Editorial

Nanotechnology and Medicine

Diseases and ill-health are caused by damage at the molecular and cellular level, which gradually multiplies affecting the system as a whole. The medicine/drug consumed to cure a particular ailment has to survive a long journey through the stomach and reach the intestine intact and then come into circulation crossing the intestinal wall. Once in blood, it gets filtered through the liver and travels through the body resisting acids of digestive juices, jump membrane barriers and then act on specified area of damage in the system. The challenges in the existing medicinal systems are for protein-based pharmaceuticals which are broken down when taken orally, killer diseases are growing more resistive to drugs, surgical tools are large and crude much suited to tear and injure rather than heal and cure [1].

Nanotechnology

Nanotechnology involves the creation and use of materials and devices at the level of molecules and atoms. A nanometer is one-billionth of a meter, too small to be seen with a conventional lab microscope. Nanotechnology has led to major developments in the area of health and medicine. This could happen because of integration of Biotechnology and Nanotechnology. Molecular Nanotechnology is a hybrid of chemistry and engineering that would let us manufacture anything with atomic precision. One major aspect associated with Nanotechnology is that it is multi-disciplinary technology with its wide spectrum applications like Nanomaterials, Nano-electronics, Nano-biotechnology, Nanomedicine and Nanosurgery etc, as broad classification [2].

Nanomedicine

Nanotechnology has led to major developments in the areas of health and medicine. This could happen because of integration of Biotechnology and Nanotechnology. This confluence led to the exciting developments of Nano-devices having bio-capabilities. These devices have been named as Nanobots. Nanobots can be used for medical diagnostics, genetic testing, new kinds of drug-delivery systems and delivering oxygen to poorly circulated tissue by acting as “artificial red blood cells”. Such Nanobots could be programmed to seek out and kill cancerous cells. An army of them could be injected into cancer patients, where they patrol their bodies day and night, and forever keep them free of cancer [3]. They might be programmed to cruise the blood stream, clearing atheroma plaque from artery walls before it has a chance to build up and trigger a heart attack. Perhaps some could be programmed to repair the body’s cells as they grow old. Nanotechnology could mean the end of disease as we know it. If you caught a cold or contracted AIDS, you’d just drink a teaspoon of liquid that contained an army of molecule-sized nanobots programmed to enter your body’s cells and fight viruses. If a genetic disease ran in your family, you’d ingest nanobots that would burrow into your DNA and repair the defective gene(s). Even traditional plastic surgery would be eliminated, as medical nanobots could change your eye colour, alter the shape of your nose, or even devour all of your excess fatty tissue without surgery [4].

Although the future of medicine lies unclear, it is certain that nanotechnology will have a significant impact. The recent advances in stem cells technology, tissue engineered organs, transplantation, nanotechnology and imaging are exciting new areas for the world. Stem cells form an integral component of initiating in regenerative medicine and nanomedicine has the ability to continually reproduce them.

References

1. Jani NN. Nano-medicine and surgery, futuristic medicinal technology. http://www.nimiedu.org/
2. Dexler KE. Machine-phase Nanotechnology. Scientific American 2001:74
3. Sceinberg D. Tiny ‘smart bombs’ can invade, kill cancer. Novermber 15, 2001 http://www.cnn.com/2001/HEALTH/11/15/cancer.smart.bomb.ap/inde
4. Freitas RA Jr. Nanomedicine. Vol 1 Basic Capabiliteis, Lande Bioscience, Georgetown, TX 1999;http://www.nanomedicine.com

Brig Azhar Mubarik
Editor, PAFMJ
Army Medical College, Rawalpindi