A few points to touch upon

Updates on various items

Research Funding and Rankings

Thematic programs and recruitment

Technology Development and Innovation Ecosystem
Key operational objectives for research growth going forward

- Identify and support the development of thematic initiatives that leverage strengths across colleges
- Establish an “Office of Research Development” that will identify strategic programmatic funding opportunities
- Diversify funding portfolio
- Strengthen strategic affiliations
- Seamless support and workflow platforms
- Reinvest in physical and intellectual infrastructure (Recruit/Retain)
- Provide broader platforms for student research opportunities
- Expand and accelerate technology transfer platforms
- Workforce development
- Work with intercollege, faculty advisory groups to move forward with implementation
Vice President for Research
Stephen M. Lanier, Ph.D.

- Center for Molecular Medicine & Genetics
  Lawrence Grossman, Ph.D.
  Director
- Merrill Palmer Skillman Institute
  Peter Lichtenberg, Ph.D.
  Director
- Institute of Gerontology
  Peter Lichtenberg, Ph.D.
  Director
- Center for Urban Responses to Urban Stressors
  (Institute of Environmental Health Sciences)
  Melissa Runge-Morris, M.D.
  Director
- Healthy Urban Waters
  Carol Miller, Ph.D.
- Translational Neurosciences
  David Rosenberg, M.D.
- Translational Sciences and Clinical Research Innovation
  Phil Levy, M.D.

- Center for Urban Responses to Urban Stressors
  Institute of Environmental Health Sciences
  Melissa Runge-Morris, M.D.
  Director

- Merrill Palmer Skillman Institute
  Peter Lichtenberg, Ph.D.
  Director

- Peter Lichtenberg, Ph.D.
  Director

- Terrence Monks, Ph.D.
  Assistant VP
  Integrative Biosciences
- Denise Figlewicz, Ph.D.
  Assistant VP
  Research Enhancement and Development
- Philip Levy, M.D.
  Assistant VP
  Translational Sciences and Clinical Research Innovation

- Antonio Yancey, Ph.D.
  Assistant VP
  Research Admin & Operations
  Business Affairs Officer
- Anne-Marie Poltorak
  Executive Assistant

- Julie O’Connor
  Director
  Communications
- Gail Ryan
  Associate VP
  Sponsored Programs
- Joan Dunbar, Ph.D.
  Associate VP
  Tech Commercialization
- Phil Cunningham, Ph.D.
  Associate VP
  Research Integrity
- Gerald Hish, DVM
  Assistant VP
  Vivarium Program
- Manuel Tancer, M.D.
  Assistant VP
  Human Research Protection Program

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  Human Research Protection Program
A few points to touch upon

Updates on various items

Research Funding and Rankings

Thematic programs and recruitment

Technology Development and Innovation Ecosystem
EXTRAMURAL RESEARCH FUNDING

<table>
<thead>
<tr>
<th>Obligated Sponsor Type (Using Prime if Applicable)</th>
<th>2013</th>
<th>2014</th>
<th>2015*</th>
<th>2016**</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corporations</td>
<td>$10,945,325</td>
<td>$11,055,679</td>
<td>$12,384,515</td>
<td>$55,958,474</td>
<td>$54,631,874</td>
</tr>
<tr>
<td>Federal Government</td>
<td>$15,843,184</td>
<td>$21,879,113</td>
<td>$25,351,610</td>
<td>$30,265,253</td>
<td>$25,284,347</td>
</tr>
<tr>
<td>Foundations</td>
<td>$7,529,182</td>
<td>$10,263,209</td>
<td>$12,646,443</td>
<td>$9,296,446</td>
<td>$9,475,080</td>
</tr>
<tr>
<td>NIH</td>
<td>$77,684,181</td>
<td>$78,603,871</td>
<td>$85,336,002</td>
<td>$89,322,782</td>
<td>$90,439,506</td>
</tr>
<tr>
<td>NSF</td>
<td>$5,404,977</td>
<td>$9,827,735</td>
<td>$12,992,732</td>
<td>$10,673,480</td>
<td>$9,935,056</td>
</tr>
<tr>
<td>Other</td>
<td>$20,229,869</td>
<td>$12,520,963</td>
<td>$14,823,738</td>
<td>$17,076,768</td>
<td>$17,060,972</td>
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<tr>
<td>State</td>
<td>$12,174,377</td>
<td>$7,769,870</td>
<td>$24,542,587</td>
<td>$32,875,350</td>
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</tr>
<tr>
<td>Grand Total</td>
<td>$149,811,095</td>
<td>$151,920,440</td>
<td>$188,077,626</td>
<td>$245,468,553</td>
<td>$236,513,445</td>
</tr>
</tbody>
</table>

*Award Data for FY 2015 and beyond reflects a change in the methodology used to capture clinical trial awards/contracts.

**Award Data for FY 2016 and beyond includes clinical trial awards/contracts involving WSU Karmanos Cancer Institute and the School of Medicine that were not previously processed through the WSU Office of Sponsored Programs.
EXTRAMURAL FUNDING (FEDERAL)

<table>
<thead>
<tr>
<th>funding source</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>Increase above 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>NIH</td>
<td>77,684,181</td>
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<td>25,284,347</td>
<td></td>
</tr>
<tr>
<td>Total FEDERAL</td>
<td>98,932,342</td>
<td>110,310,719</td>
<td>123,680,344</td>
<td>130,261,515</td>
<td>125,658,909</td>
<td>26,726,567 (27% increase)</td>
</tr>
</tbody>
</table>
NSF Reported Research Expenditures and Institutional Ranking

Rank among US public universities – 393 total
Facilities & Administrative Costs Recovered - generated by expenditures of awarded grants/contracts


$31,558,947 $31,638,042 $34,217,274 $34,656,619 $38,422,551 $39,601,937 $35,574,556 $34,078,978 $36,483,800 $35,027,833 $37,327,025 $37,805,249 $34,509,504
**EXTRAMURAL RESEARCH FUNDING**

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</table>
### Overview of Total Research Funding for Past 4 Fiscal Years

<table>
<thead>
<tr>
<th></th>
<th>FY 2014</th>
<th>FY 2015</th>
<th>FY 2016</th>
<th>FY 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>University Overall</td>
<td>$151,920,440</td>
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</tr>
<tr>
<td>Medicine</td>
<td>$94,471,462</td>
<td>$116,923,561</td>
<td>$176,563,164</td>
<td>$152,096,963</td>
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<tr>
<td>Liberal Arts &amp; Sciences</td>
<td>$16,103,749</td>
<td>$21,124,216</td>
<td>$17,007,135</td>
<td>$18,223,960</td>
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<tr>
<td>Engineering</td>
<td>$13,669,158</td>
<td>$12,605,980</td>
<td>$14,197,962</td>
<td>$14,983,264</td>
</tr>
<tr>
<td>VPR Centers &amp; Institutes</td>
<td>$4,106,837</td>
<td>$4,179,404</td>
<td>$7,768,487</td>
<td>$14,216,377</td>
</tr>
<tr>
<td>Nursing</td>
<td>$3,299,463</td>
<td>$3,593,876</td>
<td>$4,973,418</td>
<td>$6,216,293</td>
</tr>
<tr>
<td>Pharmacy &amp; Health Sciences</td>
<td>$4,003,946</td>
<td>$4,871,394</td>
<td>$4,247,657</td>
<td>$5,209,199</td>
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<tr>
<td>Social Work</td>
<td>$917,624</td>
<td>$760,456</td>
<td>$1,138,555</td>
<td>$2,843,256</td>
</tr>
</tbody>
</table>

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**Award Data for FY 2016 and beyond includes clinical trial awards/contracts involving WSU Karmanos Cancer Institute and the School of Medicine that were not previously processed through the WSU Office of Sponsored Programs.*
A few points to touch upon

Updates on various items

Research Funding and Rankings

Thematic programs and recruitment

Technology Development and Innovation Ecosystem
Thematic Initiatives - Integrative Biosciences

Translational Sciences and Urban Health

- Interface of Environment, Ethnicity and Health
- Urban Life Span
- Infectious Diseases
- Brain and Mind Health
- Metabolic Diseases

[^1] Health Disparities
[^2] Behavioral Health Sciences
[^4] Community
[^7] Humanitatis
The Healthy Urban Waters Initiative

- Blue Economy
- Health
- Policy and Socioeconomics
- Infrastructure
- Transitional Demographics

Disparities and Equity

- Allostatic load and the Built Environment
- Bio and Systems Engineering
- Local, Regional and International Community
- Urban Laboratories and Education Platforms
- Data Analytics
- Urban Planning and Sustainability
Thematic Recruitments and IBio Initiative Update

Tracie Baker, Ph.D.
Tenure Track Assistant Professor
Institute of Environmental Health Sciences, CURES and Department of Pharmacology
Zebrafish model organism and developmental impact of environmental toxins
NIH funding

Samuele Ziliolo, Ph.D.
Tenure Track Assistant Professor – Started Nov 1, 50% Psychology (CLAS) and 50% Division of Behavioral Health in the Dept of Family Medicine and Public Health Sciences (SoM)
Health equity - Socioeconomic stressors and behavioral outcomes
Department of Justice funding, NIH pending

Ulrike Klueh, Ph.D.
Associate Professor – tenure track – Biomedical Engineering
Glucose sensors, diabetes and implantable devices
Helmsley Foundation and NIH funding

Marianna Sadagurski, Ph.D.
Tenure Track Assistant Professor – Dpt of Biology - Metabolic diseases group at Ibio
Mouse models to track neuronal adaptation mechanisms involved with obesity and diabetes
Juvenile Diabetes Research Foundation funding and NIH pending


**Thematic Recruitments and IBio Initiative**

**Wanquing Liu, Ph.D.** (Metabolic diseases and pharmacogenomics)
July 2017 - Tenured Associate Professor - 50% in Pharmaceutical Sciences in the College of Pharmacy and Health Sciences and 50% appointment in Department of Pharmacology in Medicine
NIH funding

**Carolyn Harris, Ph.D.** Translational Neurosciences – Neuroprosthetics
Assistant Professor – March 2017 Chemical Engineering tenure track
NIH and industry funding

**Eduard Chekmenev, Ph.D.** Biomedical imaging (Cancer, Chemistry, Bioengineering, Translational Neurosciences)
Starts spring of 2018 50% Chemistry (tenure home) and 50% Oncology – Associate Professor
NIH, DoD, NSF funding

**Jun Li, M.D.** - Translational Neurosciences Initiative
Chair - Department of Neurology
Neurological and Neuromuscular Diseases
NIH funding-

**TWO ADDITIONAL RECRUITS (CONFIDENTIAL – NOT YET ANNOUNCED)**
Translational Neurosciences and Neurotrauma
Brain Health and neuroimaging
PROGRAMMATIC GRANT SUCCESS AND INITIATIVES

- “Prenatal Exposures and Child Health Outcomes: A Statewide Study” ~$28M UG3 OD023285-01
- P30 NIEHS Center for Urban Responses to Environmental Stressors ~$7M
- Cancer Center Support Grant – National Cancer Institute Designation as a comprehensive cancer center (1 of 45 in the country) ~$15M
- “Scale it up: Effectiveness-implementation research to enhance HIV-related self management among youth” ~$15M 1U19HD089875-01
- ”Enhanced Disease Surveillance and Environmental Monitoring” ~$3M
- Michigan Alzheimer's Disease Core Center
- Scientific Software Innovation Institutes (S²I²) (Physics and Computer Science)
- Urban Watersheds, Brain and Mind Health, Translational Neurosciences
- “Translating an efficacious illness management intervention for African American Youth with poorly controlled asthma to real world settings - ~$3.2M HL138633
- “Detroit Research on Cancer Survivors” ~$9M CA199240
KEY ITEMS OF FOCUS GOING FORWARD

• Recruitment -
  - Three targeted recruitments in progress (Neurosciences, Environmental Sciences, Metabolic Diseases)
  - Thematic recruitment cycle continuing with general ad and targeted ad postings

• Strategic partnership development

• Continued growth in Technology Commercialization and Industry engagement
Technology Commercialization - Expand and accelerate technology transfer platforms

<table>
<thead>
<tr>
<th></th>
<th>2012-2014</th>
<th>2015-2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disclosures</td>
<td>187</td>
<td>204</td>
</tr>
<tr>
<td>Patent applications (U.S.)</td>
<td>197</td>
<td>189</td>
</tr>
<tr>
<td>Patent applications (foreign)</td>
<td>82</td>
<td>15</td>
</tr>
<tr>
<td>Patents issued (U.S.)</td>
<td>46</td>
<td>68</td>
</tr>
<tr>
<td>Patents issued (foreign)</td>
<td>11</td>
<td>13</td>
</tr>
<tr>
<td>Licenses including options</td>
<td>16</td>
<td>27</td>
</tr>
<tr>
<td>Start-up companies</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Revenues</td>
<td>$1,872,396</td>
<td>$2,425,940</td>
</tr>
</tbody>
</table>
Technology Commercialization - Expand and accelerate technology transfer platforms

- STTR/SBIR grants - WSU faculty start ups - 12 awarded 2014-2017, 4 in 2017
- Acquisition of WSU Spin off *RetroSense Therapeutics* by Allergan Pharmaceutical Company
- Optimizing organizational structure around best practices for innovation ecosystem
- External funding - (examples)
  - MEDC - $1,073,875 - Michigan Translational Research Acceleration Program
  - $200,000 - Technology Transfer Talent Network
  - New Economy Initiative $500,000

- New sponsored research agreement options for industry engagement
  - SPECIALIZED SERVICES AGREEMENT FOR RESEARCH AND TECHNOLOGY DEVELOPMENT WITH INDUSTRY
  - SPONSORED AGREEMENT FOR RESEARCH AND TECHNOLOGY DEVELOPMENT WITH INDUSTRY
  - CLASS PROJECT AGREEMENT FOR INDUSTRY ENGAGEMENT
Technology Commercialization - Expand and accelerate technology transfer platforms (Updates)

- **Applied Materials** (AMAT): WSU - Q1, 2018 - Chuck Winters - CLAS
  Colocation of AMAT R&D at WSU(Chemistry)
  Collaborative Translational Research: From bench to industrial process
  Access of WSU researcher and students to specialized equipment
  Research funding and equipment donation
  Recognition of WSU research excellence in field of atomic layer deposition (microelectronics)

- **Seraph**: WSU start-up, launched 2014 - Greg Auner - CoE
  In-licensed technology from WSU
  Use of Raman for the real-time identification of bacterial, viral, fungal and parasitic infections for veterinary and human applications
  Experienced management team
  2017 secured $5M Series A investment following earlier round of Angel funding
  Approximately $1M Sponsored Research to WSU to date
Technology Commercialization - Expand and accelerate technology transfer platforms (Updates)

- **Nanofibres and Nanowires** (Guangzhao Mao, CoE) 2013-
  Technology Development funding ($25,000) and Mentor in Residence (MiR) support
  Two follow-on NSF grants > $500,000
  First WSU NSF iCorps grant ($50,000)
  Strategic partnership with Applied Nanotech, Inc (Austin, TX) and STTR funding ($75,000)
  MTRAC funding ($75,000)

- **NeuroLuX** (Huttemann, Reynolds, Sanderson - SoM) 2013-
  Technology Development funding ($50,000); Innovation fellow/funding ($25,000); MiR
  Follow-on DoD funding ($2.1M)
  MTRAC ($100,000)
  Start-up, Mitovation, launched (Q1, 2018). Recruited experienced CEO
  STTR Fast Track approved for funding
RESEARCH AND TECHNOLOGY DEVELOPMENT ECOSYSTEM AND INDUSTRY ENGAGEMENT

- Technology Transfer and IP Management
- Industry Engagement and New Ventures
- Defined engagement
  - Contract options
  - Specialized Services
  - IP Option agreements
- Urban Innovation and Community Initiatives
- TechTown and Incubator Facilities
- Clinical Studies and Trials

Contract Management
Legal and business development
Clinical Research Support
Innovation and Tech Business Development Programs
Student Engagement Opportunities
Philanthropy
Academic Senate
Research Updates
February 7, 2018