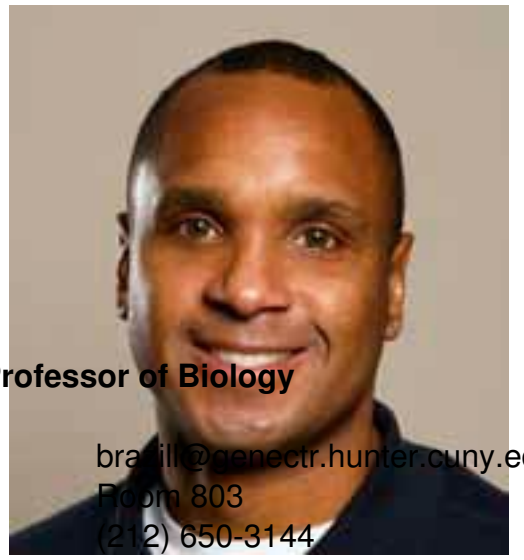

Derrick Brazill, Professor of Biology

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Education:

- Ph.D. 1995, University of California, Berkeley
- B.S. 1989, Stanford University
- Postdoc. 1995-1999, Rice University

Research Interest:

- **Signal Transduction During Development in Dictyostelium Discoideum**

Proteins in human serum constantly bombard our cells with numerous signals, telling them to grow, multiply, differentiate or die. These signals must be properly integrated by the cells in order to ensure the health of the individual. Loss of regulation can lead to defects and diseases including metastatic cancer and atherosclerosis. My lab is specifically interested in how these signals regulate the cytoskeleton. Unfortunately, the sheer number of players involved in signaling to the cytoskeleton creates an unwieldy morass of interconnected proteins, making the process difficult to study. We therefore study the role of extracellular factors in regulating cell behavior in the simple eukaryote *Dictyostelium discoideum*.
As an NIH model system,
Dictyostelium
offers a variety of advantages including its ease of growth, its conservation of mammalian signaling pathways and its genetic tractability.

Dictyostelium normally exist as vegetative amoebae that feed on bacteria and multiply by fission. When the amoebae overgrow their food source, they aggregate using relayed pulses of cAMP as a chemoattractant. The aggregate then elongates forming a mobile slug, which migrates and eventually forms a fruiting body consisting of a mass of spore cells situated on top of a column of stalk cells. The entire process takes 24 hours, but will not begin unless the density of starving cells is high enough to allow formation of an appropriately sized fruiting body. The starving cells are able to sense the density of the cells around them by simultaneously secreting and sensing a protein called CMF. Only when the cells are at a high density, as determined by high levels of CMF, will the cells initiate development. We study the signal transduction pathways activated by CMF and how they impact upon other developmental pathways. We have found that CMF regulates development by modulating the cell's cytoskeleton, including cell shape, motility, chemotaxis and adhesion. Specifically, we've been looking at how CMF controls signaling by G proteins, protein kinases, phospholipase D and paxillin, all of which have human homologs. These findings have led us to studies of the interactions between phospholipase D and paxillin in cancer cells.

Selected Publications:

- Santiago, Z., Loustau, J., Meretzky, D., Rawal, D., Brazill, D. (2019)   Advances in geometric techniques for analyzing blebbing in chemotaxing Dictyostelium cells. PLOS ONE 14(2): e0211975.

- Singh, S., Mohamed, W., Aguessy, A., Dyett, E., Shah, S., Khan, M., Baskar, R. Brazill, D. (2017). Functional interaction of PkcA and PldB regulate aggregation and development in Dictyostelium discoideum. Cell Signal. 34: 47-54
- Mohamed, W., Ray, S., Brazill, D., Ramamurthy, B. (2015). Absence of catalytic domain in a putative protein kinase C (PkcA) suppresses tip dominance in Dictyostelium discoideum. Dev Biol. 405(1): 10-20
- Garcia M, Ray S, Brown I, Irom J, Brazill D. (2014). PakD, a Putative p21-Activated Protein Kinase in Dictyostelium discoideum, Regulates Actin. Euk Cell. 13(1):119-26
- Garcia, R., Nguyen, L., and Brazill, D. (2013). Dictyostelium discoideum SecG interprets cAMP mediated chemotactic signals to influence actin organization. Cytoskeleton. 70(5):269-80

- Maharjan, A., Roife, D., Brazill, D., and Gomer, R. (2013). Serum amyloid P inhibits granulocyte adhesion. Fibrogenesis and Tissue Repair. 6(1):2-18
- Pribic, J., and Brazill, D. (2012). Paxillin phosphorylation and complexing with Erk and FAK are regulated by PLD activity in MDA-MB-231 cells. Cell Signal. 24: 1531-1540
- Pribic, J., Garcia, R., Kong, M. and Brazill, D. (2011). Paxillin and Phospholipase D interact to regulate actin-based process in Dictyostelium discoideum. Euk. Cell. 10(7):977-84

- Gomer, R., Jang, W., Brazill, D. (2011). Cell Density Sensing and Size Determination. Dev. Growth. Diff. 53(4):482-94.
- Ray, S., Chen, Y., Ayoung, J., Hanna, R. and Brazill, D. (2011). Phospholipase D Controls Dictyostelium Development By Regulating G Protein Signaling. Cell Signal 23(2):335-43.

- Duran, M.B., Rahman, A., Colten, M., Brazill, D. (2009) Dictyostelium discoideum Paxillin Regulates Actin-Based Processes. Protist 160(2):221-32