NEWS IN BRIEF

THE NOBEL PRIZE IN MEDICINE 2016

This year the Nobel Prize in Medicine goes to a Japanese scientist Yoshinori Ohsumi for his work on the process of autophagy in the cell. Autophagy – meaning eating one self – is a process developed in cells to recycle degraded proteins and organelles. It may be an evolutionary tool to deal with starvation to conserve nutrients, but is now considered a method to maintain cellular health, resist infection and fight cancer. The organelle which degrades cellular constituents had been discovered in the 1950's. However, further research into this mysterious organelle remained at a standstill when in 1990's, Ohsumi decided to further study how exactly this happens because "nobody else was studying it."

He conducted a series of experiments in yeast cells which elegantly delineated the process of autophagy. First, he induced autophagy by exposing the yeast to starvation. He then carried out a series of experiments to disrupt the process. On studying it microscopically, he observed that the yeast cell was full of small vacuoles that had not been degraded. Ohsumi exposed the yeast cells to a chemical that randomly introduced mutations in many genes, and then he induced autophagy. Within a year, he had identified several of the genes that played a role in autophagy. The results showed that autophagy is controlled by a cascade of proteins and protein complexes, each regulating a distinct stage of autophagosome initiation and formation.

Autophagy is the cells' rapid response to provide fuel for energy and aminoacids for renewal of cellular components. Autophagy can eliminate invading intracellular organisms, and is vital for embryo development and the negative consequences of aging. Disrupted autophagy has been linked to Parkinson's disease, type 2 diabetes, cancer and other disorders of aging. An attempt is now being made to develop drugs that can target autophagy in various diseases. (*https://www.nobelprize.org/nobel_prizes/medicine/laureates/2016/press.html*)

NOBEL PRIZE FOR CHEMISTRY 2016

This year's Nobel Prize for Chemistry goes to three men who have smashed open our window of imagination at nano level. Jean Pierre Sauvage from the University of Strasboug, France developed the first molecular machine. He linked two ring-shaped molecules to form a chain called a catenane. What was simply marvelous was that one ring of the molecule could freely move around the other.

In 1991, Sir J Fraser Stoddart from Northwestern University, USA studied this phenomenon further. He threaded the molecular ring onto a thin molecular axle. The ring remained around this axle because the two components had complementary electron groups that kept them together yet loose enough to move. When Stoddart added heat – exciting the electrons on various segments of the axle – the ring slid up and down. This type of control set the stage for devices, including a molecular elevator, going up and down, and a molecular muscle that can expand and contract.

Bernard Ferringa, from the Netherlands, added energy to create spinning motions, essential for a true motor. In 1999, he got a molecular rotor blade to spin in one direction, overcoming the basic random movements of molecules. By 2014 he had this motor spinning at 12,000 revolutions per second. He also has used motors to spin a glass cylinder that is 10,000 times bigger than the motor itself. And his team has linked several motors and axles to create a four-wheel-drive "nanocar."

The molecular motors are being compared to the electric motors of the 1830's. Scientists then were happily experimenting with spinning cranks and wheels little imagining that these would evolve into the washing machines and sophisticated vehicles of the future. (*https://www.nobelprize.org/nobel_prizes/chemistry/laureates/2016/press.html*)

THE DELHI NEONATAL INFECTION STUDY

The data from Delhi Neonatal Infection Study (DeNIS) collaboration published in The Lancet this October has brought the spotlight onto one of the major scourges haunting pediatricians in India. Neonates born in one of three tertiary care centers in Delhi, India, and subsequently admitted to the intensive care unit, were followed up daily until discharge or death. Of 88 636 livebirths enrolled between July 18, 2011 and Feb 28, 2014, the incidence of total sepsis was 14·3%. Nearly two-thirds of total episodes occurred at or before 72 h of life. *Acinetobacter*, *Klebsiella* and *E Coli* accounted for 64% of the isolates. Multidrug resistance was observed in 82% isolates of *Acinetobacter*. Nearly a quarter of the deaths were attributable to sepsis. The high rate of early onset sepsis and the apparent dominance of so-called nosocomial-type pathogens in early-onset sepsis could possibly be due to ultra-early horizontal transmission from delivery rooms and NICUs or vertical transmission from the maternal genital tract colonized with these pathogens after unhygienic personal and obstetric practices.

We are pushing institutional deliveries without considering the significant risks of nosocomial infections. The problem is complex and needs urgent attention. (*Lancet Glob Health. 2016;4:e752–60*)

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