**Nanomaterials and Nanoparticles in Medicine**

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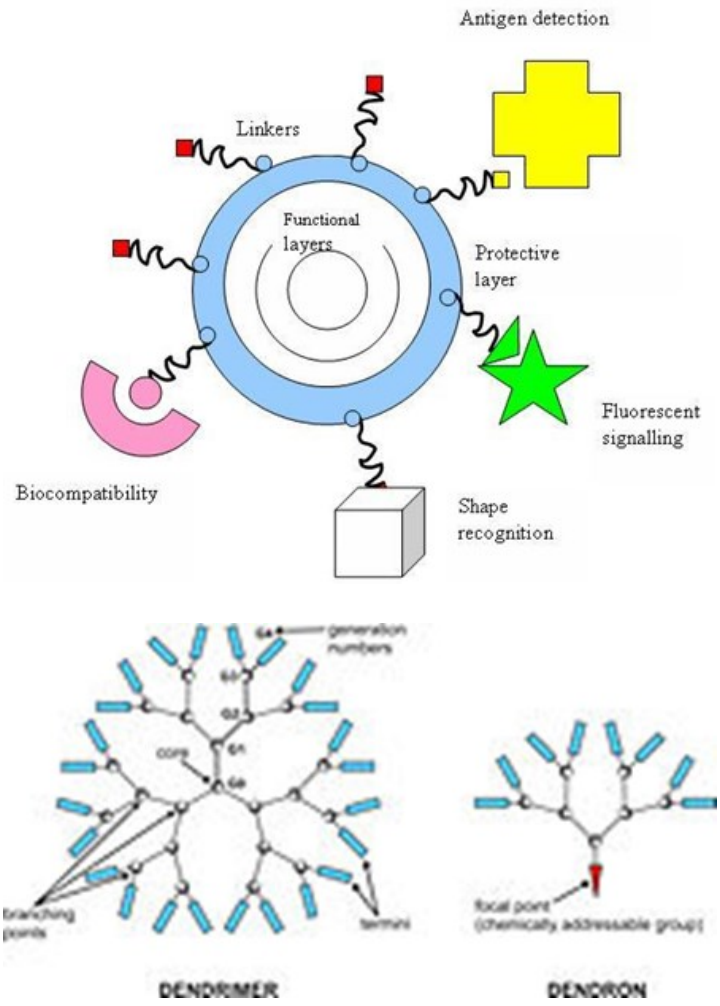
Nanomedicine is the application of nanotechnology in medicine, from medical applications of nanomaterials or nanoparticles (NP) and biological devices, to biosensors, and biological machines. Problems of nanomedicine include understanding the issues related to toxicity and environmental impact of nanoscale materials (materials structure on the scale of nanometers, i.e. billionths of a meter). Functionalities can be added to nanomaterials by interfacing them with biological molecules or structures. The size of nanomaterials is similar to that of most biological molecules and structures; therefore, nanomaterials can be useful for both in vivo and in vitro biomedical research and applications. Thus far, the integration of nanomaterials with biology has led to the development of diagnostic devices, contrast agents, analytical tools, physical therapy applications, and drug delivery vehicles. Thus, nanomedicine is defined as the use of nanomaterials for diagnosis, monitoring, control, prevention and treatment of diseases.




Nanotechnologies have impact in neurology and neurodegeneration, which means that nanoparticles specific for braincells are gaining attention in Alzheimer's disease (AD) diagnosis and therapy. The new in vitro developments concerned to AD diagnostics include scanning, tunneling microscopic procedures, immunosensors, ultrasensitive NP-based bio-barcodes which are able to detect Aβ (1-40) and Aβ (1-42).

Brain-specific nanoparticles can directly interact with the Aβ peptides to break already existing amyloid aggregates or suppress the self-assembly of Aβ in toxic oligomers or fibrils. Nanomaterials can efficiently carry and deliver drugs, neuroprotective, therapeutic molecules to the brain and also eliminate AD pathogenic factors.

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