Title: Neuro-degenerative disease by nano-particles?

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The progress of NanoMedicine over the past decades has been remarkable, and many interesting applications in nanodrug delivery have been reported. But despite advances, there are still challenges in understanding the interaction of nanodrugs and carriers with DNA during delivery. Indeed, the question has been raised of whether the nanoscopic drug carrier may damage DNA to offset advantages of the drug, e.g., adjuvants in vaccines [1] to activate the immune system comprise submicron (< 100 nm) nanoparticles (NPs) of aluminum that cross the blood-brain-barrier and by remaining in the brain for an extended time to damage DNA and neurons perhaps even causing neuro-degenerative diseases and autism. In this regard, the potenrial for NPs to produce UV radiation upon equilibrating with blood temperature is of great interest. By classical physics, the NPs acquire blood temperature, but at the nanoscale the atoms in the NP are denied heat capacity by the Planck law of quantum mechanics. Hence, heat at the nanoscale cannot be conserved by an increase in temperature. Because of this, simple QED was formulated [2] to conserve heat at the nanoscale by producing EM radiation. An illustrative example of simple QED is presented for the worst-case scenario of the heat transfer of a single 85 nm iron NP in a thermal bath showing significant numbers of UV photons are produced. Although the DNA damage from NPs and other sources is routinely repaired by the immune system, individuals with deficient repair are prone to neuro-degenerative disease. How nanocarrier design may reduce UV induced DNA damage are discussed.

Biography

Thomas Prevenslik is a retired American living in Hong Kong and Berlin. He began simple QED nanoscale heat transfer development in Hong Kong in 2010. Simple QED has nothing to do with Feynman's QED and is based on the Planck law that precludes atoms in nanostructures the heat capacity to conserve heat by temperature. Instead, heat conservation proceeds by creating size dependent standing EM radiation E inside the nanostructure. For a spherical NP, simple QED creates a quantum state $E = hc/2nd$, where h is Planck's constant, c the velocity of light, with n and d the refractive index and diameter of the NP.

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References

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[2] Simple QED Applications, at nanoqed.org, 2016 - 2020.