Why “Generalized Medicine” is the next new wave in biomedical research

James E. Crowe, Jr., MD
Mapping of the human genome has shown that our genetic make-up is >99% identical.
Unprecedented opportunity to make big data
There is power in numbers, but which numbers are important to study?
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Some features in millions of people
There is power in numbers, but which numbers are important to study?

Millions of features in some people

Some features in millions of people
The current wave of fashion

Personalized or Precision Medicine
N=1 studies

If our genes are mostly shared, then . . . .

. . . the solutions to many of the most pressing problems can be discovered by in-depth studies of a single patient.

“Personalized Medicine” studies
N=1 studies

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“Generalized Medicine” studies
Astrid Joosten fell ill after visiting a bat cave in Uganda and died of Marburg.
Michelle Barnes, adventure traveler
Antibody

Marburg Virus Protein
Cell

Immunity against Marburg
Monoclonal antibody cures Marburg infection in monkeys

NIH-funded groups preparing for next filovirus outbreak.

What

Scientists funded by the National Institutes of Health have found that an experimental treatment cured 100 percent of guinea pigs and rhesus monkeys in late stages of infection with lethal levels of Marburg and Ravn viruses, relatives of the Ebola virus. Although the Marburg and Ravn viruses are less familiar than Ebola virus, both can resemble Ebola in symptoms and outcomes in people, and both lack preventive and therapeutic countermeasures.
BARDA Task Order Valued at Up to $30 Million

GAITHERSBURG, Md., Feb. 13, 2017 (GLOBE NEWSWIRE) -- Emergent BioSolutions Inc. (NYSE:EBS) today announced that it has received a task order from the Biomedical Advanced Research and Development Authority (BARDA) valued at up to $30.5 million to develop monoclonal antibody therapeutics for viral hemorrhagic fever. This task order will utilize the company’s Center for Innovation in Advanced Development and Manufacturing (CIADM) facility located in Baltimore, Maryland. Using monoclonal antibodies from Mapp Biopharmaceutical Inc., the company will conduct technology transfer of process materials and information, perform process and analytical method development, execute small-scale production runs, and perform cGMP cell banking leading to cGMP manufacture of bulk drug substance. The task order consists of a 36-month period of performance with a base task order valued at $7.4 million and options that, if executed, will bring the total task order value over three years to up to $30.5 million.
Ebola outbreak, Lagos, Nigeria
Morris Ibeawuchi, MD
Ebola survivor
Studying human materials at scale
Immortalizing millions of human cells from one person for studies of unprecedented detail.
Sorting through millions of cells to find those that recognize all Ebola strains.

Antibody binding to Ebola:
- **High**
- **Low**

Ebola strain 3 (Sudan)

Ebola strain 2 (BDBV)

Ebola strain 1 (Zaire)
Sorting through millions of cells to find those that recognize all Ebola strains

Ebola strain 3 (Sudan)

Ebola strain 2 (BDBV)

Ebola strain 1 (Zaire)

High

Low

Antibody binding to Ebola
Universal Ebola antibodies
- promising new treatment for any Ebola infection
Let’s determine the sequence of every antibody and T cell!

Human Immunome Program
Finding the shared immune factors

Donor 1
(38.9 million B cells)

Donor 2
(59.4 million B cells)

Donor 3
(59.4 million B cells)

- 12,438,269 (0.6%)
- 9,567,218 (2%)
- 8,837,837 (0.2%)
- 1%
Finding the shared immune factors

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N=1 studies

“Generalized Medicine”
Good science is team science