

Lisa M. Coussens, Ph.D.
2018 Susan G. Komen®

Brinker Award for Scientific Distinction in Basic Science



Lisa M. Coussens, Ph.D., is being honored for her significant contributions to breast cancer research, which have been essential in advancing our understanding of the role of the tumor microenvironment, particularly immune cells, in cancer development. Her research has established that immune cells can both enhance and inhibit tumor growth and identified critical immune-regulated pathways that can be targeted therapeutically to block or slow cancer development. Dr. Coussens' work is helping to lay the foundation for development and clinical use of cancer immunotherapies that will significantly impact the future of breast cancer research and treatment.

Dr. Coussens has made several pivotal discoveries regarding the role of immune cells in cancer development and progression. In a seminal study, she demonstrated that certain immune cells were actually "hijacked" by early tumors to promote breast cancer growth and metastasis. She and her team discovered an intricate cell-cell communication process through which tumor cells trigger T-lymphocytes or T-cells (a type of white blood cell involved in controlling the immune response to foreign substances) to recruit another type of white blood cell called macrophages to early tumors. Normally involved in clearing debris, macrophages around tumor cells produce epidermal growth factor (EGF) that in turn promotes tumor cell proliferation and invasion. This provocative finding expanded our understanding of the tumor microenvironment and sparked additional research aimed at reprogramming these immune cells by designing and then testing targeted and immune-based therapies to prevent them from aiding and abetting the cancer.

Her research has also led to a better understanding of the role immune cells play in regulating responses to cytotoxic, targeted and immune-based therapies. Dr. Coussens and others have found that dying cancer cells release factors that can induce a CD8⁺ T-cell mediated immune response against the cancer. However, macrophages and other factors in the tumor microenvironment suppress this response thereby preventing CD8⁺ T-cells from killing cancer cells. This knowledge is now being leveraged to design new approaches to treating breast and other cancers that will target the immune system, specifically relieving immune suppression and allowing CD8⁺ T cells to infiltrate and attack cancer cells.

Dr. Coussens' more recent work focuses on this strategy of targeting the immune system and relieving CD8⁺ T cell suppression. In work funded through a Susan G. Komen® Promise Grant, for example, Dr. Coussens and colleagues have conducted a multi-center Phase Ib/II clinical trial evaluating a novel drug that reduces infiltration of macrophages into tumors in combination with chemotherapy in women with metastatic triple negative breast cancer (TNBC). Combining laboratory and clinical research, they are assessing the best therapeutic combinations to block cancer-surrounding macrophages from infiltrating tumors and render cancer cells more sensitive to chemotherapy. They are also testing for biomarkers that would allow clinicians to tailor treatment approaches for TNBC patients and evaluate their response to treatment over time, with the goal of avoiding potential resistance to therapy and ultimately minimizing metastases.

Dr. Coussens started her career at San Francisco-based Genentech, Inc., where she cloned the HER2 proto-oncogene. She earned her Ph.D. at the University of California, Los Angeles,

and completed postdoctoral training in cancer biology at the University of California, San Francisco where she then established her laboratory that revealed these important immune-based paradigms. She moved to Oregon Health & Sciences University (OHSU) in 2012, where she is the Chair of the Department of Cell, Developmental & Cancer Biology, and Associate Director for Basic Research in the Knight Cancer Institute at OHSU and holds the Hildegard Lamfrom Endowed Chair in Basic Science.

Dr. Coussens' pioneering research has shed light on the complex interplay between tumors and immune cells. Fueled by a personal encounter with breast cancer (her mother, now 88 years of age, was diagnosed with estrogen receptor-positive breast cancer in the 1990s), Dr. Coussens' drive for innovation and continuous focus on translating her laboratory findings to the clinic have provided critical insights into cancer biology and paved the way for development of new approaches to treat breast cancer. Her work will have a lasting impact for years to come.