

Selected publications

- *Recommendations toward a human pathway-based approach to disease research.* Marshall LJ et al. 2018. Drug Discovery Today, <https://doi.org/10.1016/j.drudis.2018.05.038>
- *Human-specific approaches to brain research for the 21st century: a South American perspective.* Triunfol M et al. 2018. Drug Discovery Today, <https://doi.org/10.1016/j.drudis.2018.06.001>
- *Towards a 21st-century roadmap for biomedical research and drug discovery: consensus report and recommendations.* Langley GR et al. 2017. Drug Discov Today. <https://doi.org/10.1016/j.drudis.2016.10.011>
- *Lessons from Toxicology: Developing a 21st-Century Paradigm for Medical Research.* Langley GR et al. 2015. Environ Health Perspect. <https://doi.org/10.1289/ehp.1510345>

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Toward a human-focused
paradigm in health
research

We have moved away from studying human disease in humans; the problem is that it hasn't worked. We need to refocus and adapt new methodologies for use in humans to understand disease biology in humans.

–Elias Zherouni, MD, former director, U.S. National Institutes of Health

The Biomedical Research for the 21st Century (BioMed21)

Collaboration brings together scientists and institutions from across the globe who share a vision of a **human-focused, non-animal paradigm** in health research and drug discovery.

The current ~95% failure rate for new medicines represents a global public health crisis, and a major root of this is the failure of preclinical animal models to accurately predict the human situation in terms of efficacy and safety. As a result, human suffering from cancer, diabetes, respiratory, infectious and other diseases continues with limited medical progress, while animals in laboratories continue to suffer genetic, surgical and other manipulations in a too-often futile attempt to model conditions that are uniquely human.

The BioMed21 Collaboration is working to shift the paradigm in health research to recognize human biology as the gold standard, with increased funding for human-relevant predictive approaches that offer greater hope for delivering cures to people in need.

Human-based toolbox

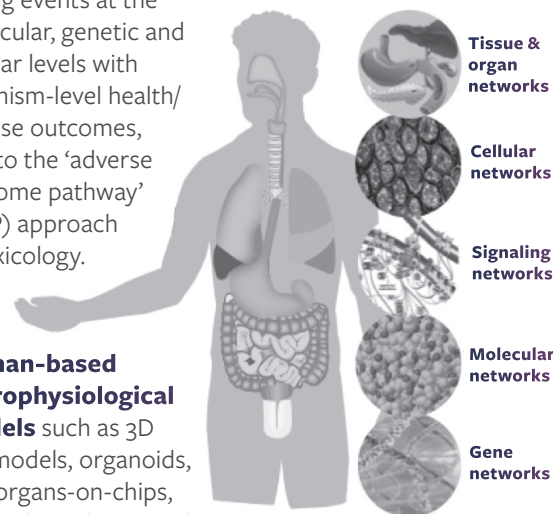
Pathway-based organizing framework

linking events at the molecular, genetic and cellular levels with organism-level health/disease outcomes, akin to the 'adverse outcome pathway' (AOP) approach in toxicology.

Human-based microphysiological models

such as 3D cell models, organoids, and organs-on-chips, to test hypotheses and evaluate pathway perturbations in species-relevant biological systems of varying complexity.

Computational systems biology models to integrate experimental and predictive approaches to understand complex biological data, develop and test hypotheses, and predict outcomes for improving translation of research results from bench to bedside.



How we work

- ✓ **Fund** open-access publication of independent scientific reviews examining the human relevance and translational efficacy of existing models for major human diseases, with recommendations for new research directions leveraging the growing toolbox of 21st century, human-specific tools and technologies.
- ✓ **Organize** and sponsor workshops to stimulate dialogue among key stakeholders at regional and international levels regarding strategic science opportunities and barriers, and to make recommendations necessary for implementing a human biology platform for biomedical research.
- ✓ **Train** scientists and graduate students in human-based research design, integrating a sophisticated understanding of disease pathophysiology and AOPs with modern microphysiological and computational tools.
- ✓ **Collaborate** with scientists, policy makers, funding bodies and other key stakeholders to redirect research funding toward modern, human-relevant approaches, and to establish targets for phasing out animal use in science, with defined timetables and metrics.