Bishop & Varmus: Oncogenes

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**Because the mechanism described by Bishop and Varmus seemed common to all forms of cancer, their work proved invaluable to cancer research. Today it is suspected that nearly 1% of the human genome, which contains an estimated 20,000–25,000 genes, is made up of proto-oncogenes. The discovery of oncogenes and tumor suppressor genes, both, in the mutant forms of normal cellular genes, are in the process of revolutionizing the understanding of cancer.**

Bishop and Varmus received the Nobel Prize for Physiology or Medicine in 1989 “for their discovery of the cellular origin of retroviral oncogenes” or achievements in clarifying the origins of cancer.

**John Michael Bishop (1936)—American virologist graduated from Gettysburg College, Pennsylvania in 1957 and from Harvard Medical School in 1962. After spending residency at Massachusetts General Hospital, Boston, he became a researcher in virology at the National Institutes of Health, Bethesda, Maryland. In 1968, He joined the faculty of the University of California Medical Center in San Francisco, becoming a full professor in 1972. In 1998 Bishop was elected chancellor of the University of California, a post, he held until 2009.**

In 1970, Bishop teamed up with Varmus and they set out working with the Rous Sarcoma Virus, known to cause cancer in chickens. They found that a gene similar to the cancer-causing gene within the virus was also present in healthy cells. In 1976, Bishop and Varmus, together with colleagues published their findings, concluding that the virus had taken up the gene responsible for the cancer from a normal cell. The duo showed that such genes can be converted by certain chemical carcinogens into a form that allows uncontrolled cellular growth.

**Harold Varmus (1939)—American virologist Varmus graduated from Amherst College in 1961; obtained MA from Harvard University in 1962, and MD from Columbia University, New York in 1966. He then joined the National Cancer Institute in Bethesda, Maryland. In 1970, he went to the University of California, San Francisco, as a postdoctoral fellow. There, Varmus joined Bishop. The findings of their research as already stated earlier that cancer is caused by viral genes (oncogenes), distinct from a cell’s normal genetic material, which lie dormant in body cells until activated by carcinogens.**

Varmus was director of the National Institutes of Health from 1993 to 1999, during which time he significantly increased the budget provided for research. Varmus was appointed president of Sloan Kettering Cancer Center in New York in January 2000 and became director of the National Cancer Institute in 2010, where he served until 2015.

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