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21st Century Drug Delivery Will Transform Healthcare: Opportunities for Nanoscience and Chemistry

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The pre-human ancestors improved eating habit to develop brain by roasting food million years ago. Food consumed by this method remained contaminated with charred carbon. Such a practice is now translated in barbeque type delicacies. We have shown that these charred carbon associated with roasted food essentially comprised of non-toxic graphene and nano carbon materials to sustain human endeavor. It was discovered that metamorphism of plants leading to coalification naturally create graphene oxide(GO) sheets under 100x100 nm size and such GOs are isolated from low grade coal. Irrespective of the source of isolation, these GOs are shown to be non-toxic and fluorescing in the entire three red green and blue regions. Living images of laboratory animals in their entire life cycle have been demonstrated using *Drosophila melanaogaster* as the proof of concept to use these nanocarbons in bio-medical research. These water soluble corrugated type GO sheets can reversibly close like spheres and re-open up to sheet forms based on chemical and physical stimuli as code similar to, "close and open sesame diktat" used in folk tale, Alibaba and forty thieves'. Based on such property, these nano carbons are used as cargo (Trojan horse) to carry drug like Donepezil (for Alzheimer), Taxol (for cancer) and hydrophobic porphyrin (for PDT therapy). The solubility of the entrapped drug follows the property of the entrapped drug thus bypasses the problem in administrating insoluble behavior in their free state. Such solubility property of the entrapped drug thus bypasses the neuronal site of the brain. Finally the empty cargo can safely be excreted from the body. We will briefly touch our ongoing research to entrap insulin using this cargo for room temperature storage stability and its oral administration in diabetes patient.

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