Controlling the biological fate of synthetic nanoworms by modulating the persistence length

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The stereo-stability and the high degree of function displayed by biopolymers is attractive to mimic with synthetic polymers because of its potential application in materials and biomedical field. Polyisocyanopeptide (PIC) is particularly noteworthy among artificial polymers because of their stable helical backbones with a high helix inversion barrier. They have been demonstrated to assume a four repeats per turn (approximately) β-helical conformation that is stabilized by a β-sheet peptidic hydrogen bond network present between monomers n and n + 4 [1-3]. Further, the hydrophobic interaction of oligo(ethylene glycol) moieties incorporated along the polymer backbone makes PIC a thermoresponsive material. This extracellular matrix (ECM) mimicking, water-soluble, semi-stiff, rod-like polymer has been utilized for various applications from wound healing [4, 5], stem-cell activation [6] to immunotherapy [7, 8]. In this work, the effect of persistence length/stiffness of the PIC nanoworms on its biological interaction – cells and healthy Balb/c mouse, has been studied using confocal microscope and molecular imaging.

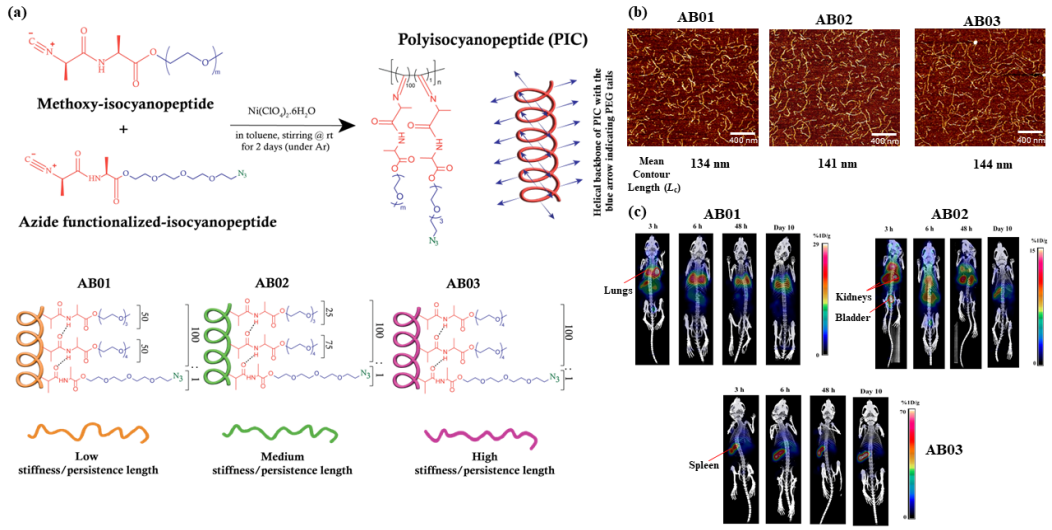

Figure 1: Bio-nano interaction of Polyisocyanopeptide (PIC). (a) Schematic representation of synthesis of PIC nanoworms, (b) AFM images of PIC and (c) Biodistribution profile of PIC in healthy Balb/c mice.

References

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