

A Golden Century – 100 Years of Saving Discovery

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This year marks 100 years of the discovery of insulin. To date, this has been the most notable therapeutic discovery for the treatment of type-I diabetes mellitus. Before 1921, survival of patients with type DM was inconceivable. In the same year, a team of researchers at the University of Toronto started with a new experimental approach suggested by Sir Frederick Banting. Insulin was discovered by Canadian physician, Sir Frederick G Banting and his assistant American physiologist, Charles H Best, and a Scottish physiologist, JJR Macleod, it was later purified by a biochemist, James B Collip. Banting, Best, and Collip shared the patent for insulin, and later on, they vended it for one dollar to the University of Toronto. They wanted insulin to be available for those who needed it. In 1923, Nobel Prize for Physiology and Medicine was awarded to Banting and MacLeod. Banting shared his portion of the prize with Best as he felt MacLeod's role in the discovery of insulin was only supervisory, while MacLeod shared it with Collip.

It was on 11th January 1922 that a 14-year-old boy named Leonard Thomson was given his first insulin injection. The boy was near death when the trial started. This was followed by a serious adverse reaction. It took 12 days for James Collip to work hard to purify the ox-pancreas extract. The purified and improved insulin was injected, with no reported side effects, his sugar levels improved significantly, and the boy regained strength and appetite. The same year witnessed medicine's most dramatic moments in Toronto General Hospital. Those days, children dying of type-I DM were kept in large wards. Their parents in attendance were grieving lot waiting for the impending death of their wards. Banting and Best went from bed to bed injecting purified extract of insulin into the comatose children, when they reached the last bed, the first few children started awakening, leading to a joyous moment for their families. To date, it remains the most effective treatment for people with type-I DM.

The Nobel laureates sold insulin for just \$1 to the University of Toronto, refusing to earn a profit from it, so that it is available at cost-effective rates to all those who needed it. Fast-forward 100 years, insulin manufacturing has become a profitable business and the approachability gaps are enormous. Innovations have come with increasing costs. Innovation in insulin therapy continues with animal insulin, biosynthetic human insulins, and modified insulins made from biosynthetic technologies. Discovery of insulin analogs and designer insulins. The growth of the insulin marketplace further increased with the introduction of new injection devices of insulin, ultimately enhancing better glycemic control and fewer side effects and anti-insulin antibodies. In terms of units of insulin, the cost has become 50–200% more with new insulin products and medical devices in relation to conventional preparation in vials.

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World Health Organization (WHO) is working with countries and manufacturers to close the gaps and expand the approach to this life-saving medicine for everyone who needs it.

Insulin is the bedrock of treatment for diabetes. Still, one out of two people with type-II diabetes, needing insulin, do not receive it. World Health Organization in its lead-up to World Diabetes Day in 2021 has highlighted access to insulin and diabetic care. Enhanced costs, low obtainability of human insulin, market capturing by few producers, and a disaligned health system are the main barriers to universal access.

The report proposes several remedies to improve availability to insulin and related products, including:

- Enhancing human insulin manufacture, supply, and diversifying the industrial production base for biosimilar analog insulins to reduce prices.
- Improve affordability by modifiable prices and markups, using pooled procurement and improving transparency in the way prices are set.
- Promote local production capacity in underserved regions.
- Safeguard that amplified access to insulin is supplemented by prompt diagnosis, and access to reasonable devices for blood sugar monitoring and injecting insulin.
- Use health resources sensibly by choosing human insulin wherever possible and assign adequate funding to provide a full package of care.

World Health Organization has augmented struggles to address some of the obstacles to the availability of insulin and related medicines and health technologies through a series of negotiations with business associations and industrialists of these products.

A few months after the first dialog, the industry has devoted itself to a number of activities, including:

- The development of a policy for enhancing access to biosimilars of insulin.
- Contribution to WHO's prerequisite program for insulin, the tools required for the diagnosis of diabetes.
- Involvement in international/UN-shared procurement or demand mechanisms, once recognized.
- Deposition of data explaining the thermostability of insulin to WHO.
- Input is given to WHO in reporting diabetes that can be utilized to announce contributions from the therapeutic, pharmacological, and health industries.

The agenda for World Diabetes Day 2021–23 is **Access to Diabetes Care**. The emphasis of the campaign in 2022 is access to diabetes awareness and to educate its prevention, with the slogan "**Education to protect tomorrow.**" Diabetes being the single chief risk factor for noncommunicable diseases would need an exceptional emphasis and access to life-reviving, and savior drugs like insulin needs pioneering remedies that comprise all stakeholders who need to boost human insulin production, and improve the availability and affordability of insulin.