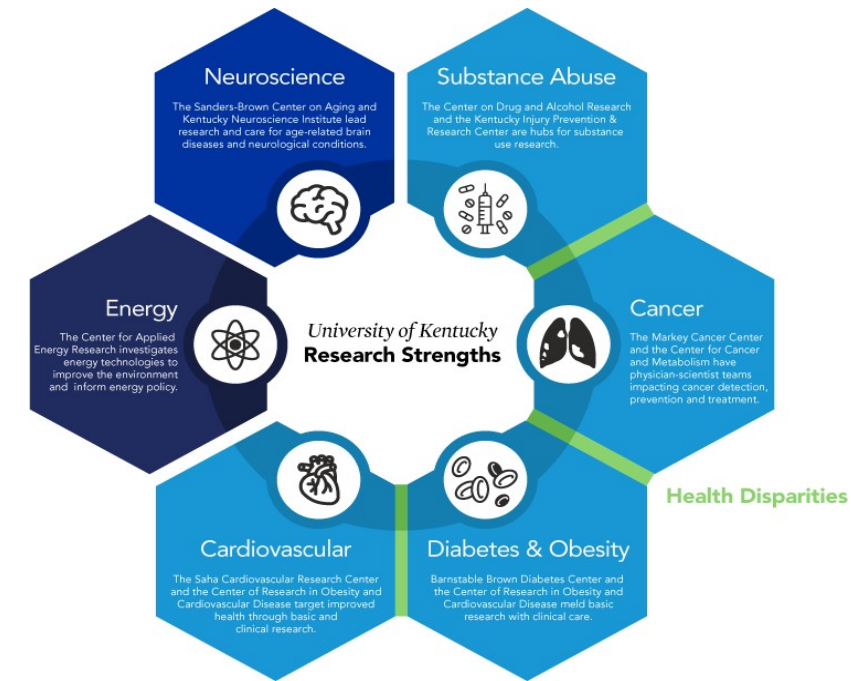
Thematic Area	Approximate # of PIs	Colleges (Departments) Involved	Thematic Area	Approximate # of PIs	Colleges (Departments) Involved
Cancer 47 patents	228	Agriculture, Food, and Environment (2) Arts and Sciences (3) Engineering (2) Health Sciences (1) Medicine (12) Nursing Pharmacy (2) Public Health (5)	Substance Abuse 41 patents	110	Agriculture, Food, and Environment (2) Arts and Sciences (3) Engineering (2) Medicine (8) Nursing Pharmacy (2) Public Health (4) Center on Drug & Alcohol Research KY Injury Prevention Research
Diabetes & Obesity 14 patents	130	Agriculture, Food, and Environment (2) Arts and Sciences (1) Medicine (5) Nursing Pharmacy (1) Barnstable Brown Diabetes Center	Neuroscience 20 patents	258	Arts and Sciences (2) Dentistry (2) Engineering (1) Health Sciences (2) Medicine (12) Nursing Pharmacy (2) Public Health (3) Sanders-Brown Center on Aging Spinal Cord & Brain Injury Research
Cardiovascular 13 patents	156	Agriculture, Food, and Environment (1) Arts and Sciences (2) Engineering (2) Health Sciences (2) Medicine (11) Nursing Pharmacy (1) Public Health (6)	Energy 27 patents	137	Agriculture, Food, and Environment (7) Arts and Sciences (7) Design (1) Engineering (8) Public Health (2) Center for Applied Energy Research KY Geological Survey

Financial support system for Research Priority Area program

- Strategic Investment Funds within the UKRF budget (IIC.7b):
 - For FY18/19: Approximately \$425K distributed to each priority area.
 - For FY19/20: 7% of UKRF budget (\$3.99M)

Examples of use include:

- Start-up funds for targeted recruits
 - Support mechanisms for research
 - Equipment
 - Research symposia, seminars
- \$1M competitive pool, FY18/19 funds were targeted to substance abuse/opioid initiatives



Can this approach make a difference?

- Example: Substance Use Disorder (SUD) group
 - Began thematic coordination with this group in early 2017
 - SUD group began to coalesce, worked on thematic template to illustrate current strengths, future growth needs
 - Had first institution-wide research day in early 2019 (140 participants, 70 poster presentations)
 - Worked together on HEALing Communities grant with leadership in place (Dr. Sharon Walsh), with support from several research offices.
 - One of 4 states to obtain NIH HEALing Communities and Networks Helping End Addiction Long-term: \$87,133,542, with the goal of reducing drug-related deaths by 40%.
 - The coming together of this research priority area under strong leadership, and in alignment with the research enterprise, epitomizes what we hope to see with this initiative.

II. Recruit and retain talent

- Instituted incentive-based program for distribution of faculty start-up needs. Start-up funds are 20% of the UKRF budget (IIC.1b), and are disseminated to Deans of each college through an incentive-based formula.
- Revised structure of the Research Professorship Program to recognize excellence in research and creative work within each College (IIC.3a).
- For FY19/20: Professional honors and awards staff added to the Proposal Development Office (I.B.1)
 - Create a database of faculty honors and awards and a database of national research awards of prominence across disciplines
 - Use SciVal and other mechanisms to identify faculty competitive for honors and awards
 - Assemble professional nomination packets

Recruit and retain talent: Support for Creative Activities (II.C.3a)

Support grant program for research, scholarship, and creative works in areas of excellence that are not traditionally amenable to external funding

Since FY 2017

Awarded \$600,000 for creative & scholarly activity

- Research & Field Work
- Research Subject Support
- Student Support
- Conferences
- Art Exhibits & Performances
- Studio Recording
- Publishing & Book Writing

Recruit and retain research talent: start-up support for hiring of faculty from under-represented groups (II.C.7a)

- Instituted a dedicated pool of funds (\$500K from Strategic Investment Fund pool for FY18/19) for start-up needs to recruit faculty from under-represented minorities. Developed this new program offering in collaboration with VP for Diversity and Inclusion, Provost.
- To date, \$250,000 in start-up funds committed to the following hires:

College of Education



Dr. Isaac Woods, Educational, School, and Counseling Psychology

Appointment Begins: 8/16/2019

PhD from the University of Memphis

Postdoctoral Fellowship, Boston Children's Hospital/Harvard Medical School

Research Area: Psychology, Social Justice in Mental Health Counseling and Education



Dr. Keith Wilson, Early Childhood, and Rehab. Counseling

Appointment Begins: 8/16/2019

PhD from The Ohio State University

Postdoctoral Fellowship, Management Development Institute, Harvard University

Research Area: Rehabilitation Services/Education

College of Engineering



Dr. Shakira Hobbs, Civil Engineering

Appointment Begins: 8/01/2019

PhD from Clemson University

Research Area: Strategic Sustainability Assessment of Enhanced Anaerobic Digestion of Food/Bioplastic Waste



Dr. James Brusuelas, Computer Science

Appointment Begins: 8/01/2019

PhD from the University of California, Irvine

Postdoctoral Fellowship, Papyrology, the Oxyrhynchus Papyri Project, University of Oxford

Research Area: Papyrology, Digital Humanities, Greek/Latin Literature, Greco-Roman Philosophy



Dr. Luis Gonzalo Sanchez Giraldo, Electrical & Computer Engineering

Appointment Begins: 8/01/2019

PhD from the University of Florida

Postdoctoral Fellowship, Computer Science, University of Miami

Research Area: Machine learning, Computational Neuroscience, Computer Vision, and Signal Processing



Blanche Cook, JD Law Instruction

Appointment Begin: 5/16/2019

Juris Doctor from University of Michigan Law School

Scholar in Residence, Sex Trafficking & Citizenship, University of California, Berkeley Law

College of Medicine



Dr. Daniel Lee, Neuroscience

Appointment Begins: 7/01/2019

PhD from Florida A&M University

Postdoctoral Fellowship, Neuroscience, University of South Florida

Research Area: Neuroinflammation, Alzheimer's disease, Parkinson's disease, Aging, Proteases Inhibitors, etc.

Recruit and retain talent: support for postdoctoral trainees from under-represented groups (I.D.2/3)

- To enhance diversity within the research domain, we offer Lyman T Johnson Postdoctoral Fellowships to support fellows from under-represented groups.
- University Research Postdoctoral Fellowships are offered to support female fellows pursuing advanced research training in under-represented areas (life sciences, engineering, physical sciences).
- Working with the VP for Diversity/Inclusion, and the College of Engineering, we are revising the structure of these program offerings to include a curriculum of career development.
- Meet the current recipients...

Supporting Diversity: Research Postdoctoral Programs

UNIVERSITY RESEARCH POSTDOCTORAL FELLOWSHIP

Dr. Patricia Klein, Mathematics (A&S)

August 2018 - Current

Commutative algebra, a field of pure mathematics that studies solutions to polynomial equations

Dr. Kathryn Everson, Biology (A&S)

August 2018 – Current

Species tree reconstruction in the genomic era: A study of two vertebrate lineages

Dr. Maggie Sanders, Earth & Environmental Sciences (A&S)

October 2017 – October 2018

Characterizing the organic and inorganic composition of shale oil reservoirs in the Midland and Appalachian basin

Dr. Jana Herzberger, Material Engineering (Engineering)

June 2018 – October 2018

pH-degradable hydrogels for improved control over stem cell localization

Supporting Diversity: Research Postdoctoral Programs

Lyman T Johnson Postdoctoral Fellowship

Dr. Shaun Hampton, Physics (A&S)

September 2018 – current

Emergence of spacetime in string theory

Dr. Ivelisse Robles, Animal and Food Sciences (CAFÉ)

May 2019 – current

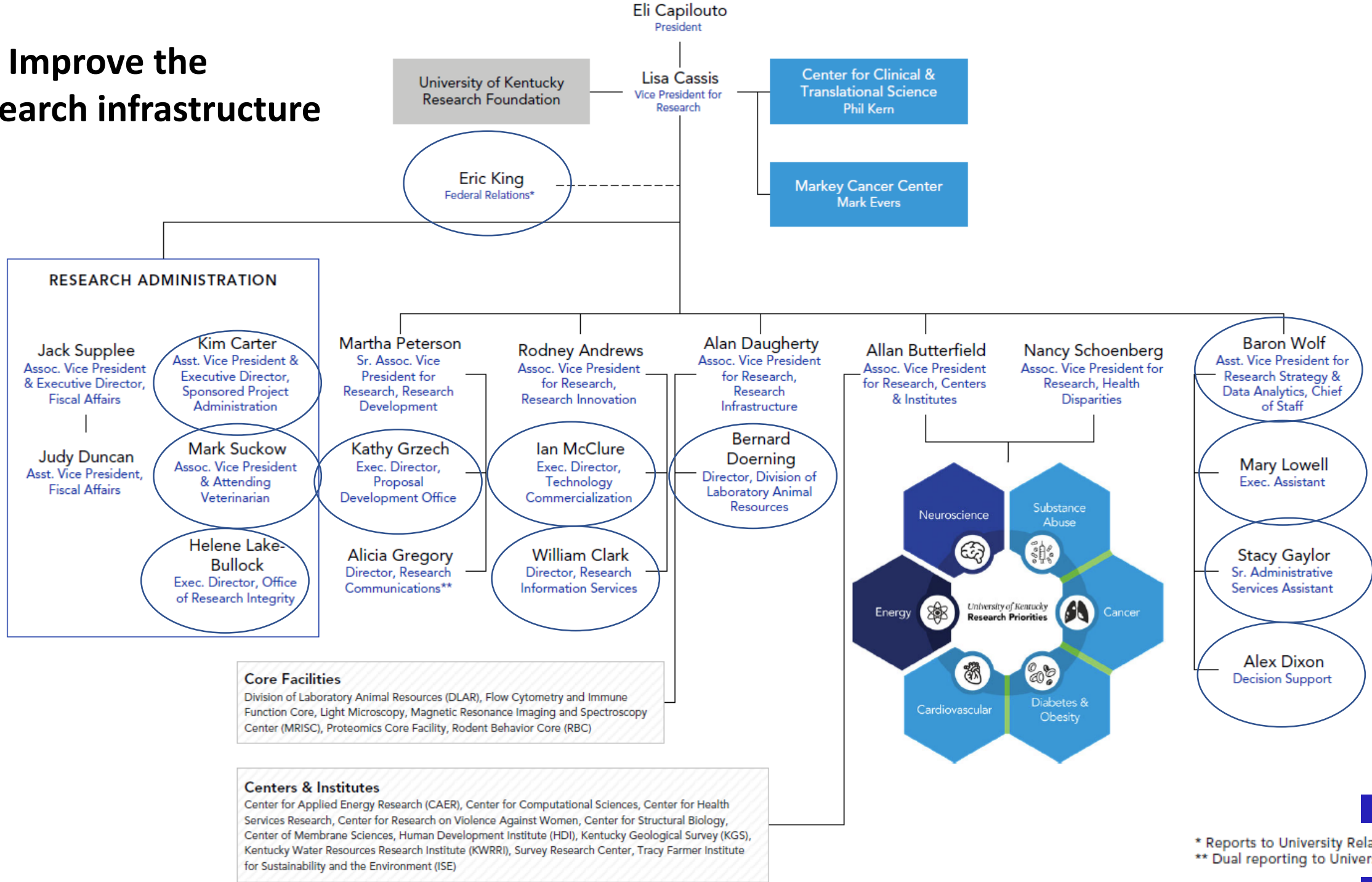
The use of precision dairy farming tools for pain behavior identification and self-medication for cows with mastitis

Dr. Silver Nyambo, Chemistry (A&S)

March 2017 – December 2018

Spectroscopic characterization of metal-mediated alkane activation

III. Improve the research infrastructure



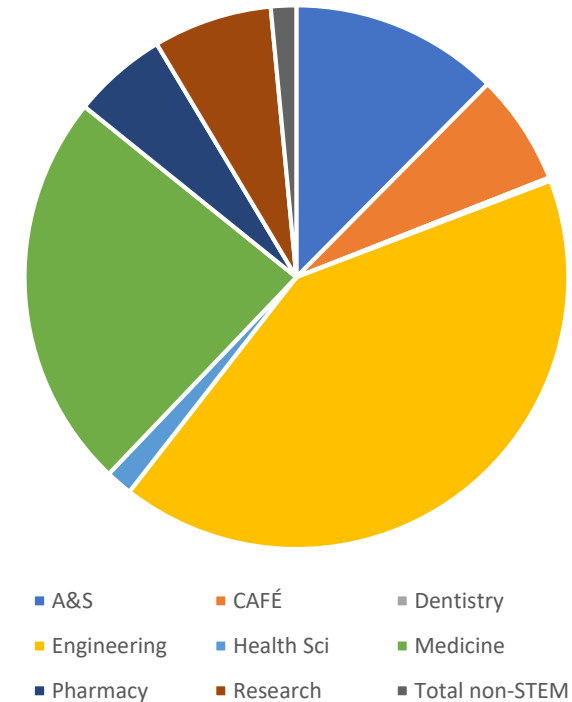
* Reports to University Relations
** Dual reporting to University Relations



Research Infrastructure Improvements

- New leadership and expansion of services within research administrative units
- Data portals and online systems
- Healthy Kentucky Research Building
- Research Core Facilities (II.C.5a, II.C.7a): Through institution-wide equipment competitions (another planned for FY 19/20), have brought in \$6.25M in new equipment to UK since 2017

College equipment competition distribution



Healthy Kentucky Research Building

Cancer – Substance Abuse – Diabetes/Obesity – Cardiovascular/Stroke

Two Floors Complete + Shared Space:

- Shared Conference Rooms & Behavioral Research Suite
- Second Floor:
 - Wet-Labs Diabetes/Obesity
 - Dry-Labs occupied by **SUD Data Consortium**, **HEAL-ing communities faculty and staff**
- Third Floor:
 - Wet-Labs occupied by **Markey Cancer Center**
 - Dry-Labs occupied by the **Institute for Rural Health Policy** and a **Health Equity Cluster**

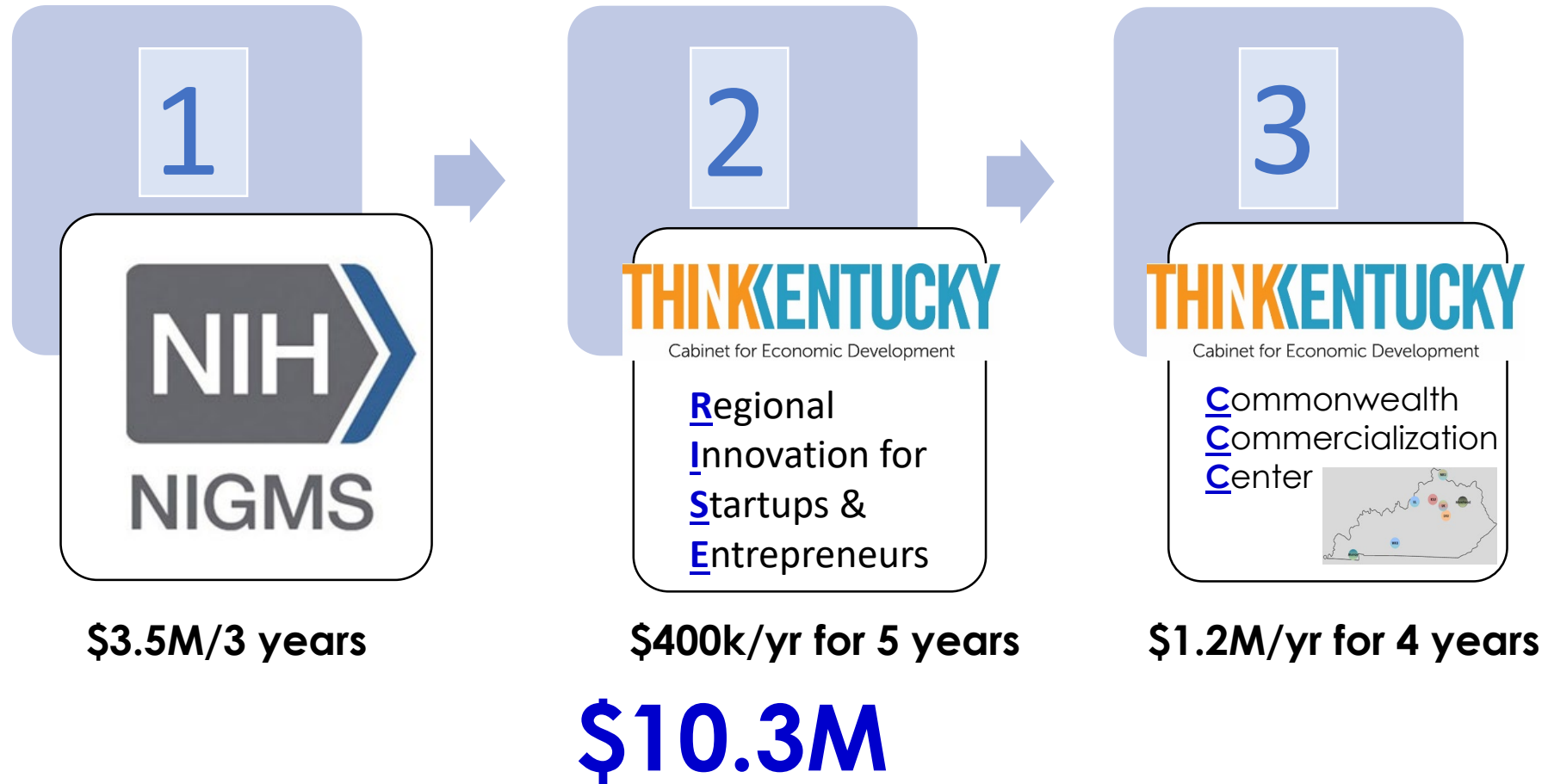


IV. Engagement, translation

- Alignment of CCTS and Markey Cancer Center with the Office of Research, renewal of these programmatic grants (Markey NCI renewal this year, CTSA renewal submitted in April, 2019)
- Support for Kentucky HEAL application to reduce opioid-related deaths in the Commonwealth
- Support for development of the Spirits Institute
- Administrative support for the State-wide EPSCoR program for all institutions of higher education in KY
- Creation of programs to foster intellectual property, commercialization and start-ups across KY (I.B.1, II.A)

UK Office of Technology Commercialization

Growing with Grants




Commercialization Metrics

Growing the Opportunity Pipeline

Capturing More Innovation; Transferring More Technology

	FY 2015	FY 2016	FY 2017*		FY 2018**
INVENTIONS DISCLOSED	55	53	54	→	101
PATENTS FILED	25	27	39	→	62
LICENSES EXECUTED	4	7	13	→	29
STARTUPS LICENSED	6	3	8	→	10



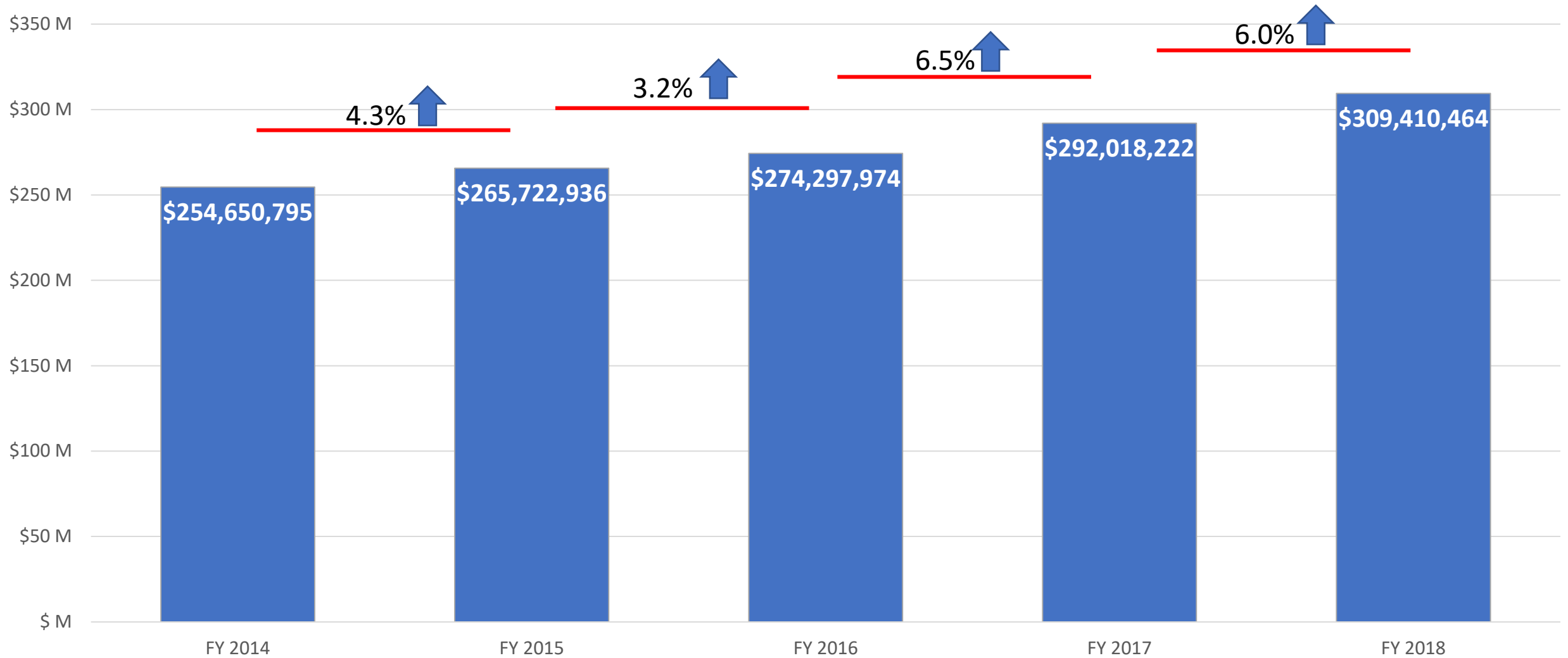
*3/4 fiscal year with Director but not full team

**First full FY with full Team

Research metrics: how are we doing?

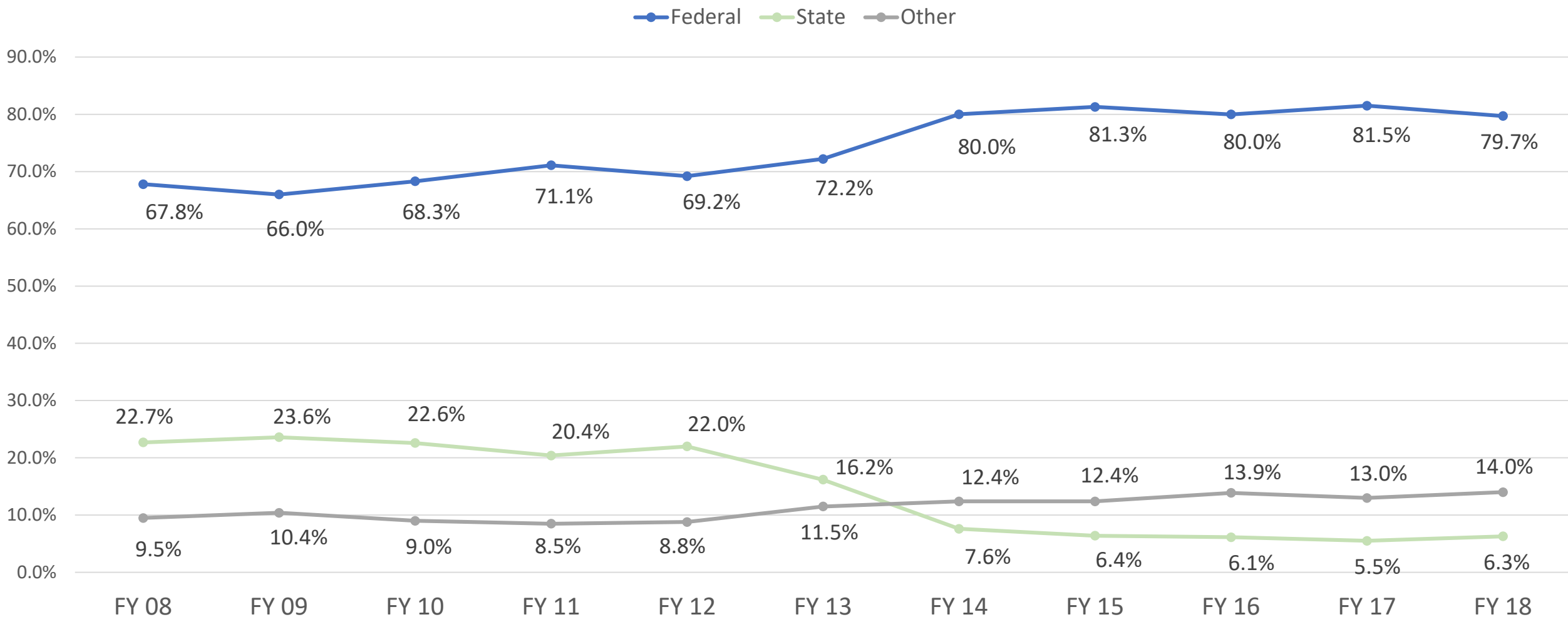
- Our grant portfolio for FY18/19 is at its strongest!
- This is reflected by national rankings

UK R&D Grant Expenditures: *Strategic Plan Goal = 1.9% increase/year*



Source: University of Kentucky OSPA database, 06/30/2018

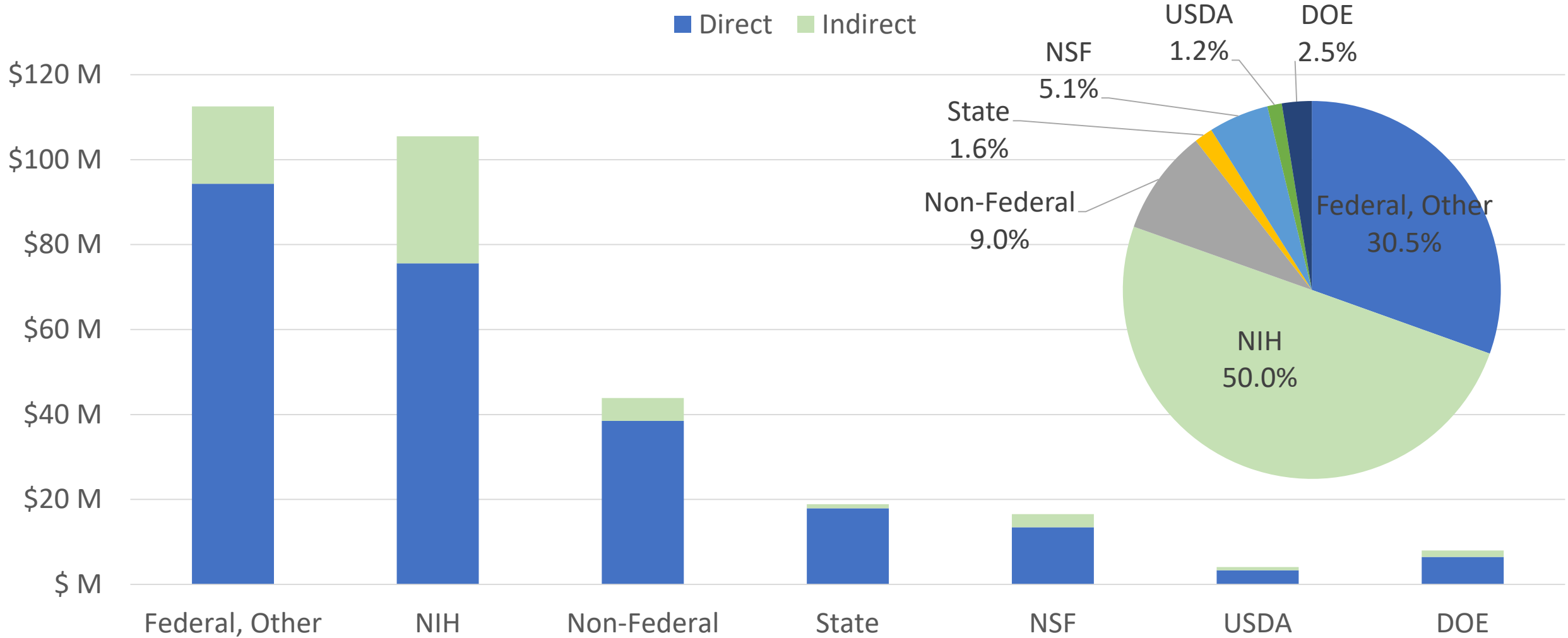
A Closer Look at R&D Expenditures: We continue to be a federally funded research enterprise



Source: University of Kentucky, OSPA database.

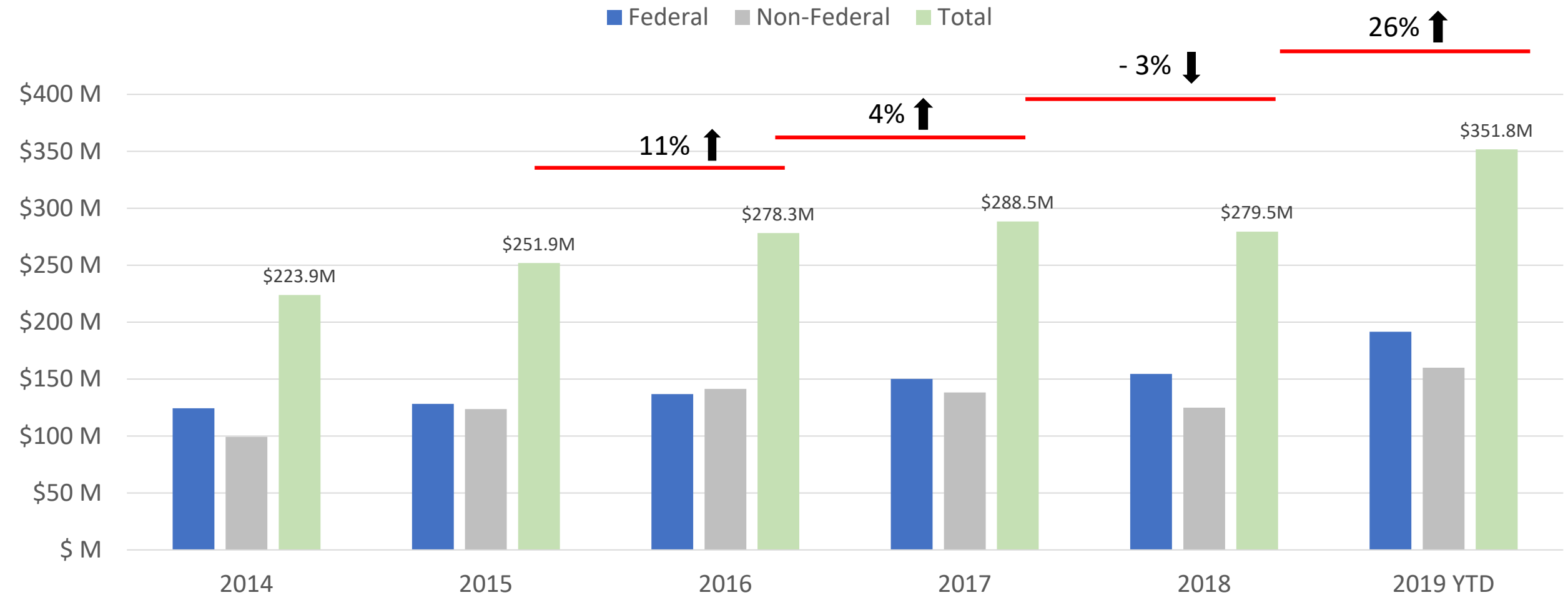
NIH is the largest source of F&A to the UKRF Budget (FY 2018)

■ Direct ■ Indirect



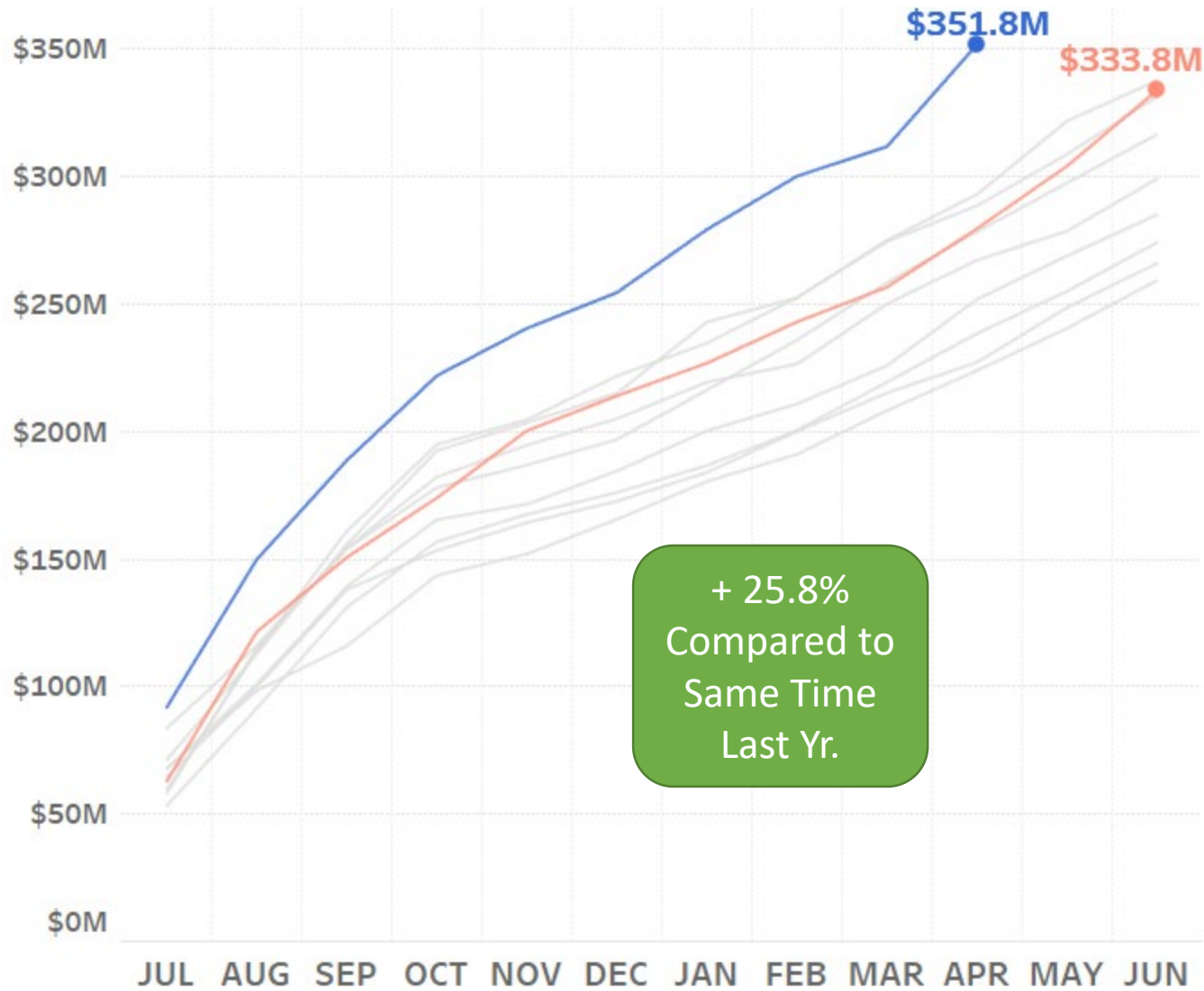
Source: University of Kentucky, OSPA database.

Our Progress thus far in 2018/19: Grant & Contract Award Data July – April 30th of Each Year

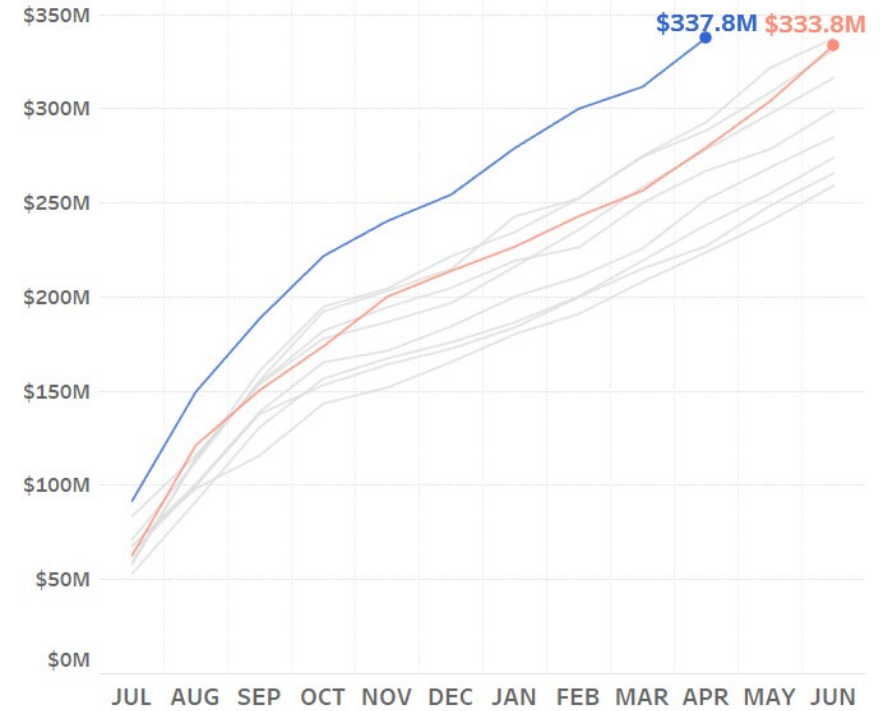


Source: University of Kentucky, OSPA database.

Successful Year for Grant Awards



Sponsored Projects Excluding KY CAN HEAL GRANT

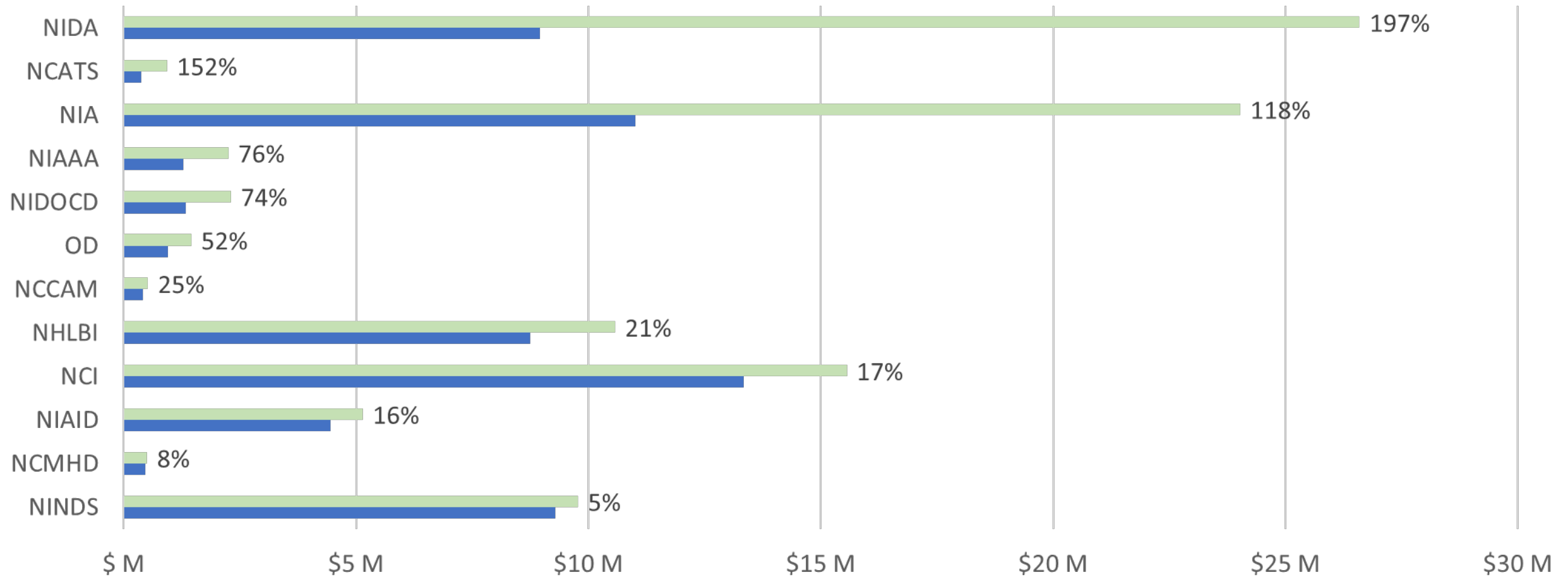


Even without the HEAL Grant
 + 20.8% Compared to Same Time Last Yr.
 + 1.2% Compared to Full FY 2018

Source: University of Kentucky, OSPA Database, 4/30/2019

Largest NIH Increases from FY 18 to FY 19 YTD July through April 30th

■ 2019 YTD ■ 2018 YTD

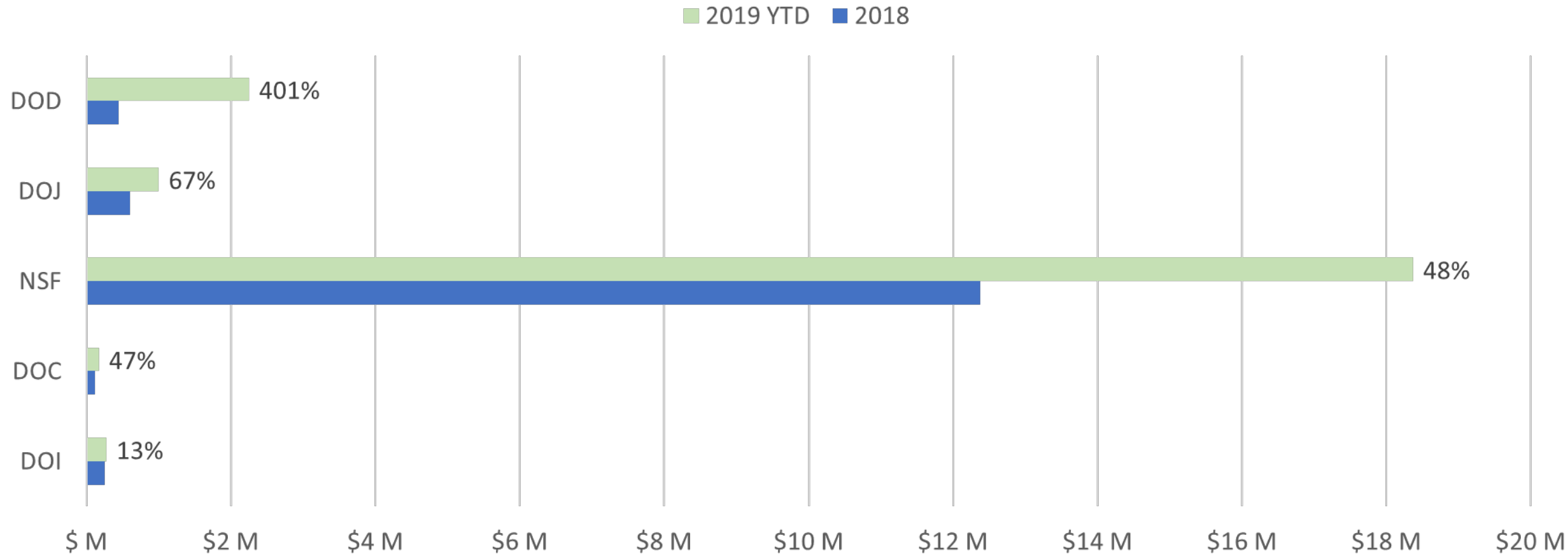


Source: University of Kentucky, OSPA database.

NIH is not the only federal agency awards that have increased

Other Federal Increases from FY 18 to FY 19 YTD

July through April 30th

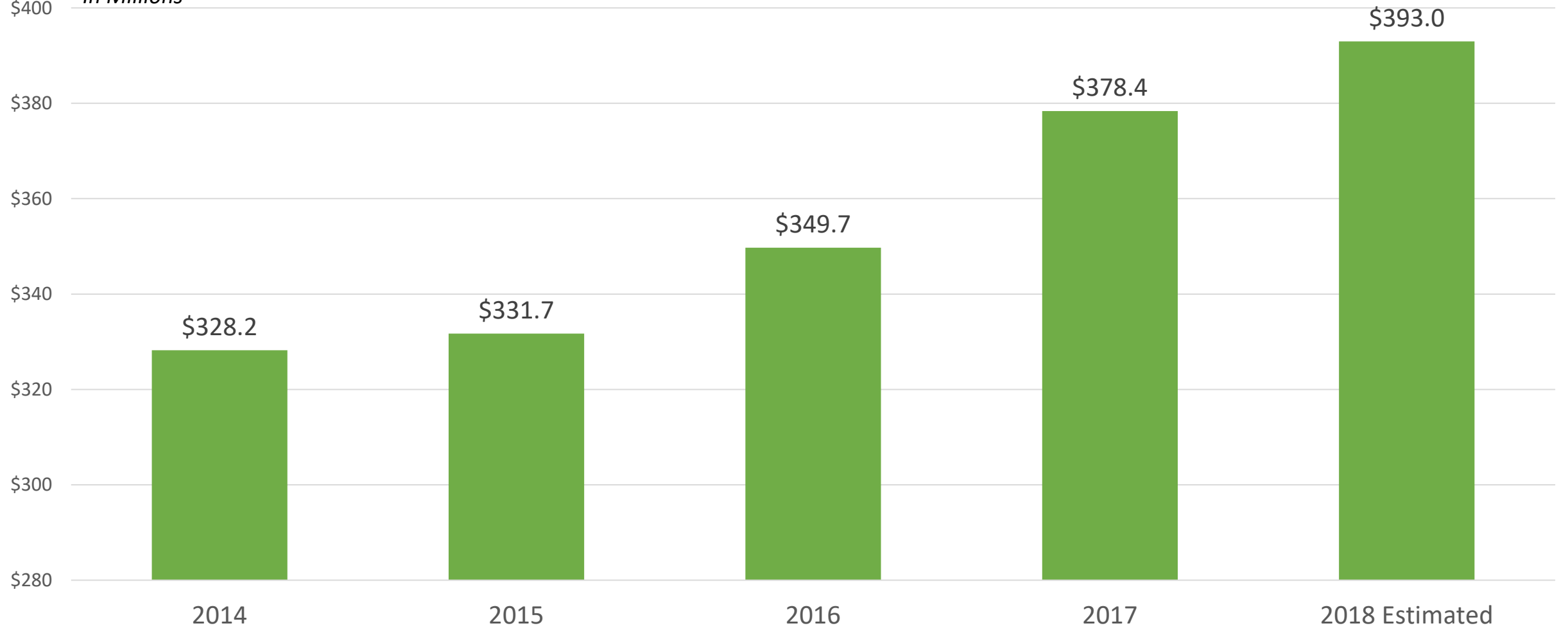


Source: University of Kentucky, OSPA database.

UK Strategic Plan Metrics

NCSES HERD R&D Expenditure Survey

In Millions



Source: University of Kentucky, OSPA database.

University Reputation & Rankings

Rankings have increased as our research portfolio expands

NSF HERD RANKING



62nd

▲ 2 (2016)

Of the 644 institutions surveyed, the University of Kentucky was ranked 62nd, up two spots from 2016.

Increase in Ranking of
7 Places in last 5-years



41st

— 0 (2016)

UK remained 41st among the 400 public institutions surveyed.

Increase in Ranking of
3 Places in last 5-years

University Reputation & Rankings

Rankings have increased as our research portfolio expands

The Top American Research Universities, 2017

The Center for Measuring University Performance

University of Kentucky

Top 50 Nationally
for the first time

Top 25 Public
Institution
for the first time

Source: https://mup.umass.edu/sites/default/files/annual_report_2017.pdf

Does UK research have an impact?


- **New Awards in 2018/19:**

- Seth DeBolt: National Science Foundation (\$3M): a new modeling framework to provide complete picture of genome-phenome relationships applied to the problem of stalk lodging resistance (breaking of the plant stem).
- Brent Seales: Andrew Mellon Foundation (\$2M): digital restoration, electronic representation, and computer based open source dissemination of the collection of Herculaneum Papyri held by 4 institutions around the world.
- Steve Estus: NIH (\$3.9M): single nucleotide polymorphisms (SNPs) in large genome-wide association studies that are associated with Alzheimer's disease risk, using these SNPs to develop drug targets for AD treatment.
- Sharon Walsh: NIH (\$13.9M): HEALing communities and networks helping end addiction long-term.
- Rick Honaker: DOE (\$3.2M): develop and design an efficient processing circuit that can be used to recover high-value rare earth minerals from coal and coal byproducts.

Scholarly Output & Performance: UK SciVal Data

2013-2019 YTD


Overall research performance

Scholarly Output 


23,629 

Field-Weighted Citation Impact 

1.40

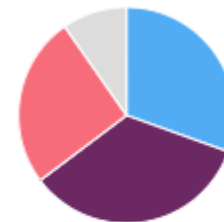
Citation Count 

215,902

Citations per Publication 

9.1

Collaboration



Metric

Metric	Percentage	Field-Weighted Citation Impact
International collaboration	30.9%	1.89
Only national collaboration	34.4%	1.37
Only institutional collaboration	25.1%	1.02
Single authorship (no collaboration)	9.6%	0.88

Performance indicators

Publications in top 10% most cited worldwide



University of Kentucky:

17.0%

United States:

16.7%

Publications in top 10% journals by CiteScore Percentile



University of Kentucky:

36.5%

United States:

37.3%

Publications co-authored with Institutions in other countries



University of Kentucky:

30.9%

United States:

32.7%

Sanders Brown Center on Aging: Research that makes a difference

- Dr. Linda Van Eldik, Professor and Director, Sanders Brown Center on Aging, Program Director, NIH P30 Alzheimer's Disease Center

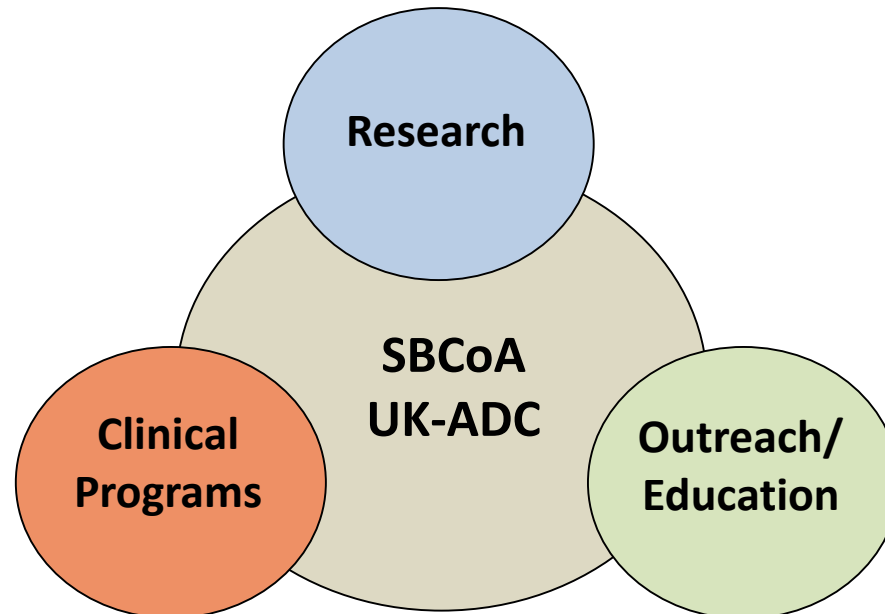


3 June 2019

**Research at
Sanders-Brown
Center on Aging**

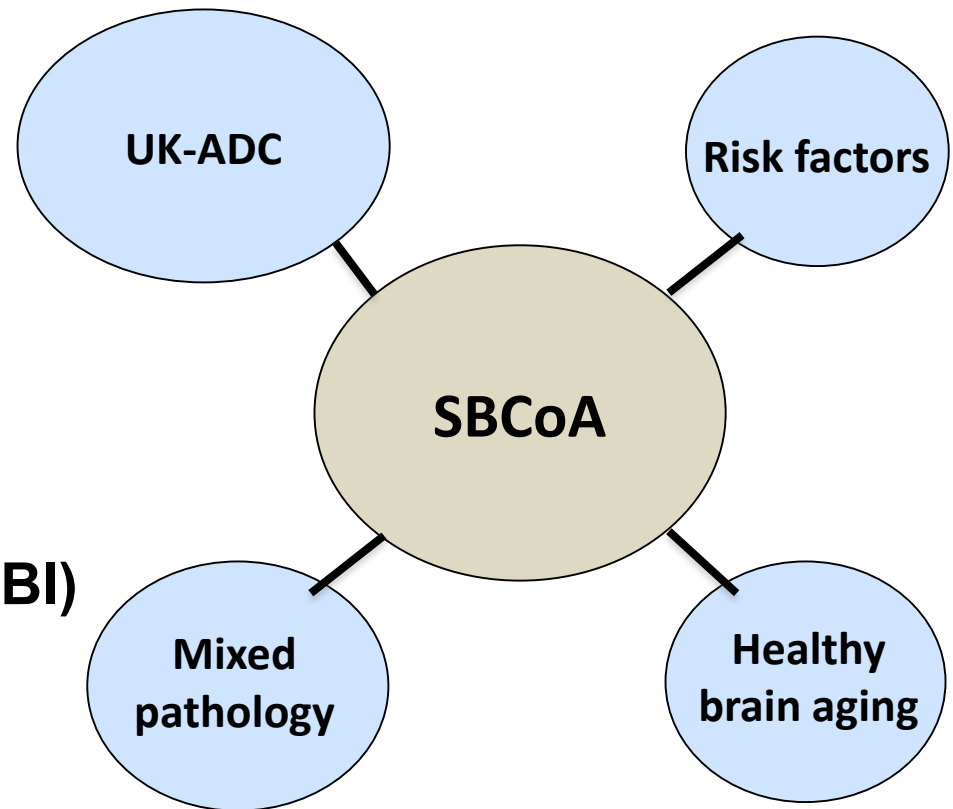
Mission

- Our mission is to improve the health of the elderly in Kentucky and beyond through **research** dedicated to understanding the aging process and age-related brain diseases, and **outreach/education** and **clinical programs** that promote healthy brain aging



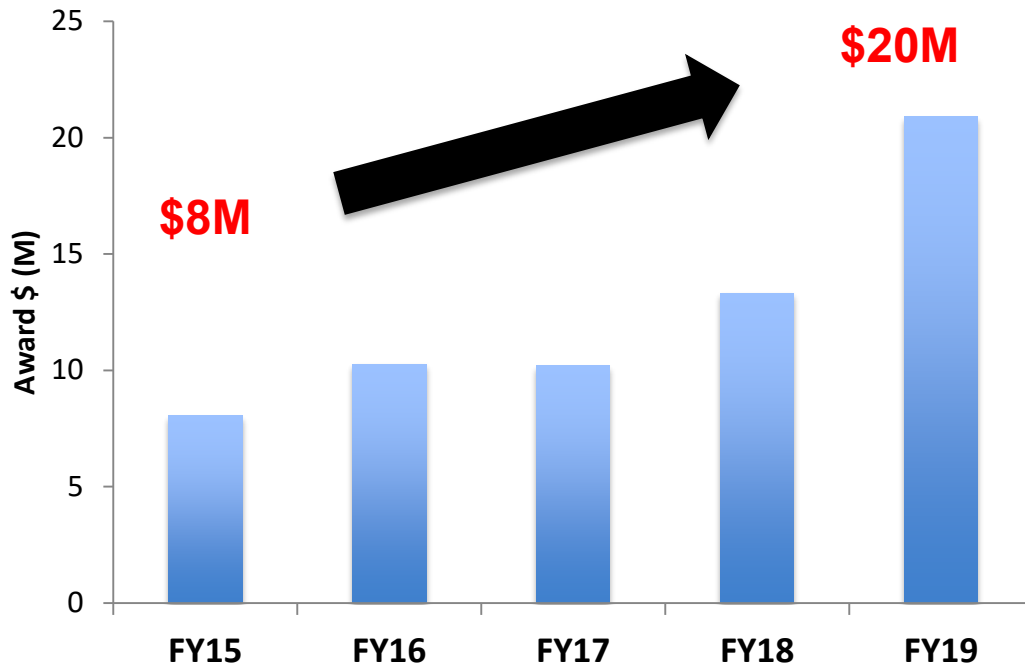
SBCoA Research Areas

- **Alzheimer's disease and related dementias**
- **Mixed pathology**
- **Healthy brain aging**
- **Risk factors**
 - **Down syndrome (DS)**
 - **Vascular co-morbidities**
 - including stroke
 - **Traumatic brain injury (TBI)**
 - **Inflammation**
 - **Genetics, lifestyle**



Research at SBCoA is Growing

Grants & Contracts Awarded



260% increase in research funding in 5 years

For FY19, this funding was to 16 faculty

Helping other units on campus



AD/ADRD supplements:

- Alan Daugherty- Cardiovascular
- Matt Gentry- Metabolism
- Daret St Clair- Cancer
- Olivier Thibault- Diabetes

Example: a UK-ADC Pilot Research Project

Visual Arts Education improves self-esteem for persons with dementia and reduces caregiver burden: A randomized controlled trial

Allan G Richards and Ann C Tietyen
University of Kentucky, Lexington, KY, USA

Gregory A Jicha, Shoshana H Bardach ,
Frederick A Schmitt, David W Fardo ,
Richard J Kryscio and Erin L Abner
Sanders-Brown Center on Aging, University of Kentucky, Lexington, KY, USA

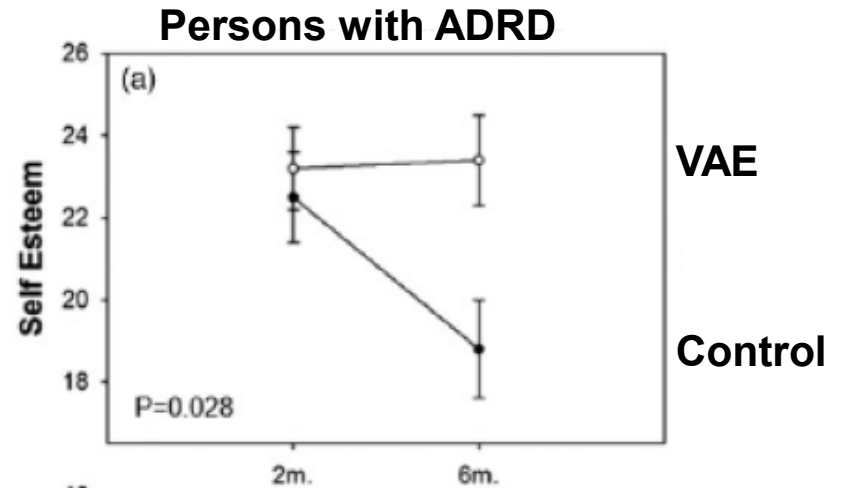
Dementia
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sagepub.co.uk/journalsPermissions.nav
DOI: 10.1177/1471301218769071
journals.sagepub.com/home/dem



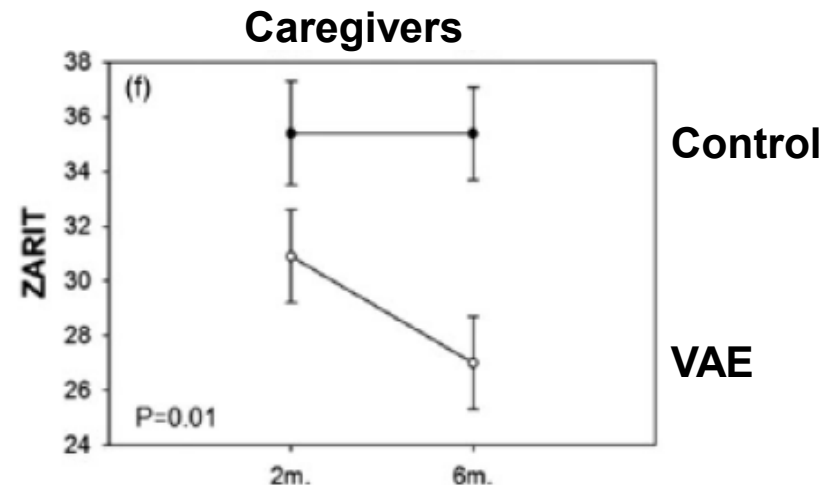

Ann Tietyen, MS and Allan Richards, PhD

Partnership: College of Fine Arts and SBCoA/UK-ADC investigators

Patient Self-Esteem Maintained



Caregiver Burden Reduced



Visual Arts Education Pilot Research Project

“It is so difficult for someone with [Alzheimer’s] to have the confidence to do anything, especially new things. With the help, guidance, encouragement, love, and understanding of Allan and Ann, and the support of the others in the class, it became easier for all of them to once again succeed in something.”



“To see the joy and hear the laughter and see the accomplishments from all the participants, especially my husband, was worth our 4-hour round trip drive to Lexington every week.”



Plans:

NIH R01 grant application being developed by Ms. Tietyen/Dr. Richards.

UK-ADC Data Core providing advice on study design and grant preparation.

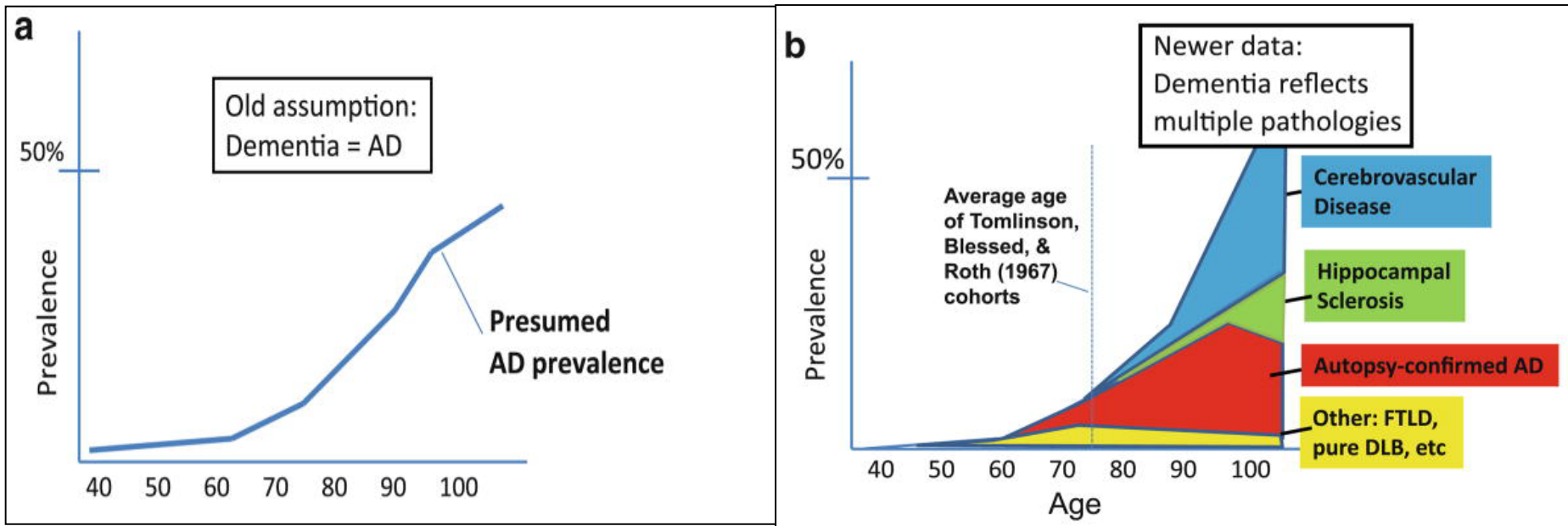
Example: Research on Late Life AD Mimics



Nelson

Dementia is not always AD.

In the elderly, there are mixed pathologies and common AD mimics that increase dramatically with age.



Example: Research on MCI-CVD & Biomarkers of VCID

MCI-CVD = Mild Cognitive Impairment due to Cerebrovascular Disease

VCID = Vascular contributions to Cognitive Impairment and Dementia

Leverage existing ADC
data/biospecimens

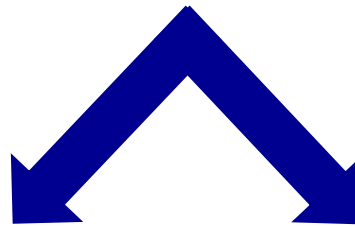


Develop new collaborative grants; e.g.,

R01 NR14189 Jicha, Nelson, Moser: Early detection and prevention of MCI due to CVD

R01 NS079637 Wilcock: Vascular breakdown in AD with CVD

R01 NS097722 Wilcock, Norris: Neurovascular astrocyte dysfunction in VCID



Build transdisciplinary partnerships for new large NIH awards to develop biomarkers of AD and vascular dementia

**P30 AG028383 Wilcock/
Van Eldik: UK-ADC
Biomarker Core**

UH2/UH3 NS100606 Wilcock/Jicha: Small vessel disease biomarkers in a longitudinally-followed “stroke-belt” cohort (MARK-VCID).

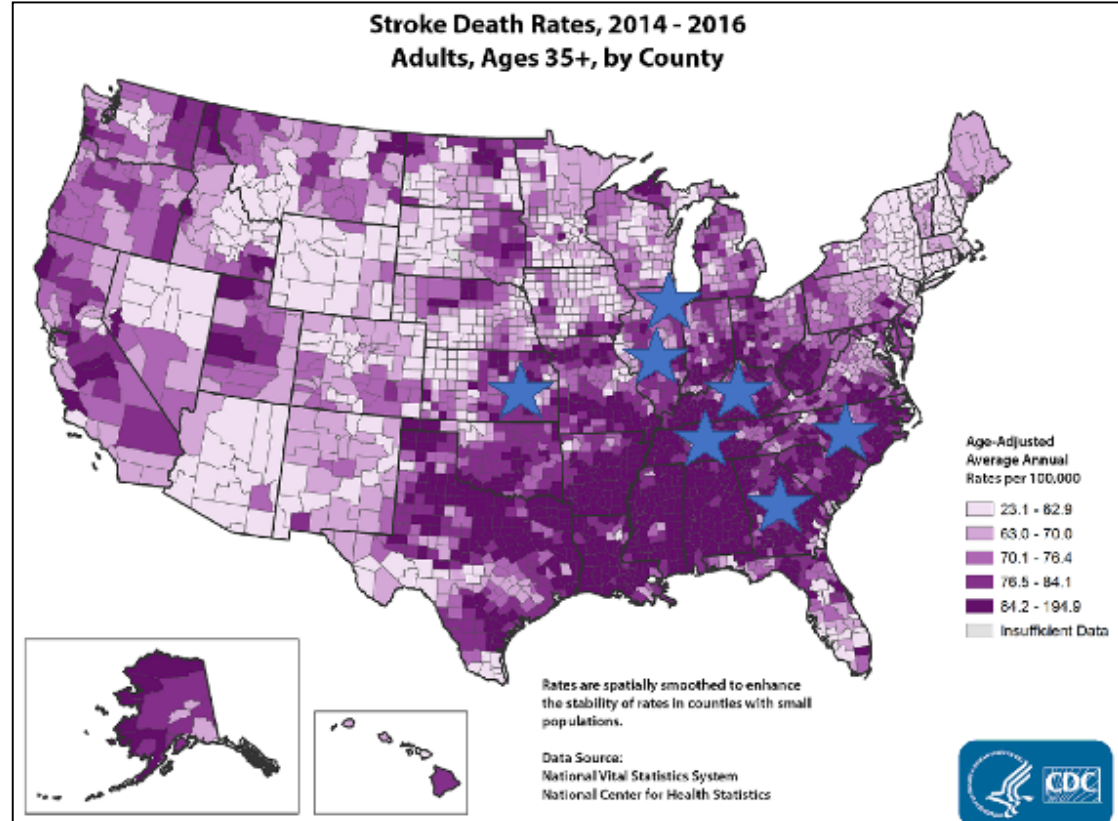
MCI-CVD and Biomarkers of VCID

U19 Consortium \$39M Application Submitted with UK as Coordinating Center

Index-Stroke Characteristics, Heritability, Epidemiology, Mechanisms, and Influences of Alzheimer pathology in the development of post-stroke Dementia: *The ISCHEMIA-D Study*

Multiple partners (Rush, Indiana, Univ Kansas, Vanderbilt, Emory, Duke, UT Memphis).

Critically important for Kentucky, a major “stroke-belt” state with high mortality

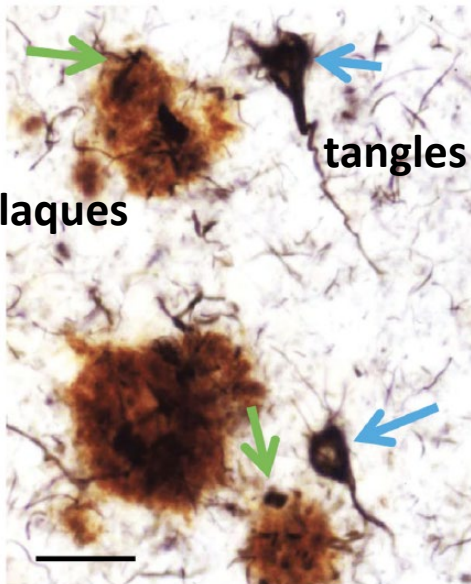


Example: Research on LATE

LATE: Limbic-predominant age-related TDP-43 encephalopathy

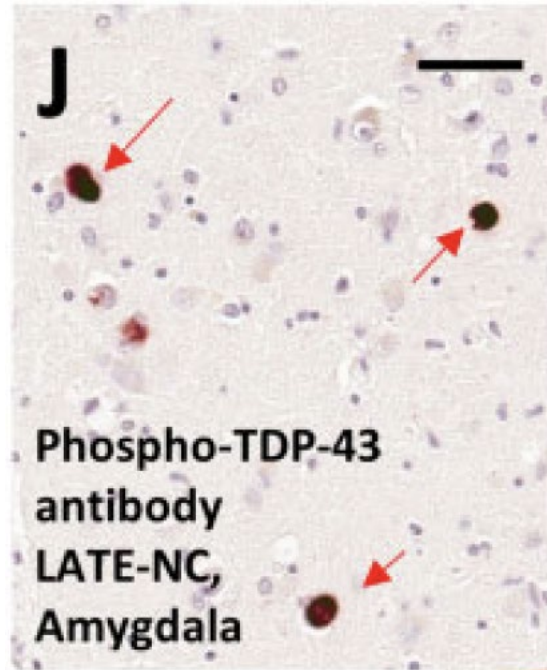
TDP-43 deposits, not AD plaques and tangles.

AD



Immunohistochemistry:
A β (brown) and Tau (black)

LATE



TDP-43 pathology is seen in ALS, FTD, but LATE is ~100x more common.

TDP-43 deposits are also in different parts of the brain compared to AD.

20-50% of people >80yo will have LATE brain changes, and prevalence increases with age.

But no one had defined it before now.

Very important for therapy: targeting the right disease

A precision medicine approach to the treatment of Alzheimer's & related dementia

Where the dementia field is now

Where Sanders-Brown will take the dementia field

One-size fits-all medicine

Stratified medicine

Precision medicine



Stratification

Patients are grouped by:
Disease
Subtypes
Demographics
Clinical features
Biomarkers



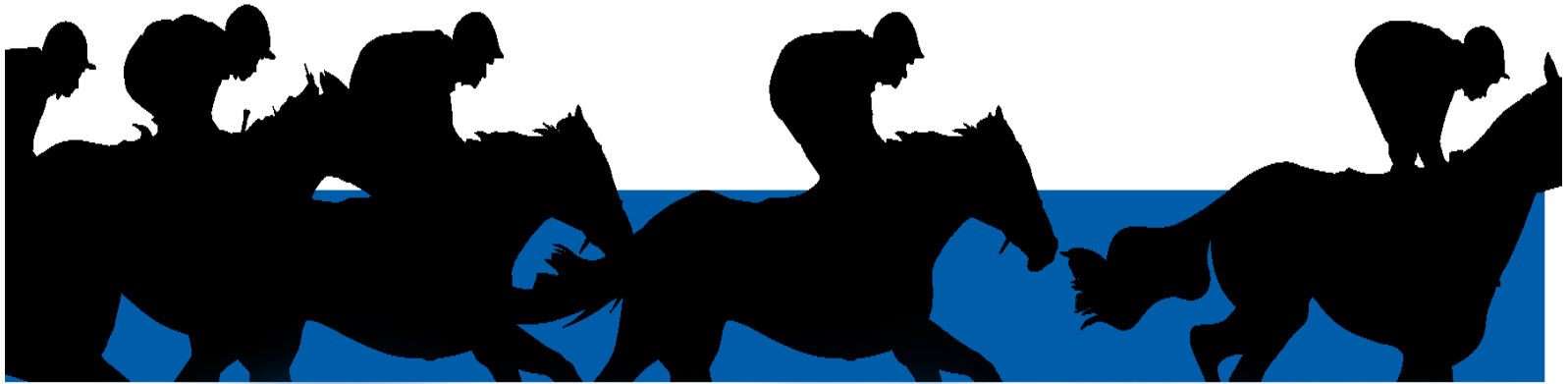
Personalisation

Patient individual:
Preferences,
Clinical features
Medication history
Environment
Behaviours & habits
Biomarker



Precision medicine



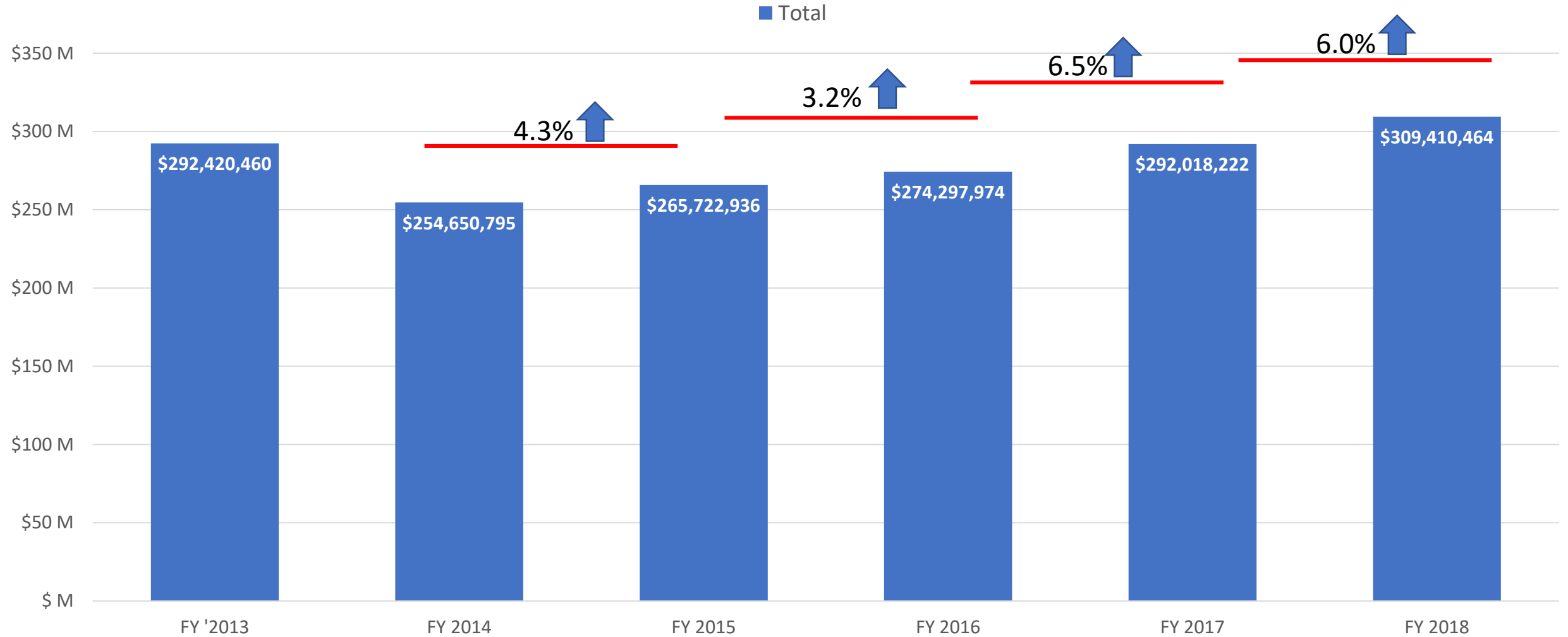


Racing to defeat dementia

 Sanders-Brown
Center on Aging

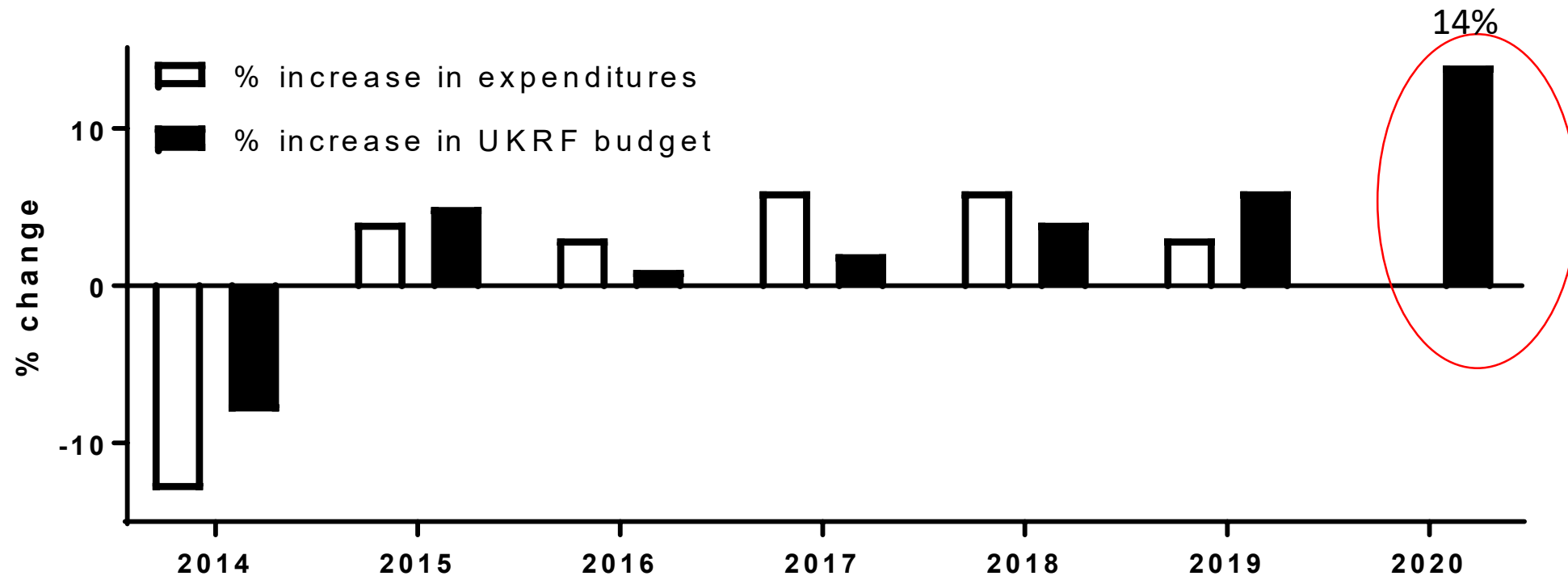


UK R&D expenditures annually: the basis for the UKRF budget



Source: University of Kentucky OSPA database, 06/30/2018

UKRF budgeting: how to decide on projected F&A income for budgeting purposes?



UKRF Budget

- For FY18/19, we budgeted \$50 million based on F&A income from FY17/18.
- 2019/20 Proposed Budget: \$57 million of F&A income, representing an 14% increase.

Page 1: Revenues (major changes)

- II.B. Private Gifts: Reduction of \$91,750
- IV. Appropriated fund balance, unrestricted
 - A. Royalty Income Unexpended Balance: \$127,100
 - B. Faculty Research Program: \$6 million (fund balance difference)
 - C. Miscellaneous: -\$2,191,560
 - D. Contingency Reserve: Increase of \$700K (10% of UKRF \$57 million budget).
 - E. Healthy Kentucky Research Building: increase of \$3,100,000

Page 2: Transfers to General Fund (major changes)

- 1.A.2. Service Assessment: +\$115,700
- 1.A.7. Research Financial Services: +\$75,000
- 1.B. Research Admin/Personnel Support: +\$704,500
- 1.B.2. College Grant Officers: +\$126,100
- 1.B.3. Office of Technology/Commercialization: +\$141,000
- 1.E. Debt service:
 - Lee T. Todd internal loan: \$3,924
 - Biopharm 5th floor, +\$2,200
 - Healthy Kentucky Research Building Internal Loan Debt Service, +\$465,816

Page 3: Expenditures (major changes)

- II.A. Operating expenses of research units: +\$429,900
- II.B. Other activity: +\$718,450
- II.C. Research Programs: +\$11,575,100

Page 3: Expenditures, Research Programs

- IIC.1a Residual start-up (-\$2,456,400): Remaining commitments
- IIC.1b Faculty start-up (\$1,400,000): 20% of this year's budget
- IIC.2a. Enrichment (\$987,100): Increased based on increased funding
- II.C.2b. Research Activity Award (\$201,300): 5% of this year's budget
- II.C.2c. 2% to Academic Home (\$181,400): additional F&A return to units
- IIC.4a. Grant related support (\$647,500): new programmatic grants.
- IIC.6a. University-wide Initiatives (\$24,200): additional support for workshops on good research practices, data handling
- II.C.7a. Research Strategic Investment fund (\$1,000,000): upcoming equipment competition, additional support for start-up for diversity hires
- II.C.7b. Research Priority Areas (\$490,000): 7% of this year's budget
- II.C.8a. Research Programs Fund Balance carryforward (\$6,000,000)
- II.C.9a. Healthy Kentucky Research Building (\$3,100,000): animal cages and racks