

What Is Basic Research and How Does It Drive Progress Against Cancer?

The National Institutes of Health (NIH) defines basic research as “the systematic study directed toward fuller knowledge or understanding of the fundamental aspects of a phenomenon and of observable facts without specific applications toward processes or products in mind.” Basic research has broad implications because it is fundamental to our understanding and treatment of human diseases, including cancer. NIH spends more than half of its budget supporting basic research. NIH-supported basic research projects significantly contribute to novel target identification and drug development.



Selected examples of basic research discoveries that have transformed the landscape of cancer treatment are:



LAG-3, a protein expressed by some immune cells, is used as a receptor for certain proteins on cancer cells to evade detection and elimination by the immune system. Identification of the *LAG-3* gene in 1990 led to the FDA approval of the first immune checkpoint inhibitor against LAG-3, relatlimab (Opdualag) (first approval in eight years against a novel immune checkpoint target) in 2022, **to treat certain patients with melanoma.**



Basic research led to the discovery in 1960s of a unique fusion of chromosomes 9 and 22, termed the Philadelphia chromosome, specifically in cells of patients with chronic myelogenous leukemia (CML). This has led to several drugs that target this gene fusion including the recent FDA approval of asciminib (Scemblix) **to treat patients who are resistant to current therapies.**



Discovery of the gene *VHL* and its function in regulating HIF-2 α led to the recent FDA approval of the first direct inhibitor of HIF-2 α , belzutifan (Welireg), for the **treatment of renal cell carcinoma, central nervous system hemangioblastomas, or pancreatic neuroendocrine tumors** in adults with von Hippel Lindau disease.