Nano-technology uses virus' coats to fool cancer cells

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While there have been major advances in the detection, diagnosis, and treatment of tumors within the brain, brain cancer continues to have a very low survival rate in part to high levels of resistance to treatment. New research published in BioMed Central's open access journal *Journal of Nanobiotechnology* has used Sendai virus to transport Quantum Dots (Qdots) into brain cancer cells and to specifically bind Qdots to epidermal growth factor receptor (EGFR) which is often over-expressed and up-regulated in tumors. By molecular-labeling cancer cells this nanoparticle technology could be used to aid diagnosis.

Qdots are tiny fluorescent particles, smaller than a virus, and over 1000 times smaller than a cell, which can be linked to biological molecules, such as antibodies. Once linked, the fluorescence would make it easy to find which cells contain the protein the antibody recognizes, and where in the cell this protein is located. However there have been problems getting the Qdots into cells without them clumping, or being packaged in to endosomes, and excreted from the cells as waste.

Researchers from the City College of New York have overcome this problem by coating the Qdots in lipid and protein coats based on Sendai virus. Prof Maribel Vazquez explained, "While cells have complex defense mechanisms to protect themselves against attack, viruses have evolved ways to fool the cell into letting them in. We were able to exploit these mechanisms by fusing inactivated mouse parainfluenza virus with liposomes containing Qdots. The Qdots were in turn attached to an antibody against EGFR. So, once inside the cell, the Qdot-antibody

complexes were able to bind to the receptor and the amount of bound complex could be monitored by measuring Qdot fluorescence."

This study looked at the level of EGFR as a marker for cancer but the Qdots could be attached to any antibody. Antibody-Qdot sets would allow rapid identification of different cancer types, determine potential chemotherapy resistance, and lead a more individualized treatment plan.

More information: Sendai Virus-based Liposomes Enable Targeted Cytosolic Delivery of Nanoparticles in Brain Tumor-Derived Cells Veronica Dudu, Veronica Rotari and Maribel Vazquez. *Journal of Nanobiotechnology* (in press)

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