J Bioengineer & Biomedical Sci 2016, 6:5 (Suppl)
http://dx.doi.org/10.4172/2155-9538.C1.015

Glycosilated polymers or small organic molecules for rapid, *in-situ* electronic detection of viral loads

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There is a strong need for the development of new, highly-sensitive, cost effective and reliable tools for the rapid screening of pathogenic viruses and/or bacteria. There are currently few methods that allow for the low-cost detection of specific pathogens at early stages of infection, when medical intervention is advantageous in order to reduce health-related costs. In nature, carbohydrate-lectin interactions are responsible of the 90% of the infectious diseases, but it has been very little explored due to lack of appropriate transduction tools based on multivalent approaches for efficient recognition. We are proposing a Field-Effect Transistors (FETs) as transducer platforms for lectins detection. Amongst the advantages of FETs are their extensive biocompatibility, relative ease of manufacture, high amplification of the electrical signal output and scalability in arrays. The active layer of the FET consists of conjugated polymers or small organic molecules modified with specific carbohydrates, for the detection of bacterial or viral infections. The development of a Glyco-FET sensors for detecting Lectins provide a label-free, ultrasensitive and selective detection method, offering a very useful diagnostic tool, for the development of Point of Care diagnostics for use in the Health Sector.

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Investigation of Organ and Effective Doses with Increasing Weight Percentiles

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Workers and patients who are exposed to ionizing radiation in various occupational and medical environments are in the different weight percentile even in the same age group. In this study this effect investigates on organ-absorbed dose and effective dose(ED). For this reason, the ORNL modified adult phantom (50th weight percentile) and the Monte Carlo N-Particle Transport Code (MCNP) were used for external photon energies (10 keV–10 MeV) in Anterior-Posterior (AP), Posterior-Anterior (PA), Left-Lateral (LLAT) and Right-Lateral (RLAT) irradiation geometries. To create percentile-specific phantoms from base phantom (50th percentile phantom), the volume of internal organs was kept constant and an increase in body weight to achieve the desired weight percentile (65th, 75th, 85th and 95th) was done by adding layers of adipose and soft tissues on the phantom. For example, torso was changed as follow (The ORNL torso is a cylinder with an elliptical cross-section): the radius along the major and minor axes of the elliptic section was increased by adding adipose and muscle tissues. The muscle layer was placed and then the adipose layer covered it. By appending these layers, the positions of the skin and breasts were altered. Skin was transferred forward by considering the thickness of the external layers added. Radial changing for breasts was also considered. The results indicate that increasing the weight percentile decreases ED and the organ absorbed doses for all energies and irradiation geometries. For instance, the ratio of ED in 95th to 50th percentile (E95/E50) is 0.78, 0.79, 0.81 and 0.80 at 1 MeV photon beams for AP, PA, LLAT and RLAT geometries, respectively. In fact, there is a notable decreasing in doses that should be considered in the protection and treatment aims.

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