

Joan S. Brugge, Ph.D.
2014 Susan G. Komen®
Brinker Award for Scientific Distinction in Basic Science



Joan S. Brugge, Ph.D., is being honored for her significant contributions to breast cancer research, which have been essential in advancing our understanding of the molecular and cell biology of breast cancer. Dr. Brugge's creative approach to tackling questions in breast cancer biology have resulted in critical insights into the cellular processes and pathways that are involved in the normal morphogenesis and organization of breast cells, and the mechanisms that are altered in breast cancer initiation, progression, and response to therapy.

Dr. Brugge has characterized a number of the molecules and molecular pathways that lead to cell transformation. Early in her career, she identified the impact of virus-generated proteins on cell transformation, including the large T antigen of SV40 virus and the Src protein of the Rous Sarcoma Virus. Her contributions to the discovery of the viral and cellular Src proteins made it possible to study the mechanisms by which Src proteins control normal and tumor cell behavior and led to a clearer understanding how a cellular protein can become an oncoprotein and induce tumorigenic transformation. She also identified the importance of integrin receptors in signal transduction as well as the identification of Ras as a critical intermediate in growth factor activation of MAP Kinase.

More recently, Dr. Brugge and her team have championed using 3D cultures to study key processes in breast cancer initiation, including survival of tumor cells when displaced from their normal niches, invasion and loss of polarity. These studies have led to a better understanding of the basis for anchorage dependence of normal epithelial cells and the mechanisms by which tumor cells escape this mechanism. The Brugge lab was also the first to discover entosis – when one cell invades another and is contained in a special vacuole until it exits the cell by exocytosis or is killed via lysosomal destruction – and its promotion of tumorigenesis.

Her most recent studies have focused on drug resistance. She has collaborated with the 2013 Brinker Awardee in Basic Research, Dr. Gordon Mills, to identify adaptive responses to targeted therapies that confer drug resistance. This resistance involves activation of multiple cellular pathways that prevent apoptosis. Interestingly, the activation of this adaptive response is specifically detected in tumor cells that are in association with specific extracellular matrix proteins, suggesting that these environments provide protection from targeted therapies.

Dr. Brugge earned her Ph.D. in Virology from Baylor College of Medicine and performed her postdoctoral training at the University of Colorado. After her training, she was a faculty member at the State University of New York at Stony Brook, the University of Pennsylvania and served as the Scientific Director of ARIAD Pharmaceuticals. In 1997, she joined the faculty at Harvard Medical School as Professor of Cell Biology, became Chair of Cell Biology in 2004 and Co-Director of the Ludwig Center at Harvard in 2014.

Dr. Brugge's leadership at her institution, in the breast cancer community, and in the general cancer community has influenced the way cancer research is conducted. Her longstanding commitment to mentoring future breast cancer researchers has provided the research community with innovative, new ideas to tackling breast cancer's toughest questions. Her ability to move into different experimental systems, identify important questions to address, and use innovative approaches have brought critical insights into new areas of breast cancer research. Dr. Brugge's contributions to the field of breast cancer signal transduction and her current work on tumor heterogeneity will significantly impact the future of the fields of breast cancer research and treatment.