

Nobel Prize in Chemistry

October 6, 2022

In news—The Nobel Prize in Chemistry 2022 has gone to **Carolyn R Bertozzi, Morten Meldal and K Barry Sharpless**, the latter winning the second Nobel of his career.

What the scientists worked on?

- The three scientists have been **awarded for their work in 'click chemistry', in which molecules snap together fast and firmly, without the need for a long, complicated process and too many unwanted byproducts.**
- **Their work has applications in the field of medical science, including the treatment of cancer.**
- **Sharpless came up with the term 'click chemistry' and worked extensively on it.**
- **Meldal independently of Sharpless, came up with a special chemical structure called 'triazole' which has many significant applications.**
- **Bertozzi took the next step of developing click reactions that could work inside living organisms – 'bioorthogonal' reactions (a term she coined), take place living systems without interfering with native biochemical processes.**
- **Meldal through his experiments came up with the useful chemical structure called triazoles, which are stable and are found in pharmaceuticals, dyes and agricultural chemicals.**
- He also found that the reaction he used could bind together numerous different molecules.
- Bertozzi, using the work of Sharpless and Meldal, came up with an efficient and innovative method to **map glycans, which are carbohydrate-based polymers made by all living organisms.**
- One area that **Bertozzi focuses on is glycans on the surface of tumour cells. Her studies have led to the**

insight that some glycans appear to protect tumours from the body's immune system, as they make the immune cells shut down. To block this protective mechanism, Bertozzi and her colleagues have created a new type of biological pharmaceutical..

- They have joined a **glycan-specific antibody to enzymes that break down the glycans on the surface of the tumour cells. This pharmaceutical is now being tested in clinical trials on people with advanced cancer.**

What is click chemistry?

- Chemists often try to recreate complex chemical molecules found in nature, and this has applications, among other things, in the field of medicine – how to target and block pathogens in cells.
- However, this process can be complicated and time-consuming.
- Instead of trying to wrangle reluctant carbon atoms into reacting with each other, Barry Sharpless encouraged his colleagues to start with smaller molecules that already had a complete carbon frame.
- If chemists choose simple reactions – where there is a strong intrinsic drive for the molecules to bond together – they avoid many of the side reactions, with a minimal loss of material.
- **Sharpless called this robust method for building molecules click chemistry**, saying that even if click chemistry cannot provide exact copies of natural molecules, it will be possible to find molecules that fulfil the same functions.