Jude Phillip, Ph.D.

Titles & Department

Assistant Professor; Primary Appointment: Department of Biomedical Engineering, Secondary Appointment: Department of Chemical & Biomolecular Engineering; Institute for Nanobiotechnology (INBT)

Specialization Area

Cell-Based Biomarkers of Aging in the Context of Health and Disease.

Unmet Need

Combines fundamental engineering with translational research to identify mechanisms that can modify the trajectory of aging.

Summary of Research & Work

Dr. Phillip's research follows cellular activities over time to identify biomarkers of aging and mechanisms with potential for delaying its harmful effects. His lab has developed technologies that can recognize age-based differences in cellular function at the molecular level, including a high-throughput model that can be used to compute cellular age. His approaches can be used to assess biophysical and biomolecular characteristics within the same sample, allowing researchers to predict the relationship between cellular function and functional health. His current research is aimed at better understanding biological aging dynamics in the context of health and disease, developing innovative techniques and strategies to mitigate age-related dysfunction, and identifying ways to promote healthy aging.

Value Proposition

- Examines age-related changes on a molecular level as opposed to organ- and tissue-based levels.
- Single-cell analysis enables stratification by cellular phenotypes, serving as a biological proxy for health span.
- Identifying mechanisms to modify aging trajectories and drive healthy aging.

Recent Publications

- Phillip, J. M., Wu, P.H., Gilkes, D. M., Williams, W., McGovern, S., Daya, J., Chen, J., Aifuwa, I., Lee, J. S., Fan, R., Walston, J., & Wirtz, D. (2017). Biophysical and biomolecular determination of cellular age in humans. Nature Biomedical Engineering, 1(7).
- Phillip, J. M., Lin, R., Cheetham, A., Stern, D., Li, Y., Wang, Y., Wang, H., Rini, D., Cui, H., Walston, J. D., & Abadir, P. M. (2022). Nature-inspired delivery of mitochondria-targeted angiotensin receptor blocker. PNAS Nexus, 1(4).
- Phillip, J. M., Han, K.S., Chen, W.-C., Wirtz, D., & Wu, P.-H. (2021). A robust unsupervised machine-learning method to quantify the morphological heterogeneity of cells and nuclei. Nature Protocols, 16(2), 754–774.

– Phillip, J. M., Zamponi, N., Phillip, M. P., Daya, J., McGovern, S., Williams, W., Tschudi, K., Jayatilaka, H., Wu, P.-H., Walston, J., & Wirtz, D. (2021). Fractional re-distribution among cell motility states during ageing. Communications Biology, 4(1).

Awards & Honors

- National Academy of Medicine (NAM) Catalyst Award – 2022
- Johns Hopkins Older Americans Independence Center (OAIC) Pilot Grant Recipient – 2022
- American Institute of Chemical Engineers MAC Distinguished Young Professional Award – 2020
- 1000 Inspiring black scientists in America (Cell Mentor and Community of Scholars) – 2020