5. The role of nanotechnology in biomedicine

Nanotechnology is becoming increasingly significant in the healthcare sector in areas such as drug delivery, gene delivery and diagnostics. One of the challenges of pharmaceutical research is to deliver the drug to the targeted place in the human body\(^4\).

**Targeted drug delivery systems**

Polymer based nanocapsules are considered effective vehicles for drug delivery systems\(^5\). There are several advantages of having a polymer coating on the drug. It prevents the drug from being released half way inside the body and thus in turn protects the healthy tissues in the body from the harmful effect of the drug. These kinds of polymeric capsules have been used to treat cancer as they contain Paclitaxel, an anti-cancer drug. Targeted drug delivery has also been proposed to cure osteoarthritis (OA), the erosion of the joint cartilage tissues.

**Nanotechnology in gene delivery**

Gene therapy is a method of correcting genetic disorders by replacing defective genes with repaired genes. Research is being conducted to see if the conventional routes of viral vectors for gene transfer can be replaced by nanotechnological tools. Nanochips have found applications in biological imaging and molecular diagnostics\(^4\). Targeting tumors with magnetic nanoparticles is a significant area of research in nanotechnology\(^6\). In the case of magnetic targeting, the drug is attached to the magnetic nanoparticle and then with the help of an external magnetic field, the magnetic nanoparticle moiety is delivered to the targeted site.

1) *Do you think it is possible that personalized medicines based on nanotechnology will be developed in the future?* What kind of research would need to be carried out in order for this to happen?

2) *Find out what is meant by functionalization of nanomaterials. Why is it so important in medicine?*
References


Further reading