NEWS IN BRIEF

NOBEL PRIZE IN MEDICINE

At the height of the Vietnamese war, the common enemy of soldiers on either side of the battle lines was chloroquine-resistant malaria. In 1964, the North Vietnamese Government approached the Chinese leader Mao Tse Tung to find a solution to this deadly scourge. Mao immediately established a military mission Project 523 with a main aim to discover a drug for resistant malaria. Youyou Tu was a phytochemist who was in charge of the project. She and her team combed through hundreds of old Chinese traditional medicine texts. Around 2000 chemicals extracted from various plants were evaluated. Finally, they zeroed on to an extract of *Artemesia annua* L. also called Quinhao which was found to have excellent antimalarial efficacy in a mouse model. The details of this research were – for several years – largely unknown outside China because it was published anonymously in Chinese. Subsequently, artemesinin has become known worldwide as one of the most effective drugs against chloroquine-resistant malaria.

Youyou Tu received this year's Nobel Prize for medicine. It is especially creditable as she is neither a doctor nor a PhD nor has ever worked overseas; all considered vital for a Nobel in medicine. She shares the Nobel Prize with William C Campbell and Satoshi Omara for the discovery of Avermectin which opened avenues for the treatment of a range of parasitic diseases. Omara is a Japanese microbiologist who has isolated several species of the soil bacteria Streptomyces, and successfully cultured them in the laboratory. From these, he selected 50 of the most promising streptomyces with good anti microbial activity. Campbell who was working for Merck in the US took his streptomyces strain, and found that one of the molecules extracted from the culture was remarkably effective against parasites of domestic and farm animals. The molecule was further purified to form ivermectin which has revolutionized treatment of various parasitic diseases. It has helped to eradicate river blindness (onchocerciasis) from Africa, and to significantly control filariasis. (*http://www.nobelprize.org/nobel_prizes/medicine/laureates/2015/press.html*).

NOBEL PRIZE IN CHEMISTRY

The inherent instability of DNA is a double-edged sword. Damaging lesions can also be mutagenic and change the coding capacity of the genome, which can lead to devastating diseases, including cancer, neurodegenerative disorders and biological ageing. On the other hand, without mutations, Darwinian evolution is unthinkable. Interestingly, mutagenic chemicals and radiations can also be therapeutic. For instance, these can be used to treat cancer, by introducing DNA lesions that halt cell proliferation and stimulate programmed cell death.

The Nobel Prize in Chemistry 2015 was awarded jointly to Tomas Lindahl, Paul Modrich and Aziz Sancar for elucidating three different mechanisms by which errors occur in our DNA and the various mechanisms of DNA repair. In the 1970's, Lindahl discovered that DNA undergoes regular decay and damage. For example, cytosine loses an amino group to become uracil resulting in a mutation. Subsequently, he discovered an enzyme system called uracil-DNA glycosylase which corrects this error. This process was called base excision repair. Aziz Sancar discovered and cloned the gene for an enzyme called photolyase which is critical in correcting DNA mutations caused by high doses of UV exposure. He further went on to identify the exact chemical processes involved in this nucleotide excision repair. Paul Modrich discovered the mechanism by which DNA errors during cell division are identified and repaired. The process is called mismatch repair.

A deeper insight into DNA repair mechanisms will help us in understanding disease pathogenesis and identify potential therapies for some apparently incurable diseases. (*http://www.nobelprize.org/nobel_prizes/chemi stry/laureates/2015/advanced-chemistryprize2015.pdf*)

THE PRECISION MEDICINE INITIATIVE

President Obama has unveiled an audacious new initiative to personalize and improve clinical care to patients. The basis of this precision medicine initiative is that in prevention and treatment of disease, individual differences need to be taken into careful account. This will be possible only if large amounts of very precise data, entailing millions of patients, are analyzed very meticulously. The time appears ripe now since it is theoretically possible to collect and analyze detailed medical, genetic and physiological data.

Today we have powerful methods for characterizing patients (such as proteomics, metabolomics, genomics, diverse cellular assays, and even mobile health technology), and computational tools for analyzing large sets of data. Americans are also increasingly interested in being active partners in medical research. Increased connectivity through mobile devices has simplified the problem.

The plan is to recruit one million participants in the next four years either individually or through health care providers. Volunteers signing up to be part of this project would agree to be recontacted, take a baseline health examination, share their electronic health care records, and provide a biospecimen. The issues like prevention of misuse of data and security need further exploration. The plan is imaginative and grand. Time and patience will certainly yield good results. (*Scientific American, 22 September 2015*).

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