



## Beatrice Mintz



**Date of Birth** 24 January 1921

**Place** New York, NY (USA)

**Nomination** 9 June 1986

**Field** Genetics

**Title** Jack Schultz Chair in Basic Science

### **Professional address**

The Institute for Cancer Research

Fox Chase Cancer Center

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### **Most important awards, prizes and academies**

**Awards:** Bertner Foundation Award in Fundamental Cancer Research (1977); New York Academy of Sciences Award in Biological and Medical Sciences (1979); Papanicolaou Award for Scientific Achievement (1979); Lewis S. Rosenstiel Award in Basic Medical Research (1980); Genetics Society of America Medal (1981); Ernst Jung Gold Medal for Medicine (1990); John Scott Award for Scientific Achievement (1994); March of Dimes Prize in Developmental Biology (1996); American Cancer Society National Medal of Honor for Basic Research (1997); Pearl Meister Greengard Prize (2008); Albert Szent-Györgyi Prize for Progress in Cancer Research (2011). **Academies:** National Academy of Sciences (1973); Fellow, American Association for the Advancement of Science (1976); Honorary Fellow, American Gynecological and Obstetrical Society (1980); American Philosophical Society (1982); Fellow, American Academy of Arts and Sciences (1982); Pontifical Academy of Sciences (1986). **Degrees:** Doctor of Science, New York Medical College (1980); Medical College of Pennsylvania (1980); Northwestern University (1982); Hunter College (1986); Doctor of Humane Letters, Holy Family College (1988).

### **Summary of scientific research**

Beatrice Mintz discovered the underlying relationship between development and cancer. She first showed that development is based on an orderly hierarchical succession of increasingly specialized small groups of precursor or "stem" cells, expanding clonally. She proposed that cancer involves a regulatory aberration in this process, especially in the balance between proliferation and differentiation. These views were based on a series of methods of her own design, for construction and analysis of chimeric and transgenic mouse models. The models enabled the experimental study of development and of cancer within the framework of the whole organism throughout life. She produced chimeric mice (which she at first termed "allophenic") by inclusion of two genetically different cells in the early mouse embryo, thereby revealing the clonal organization. Mintz then devised modifications of chimerism to examine the roles of stem cells in cancer. Her lab. found that mouse teratocarcinoma stem cells developed normally in a normal embryo environment. This led to many new kinds of experiments in many laboratories, aimed at defining the role of a normal microenvironment on cancer cells. Her new experiments also showed that stem-like cancer cells could be grown in culture and used as "messengers" to convey specific-DNA into the organism. Later, the DNA was injected directly into the fertilized egg. Her lab. used that method to produce a mouse model of malignant melanoma resembling the human disease, so as to explore possible treatments.

### **Main publications**

Mintz, B., 'Genetic mosaicism in adult mice of quadriparental lineage', *Science*, 148, pp. 1232-3 (1965); Mintz, B., 'Gene control of mammalian pigmentary differentiation. I. Clonal origin of melanocytes', *Proc. Natl. Acad. Sci. USA*, 58, pp. 344-51 (1967); Mintz, B., 'Clonal basis of mammalian differentiation', *Sympos. Soc. Exp. Biol.*, 25, pp. 345-70 (1971) Cambridge University Press; Mintz, B. and Illmensee, K., 'Normal genetically mosaic mice produced from malignant teratocarcinoma cells', *Proc. Natl. Acad. Sci. USA*, 72, 3585-9 (1975); Fleischman, R.A. and Mintz, B., 'Prevention of genetic anemias in mice by microinjection of normal hematopoietic stem cells

into the fetal placenta', *Proc. Natl. Acad. Sci. USA*, 76, pp. 5736-40 (1979); Mintz, B. and Cronmiller, C., 'METT 1: A karyotypically normal in vitro line of developmentally totipotent mouse teratocarcinoma cells', *Somatic Cell Genet.*, 7, pp. 489-505 (1981); Stewart, T.A. and Mintz, B., 'Successive generations of mice produced from an established culture line of euploid teratocarcinoma cells', *Proc. Natl. Acad. Sci. USA*, 78, pp. 6314-8 (1981). Wagner, E.F., Stewart, T.A. and Mintz, B., 'The human  $\beta$  globin gene and a functional viral thymidine kinase gene in developing mice', *Proc. Natl. Acad. Sci. USA*, 78, pp. 5016-20 (1981); Mintz, B. and Silvers, W.K., 'Transgenic mouse model of malignant skin melanoma', *Proc. Natl. Acad. Sci. USA*, 90, pp. 8817-21 (1993).