

II. Research and Scholarship with Global Impact

Princess Imoukhuede, Ph.D.

Assistant Professor of Bioengineering



University of Illinois
at Urbana-Champaign

Overcoming health disparities via RELATIONSHIP EMPOWERMENT

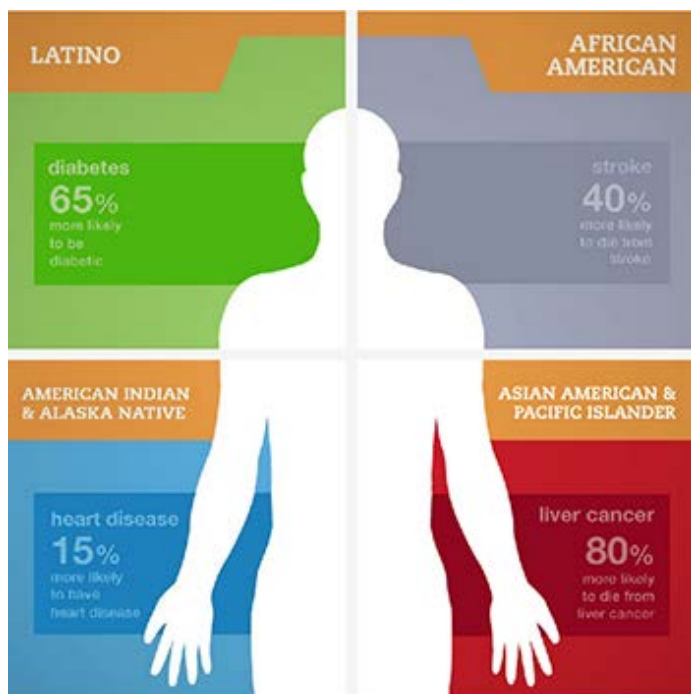


Components

- AA patients 60+ years
- Emphasis on doctor-patient relationship, not just patient
- Web-based intervention

Results

- Patients increased health literacy
- Improved disease management





How does one move these researched practices to common practice?

National Center for Supercomputing Applications (NCSA) Blue Waters: FASTEST supercomputer on a university campus



Innovation,
collaboration,
entrepreneurship



Prof. Ruby Mendenhall:
Sociogenomics - Social
determinants of health

humanities
and arts

- Mobile app?
- *...did not have Illinois resources*

- Work with sociologists to expand “RELATIONSHIP EMPOWERMENT?”
- *...did not have Illinois resources*



Illinois is a powerhouse of discovery, problem solving, innovation, & creative production...

...what's possible?

II. Research and Scholarship with Global Impact

II. Research and Scholarship with Global Impact: Illinois Has Resources for Innovation

Innovation, collaboration, entrepreneurship

sociotechnical problems

humanities and arts

research and development

1. Build a System-wide culture of innovation, collaboration, entrepreneurship, and thoughtful risk-taking
2. Identify a set of significant sociotechnical problems that the System is particularly well suited to solve
3. Highlight the centrality of the humanities and arts in the human experience
4. Forge new research development partnerships around the world

Angiogenesis: blood vessel formation



Tumor growth

~30,000 equations

$$\begin{aligned} \frac{d[\text{VEGFR1}]}{dt} &= k_{i,PLC_7}[\text{VEGFR1:PLC}_7] - k_{e,PLC_7}[\text{VEGFR1}][\text{PLC}_7] \\ &\quad + k_{d,PTPN}[\text{VEGFR1:p-PLC}_7;\text{PTPN}] \\ \frac{d[\text{PLC}_7]}{dt} &= k_{i,PLC_7}[\text{VEGFR1:PLC}_7] - k_{e,PLC_7}[\text{VEGFR1}][\text{PLC}_7] \\ &\quad + k_{d,PLC_7}[\text{PLC}_7;\text{PTPN}] \\ \frac{d[\text{PTPN}]}{dt} &= k_{i,PTPN}[\text{VEGFR1:p-PLC}_7;\text{PTPN}] - k_{e,PTPN}[\text{VEGFR1:p-PLC}_7];[\text{PTPN}] \\ &\quad + k_{d,PLC_7}[\text{PLC}_7;\text{PTPN}] \\ \frac{d[\text{VEGFR1:PLC}_7]}{dt} &= k_{i,PLC_7}[\text{VEGFR1}][\text{PLC}_7] - k_{e,PLC_7}[\text{VEGFR1:PLC}_7] \\ &\quad - k_{p,PLC_7}[\text{VEGFR1:PLC}_7] + k_{sp,PLC_7}[\text{VEGFR1:PLC}_7] \\ \frac{d[\text{VEGFR1:p-PLC}_7]}{dt} &= k_{p,PLC_7}[\text{VEGFR1:PLC}_7] - k_{dp,PLC_7}[\text{VEGFR1:PLC}_7] \\ &\quad - k_{i,PTPN}[\text{VEGFR1:p-PLC}_7];[\text{PTPN}] \\ &\quad + k_{i,PTPN}[\text{VEGFR1:p-PLC}_7;\text{PTPN}] \\ \frac{d[\text{VEGFR1:p-PLC}_7;\text{PTPN}]}{dt} &= k_{i,PTPN}[\text{VEGFR1:p-PLC}_7];[\text{PTPN}] \\ &\quad - k_{e,PTPN}[\text{VEGFR1:p-PLC}_7;\text{PTPN}] \\ &\quad - k_{d,PTPN}[\text{VEGFR1:p-PLC}_7;\text{PTPN}] \\ \frac{d[\text{PLC}_7;\text{PTPN}]}{dt} &= k_{d,PTPN}[\text{VEGFR1:p-PLC}_7;\text{PTPN}] - k_{d,PLC_7}[\text{PLC}_7;\text{PTPN}] \end{aligned}$$

National Center for Supercomputing Applications (NCSA)



II. Research and Scholarship with Global Impact: System-wide Collaborations Become the Standard

Angiogenesis: blood vessel formation



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UIC UNIVERSITY OF ILLINOIS AT CHICAGO

ILLINOIS UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN



Dimitri Azar MD, MBA
Dean, UIC College of Medicine



Masuko Ushio-Fukai, PhD



Princess Imoukhuede, PhD
pii@illinois.edu



Mark Rosenblatt MD, PhD, MBA, Head UIC Ophthalmology

University of Illinois Angiogenesis Symposium

September 19, 2014: 1-5 pm

UIC Ophthalmology Lion Research Building Conference Room
1905 W. Taylor Street, Chicago, IL 60612



Ying Liu, PhD



Wawrzyniec Dobrucki, PhD



Robert Chang, PhD



Tohru Fukai MD, PhD

I. Research and Scholarship with Global Impact: Curing Sickle Cell Disease

Innovation,
collaboration,
entrepreneur-
ship

sociotechnical
problems

humanities
and arts

research and
development

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Transplanted stem cells to cure sickle cell disease

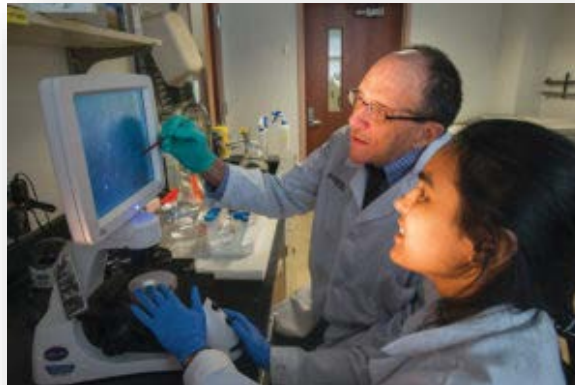


Cell transplantation
Donor: P.J. Hearn &
Recipient: Kamia Quinones

Damiano Rondelli, MD



Victor Gordeuk, MD



I. Research and Scholarship with Global Impact: Understanding Tumor Heterogeneity

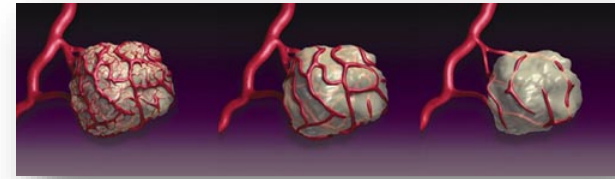
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collaboration,
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Some patients respond
Some patients do not

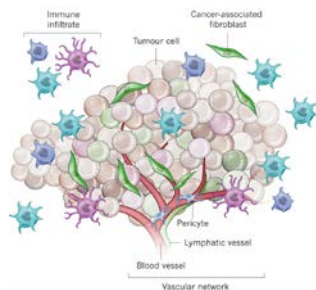
Beckman Institute



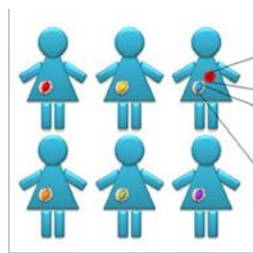
**Carl Woese Institute
for Genomic Biology**



Grand Challenge
Tumor heterogeneity:

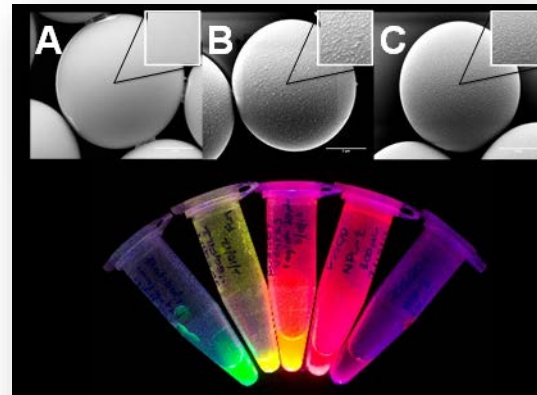


Junttila & Savage (2013) Nature



Oslo University Hospital

**New imaging tools for
personalized medicine**



II. Research and Scholarship with Global Impact: System-wide Collaboration can Enable Clinical Advancement

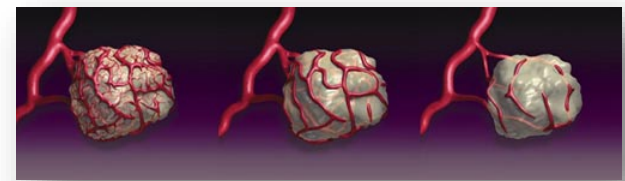
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Some patients respond
Some patients do not

Chicago

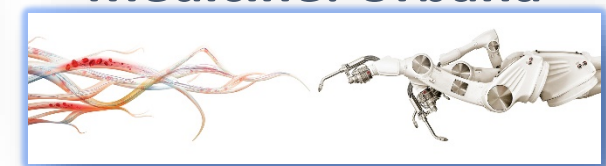
Rockford



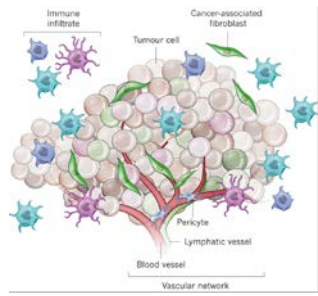
Peoria



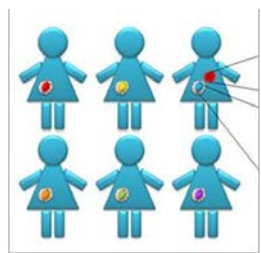
Engineering-based Medicine: Urbana



Grand Challenge Tumor heterogeneity:

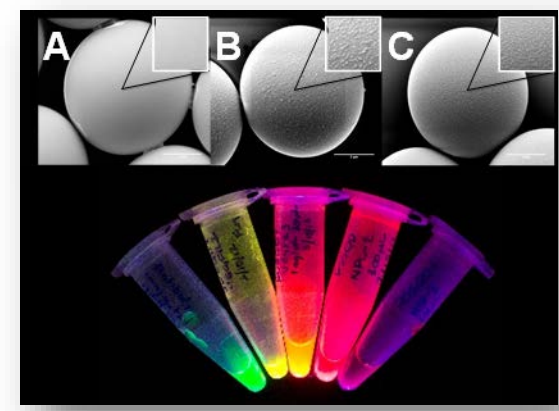


Junttila & Sauvage (2013) Nature



Oslo University Hospital

New imaging tools for personalized medicine



II. Research and Scholarship with Global Impact: Enabling Public-Private Partnership & Commercialization

Innovation, collaboration, entrepreneurship

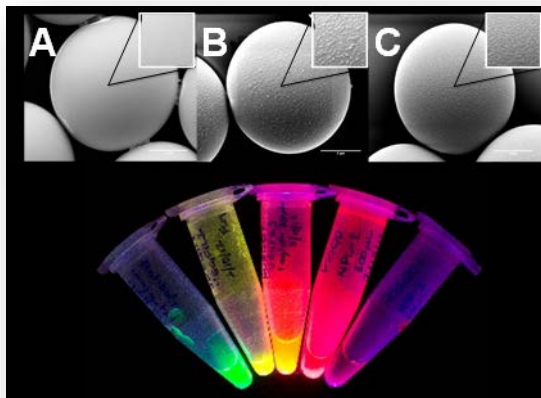
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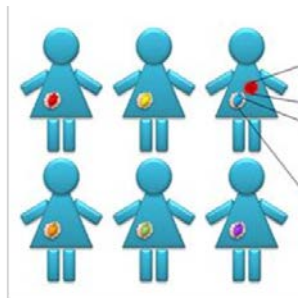


Bench

EnterpriseWorks Incubator



Ensuring patients get the right drugs the first time



Oslo University Hospital



Bedside

I. Research and Scholarship with Global Impact: Sustaining Scholarship

innovation,
collaboration,
entrepreneur-
ship

sociotechnical
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humanities
and arts

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Christy Lleras, PhD



Human & Community Development

- Diverse families
- Poverty/inequality
- Social justice
- Child & adolescent development

Ruby Mendenhall, PhD



Sociology, Urban Planning & African American Studies

- Race and residential housing patterns
- Social networks
 - Racial microaggressions
- Genomics

Kathryn Clancy, PhD



Women's Studies & Anthropology

- Endometrial function
- Stress, immunity & fertility
- Female reproductive physiology

I. Research and Scholarship with Global Impact: Collaboration sheds light on enduring problems

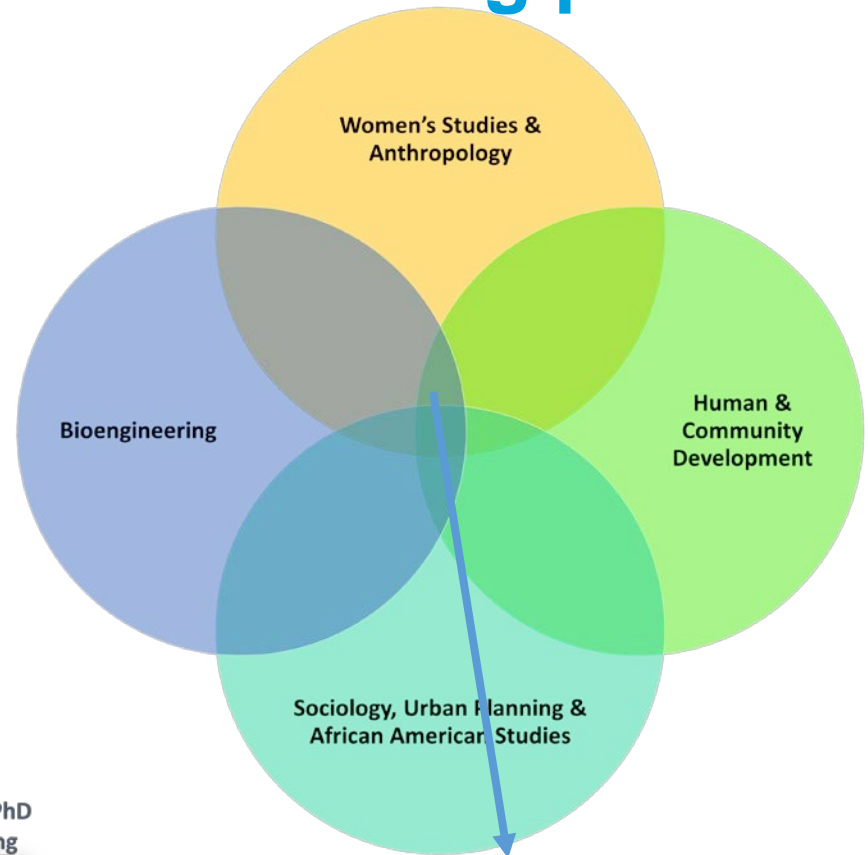
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Kathryn Clancy, PhD
Anthropology &
Women's Studies



Christy Lleras, PhD
Human & Community
Development



Ruby Mendenhall, PhD
Sociology & African
American Studies



Princess
Imoukhuede, PhD
Bioengineering



- Reproductive consequences of psychosocial stress
- Relationship between social ties, community cohesion, and health for African-American women and girls in high-poverty neighborhoods

II. Research and Scholarship with Global Impact

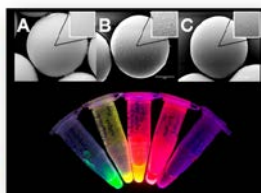
...what's possible?

Innovation,
collaboration,
entrepreneur-
ship



Research collaborations
stretching across the System

sociotechnical
problems



Tackling Tough Problems:

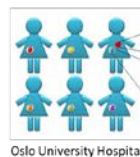
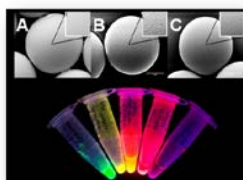
- Tumor heterogeneity + Personalized medicine
- Curing Sickle Cell

humanities
and arts



Sustaining scholarship
& shedding new light
on enduring questions

research and
development



Bench to Bedside: Public-
Private Partnerships

Bench

Bedside