



1914

Dr. John FitzGerald founds Connaught Laboratories in partnership with the University of Toronto, where he personally manufactures the first safe, effective, Canadian-made rabies vaccine and diphtheria anti-toxin. (Toronto)

1921



Dr. Frederick Banting and his assistant **Dr. Charles Best** discover insulin as a treatment for diabetes with the aid of J.B. Collip and J.J.R. Macleod (Toronto). Banting and Macleod (Toronto). Banting and Macleod later win the Nobel Prize in Medicine for their discovery. Treatment for children begins the following year at SickKids; 10-year mortality drops 50%.

1935

Dr. Gordon Murray conducts first human trials of heparin as a blood thinner. (Toronto) By 1937, it is clear that heparin is a safe, easily available and effective blood anticoagulant.

1947



Dr. Marion Hilliard and colleagues develop a simplified method for detecting early symptoms of cancer, particularly of the cervix. (Toronto)

1916



Norman Bethune receives his M.D. (Toronto), launching a career that defines the battlefield surgeon with the development of new surgical instruments and first mobile blood bank among his key innovations. A doctor to the very end, Bethune died of blood poisoning in 1939, while ministering to the Chinese Army.

1930

Nutritional research by **Drs. Alan Brown, Fred Tisdall** and **Theo Drake** at The Hospital for Sick Children leads to the development of a new quick-to-prepare, low-cost cereal that later becomes famous the world over as Pablum. (Toronto)

1946

Dr. Gordon Murray performs North America's first kidney dialysis, using a machine he co-invented.

1948

Later nominated for the Nobel Prize, **Dr. Murray Barr** discovers the sex chromatin body now known as the Barr body, initiating a new era of research and diagnosis of genetic disorders. (London, ON)

1949

Dr. William Mustard is one of the first to perform open-heart surgery. He developed two operations named for him: the Mustard operation in orthopedics used to help hip use in people with polio and the Mustard cardiovascular procedure used to help correct heart problems in "blue babies", which has saved thousands of children worldwide. (Toronto)

1950

Based on the work of **Dr. Gordon Richards, Dr. Vera Peters** demonstrates that Hodgkin's disease is curable with high-dose radiotherapy. (Toronto)

1954

Dr. Robert Nobel, Dr. Charles Beer and their teams isolate and purify a potent alkaloid extract from periwinkle tea leaves (London, ON); called "vinblastine", it's the first major advance in chemotherapy originating in Canada.

1962



Raymond Heimbecker conducts the first successful human heart valve transplant. (Toronto)

1970

The Canadian Aspirin Trial, headed by **Dr. Henry Barnett**, establishes for the first time that the antiplatelet drug could prevent stroke. (London, ON)

1950



Dr. Wilfred Bigelow, Dr. John Hopps and Dr. John Callaghan build the world's first pacemaker for continuous clinical use. Duplicating the normal stimulation of body nerves without damaging muscles or nerves, the design is not unlike that of modern pacemakers except for its size. This collaboration is considered to be the dawn of bioengineering and Hopps the father of that field. (Toronto)

1961

Dr. Ernest McCulloch and Dr. James Till discover the first stem cell while experimenting with bone marrow in laboratory mice. (Toronto)

1966

Canada's Medical Care Act provides free access to physician services. (Ottawa)

1967

The first "Palm N Turn" child-proof pill container is designed and adopted in Ontario (Windsor); the innovation spreads and the incidence of child poisoning drops dramatically.





1972



Dr. John Bienenstock pioneers the concept of the common mucosal system whereby surfaces within the gut, respiratory tract and reproductive system, share information to fight infection. (Hamilton, ON) His team demonstrates that vaccines taken by mouth induce immunity throughout the entire mucosal system.

1986



Dr. John C. Polanyi receives the Nobel Prize for the development of reaction dynamics, a new field of research in chemistry that gives a detailed understanding of how chemical reactions take place. (Toronto)

1994



Dr. John Dick isolates the first cancer stem cell from acute myeloid leukemia patient – the first direct evidence for cancer stem cells. (Toronto)

1983



Dr. Tak Mak discovers the T-cell receptor, a key component of acquired immunity. (Toronto)

1983

Dr. Joel Cooper performs the world's first successful single-lung transplant. (Toronto)

1988

Dr. David Grant of University Hospital at London Health Sciences Centre performs the world's first liver-small bowel transplant. (London, ON)

1989



Dr. Lap-Chee Tsui discovers the single gene defect that leads to cystic fibrosis. (Toronto)

1996

Researchers at Toronto's Hospital for Sick Children discover a blood stem cell they call the "mother of all" human blood cells.

2001

The Stem Cell Network is formed under Canada's Networks of Centres of Excellence program. (Ottawa)

2005

Fathers of stem cell research, **James Till and Ernest McCulloch** are awarded the Lasker Prize for their groundbreaking work. (Toronto)

2006

Dr. John Dick identifies that abnormal stem cells are the cause of cancer. (Toronto)

2008



A Canadian team led by **Dr. Stephen Scherer** at SickKids (Toronto) – and part of the international Autism Genome Project – discovers gene abnormalities linked with susceptibility to autism spectrum disorder.

2009



McMaster's **Mick Bhatia** finds a way to tell the difference between normal and cancer stem cells, which is an important step towards using embryonic stem cells for personalized medicine.

2005



University of Toronto researchers discover connective-tissue stem cells – the basic building blocks for the body's bone, fat and ligament tissues – in a region of the umbilical cord. At Mount Sinai Hospital, **Andras Nagy** develops the first two human embryonic stem cell lines in Canada.

2007

Researchers at SickKids (Toronto) and the University of British Columbia use skin-derived stem cells to repair spinal cord injuries in rats.

2008



Gordon Keller grows the earliest form of human heart cells from embryonic stem cells, a step towards using human embryonic stem cells to repair damaged organs at the McEwan Centre for Regenerative Medicine in Toronto.

As seen in the **"Collaborate and Discover: Ontario's Biopharma Cluster"** report, by MaRS and the province of Ontario.