Nanoparticles at the interface of blood-brain barrier

Jinmyoung Joo[1*]

[1]*Ulsan National Institute of Science and Technology, Republic of Korea*
E-mail address: jjoo@unist.ac.kr

Nanotechnology have attracted great attention to molecular biology and translational medicine because life processes are maintained by the action of a series of molecular nanomachines in the cell machinery. Recent advances in nanoscale materials that possess emergent physical properties and molecular organization hold great promise to impact human health in the diagnostic and therapeutic arenas. In order to be effective, nanomaterials need to navigate the host biology and traffic to relevant biological structures, such as diseased or pathogenic cells. Moreover, nanoparticles intended for human administration must be designed to interact with, and ideally leverage, a living host environment. Inspired by nature, we use peptides or aptamers to transfer biological trafficking properties to synthetic nanoparticles to achieve targeted delivery of payloads. In this talk, development of nanoscale materials will be presented with a particular focus on targeted drug delivery to brain. Unique combinations of material properties that can be achieved with nanomaterials provide new opportunities in translational nanomedicine for neuroinflammation and neurodegenerative diseases. This framework for constructing nanomaterials that leverage bio-inspired molecules to traffic diagnostic and therapeutic payloads can contribute on better understanding of living systems to solve problems in human health. The biocompatible and self-destructive nanocarriers present promising potential for therapeutic application via targeted delivery to brain. Tailoring design strategies of the biomedical nanoparticle platforms and their practical applications as a theranostic agent are also discussed.