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Glycan Nodes: Multiplexed Glycotransferase Surrogate Analysis for Detecting and Monitoring Cancer

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Invention Description

Cancer biologists have known for decades that tumor cells display aberrant sugar polymer (glycan) structures. This means that if glycans can be analyzed in the right way(s), they should serve as excellent markers for the presence and progression of cancer. Altered activity of the enzymes that build glycans (glycotransferases, GTs) is the immediate upstream cause of abnormal glycan production. GTs build glycans in an opportunistic first-come-first-build way, with each type of GT adding a specific sugar residue to a specific position of a growing glycan "tree". Thus increased expression of a particular GT results in an increased number of specific glycan polymer branch points (or linear linkages) and a highly diverse, difficult-to-track set of final glycan structures.

Researchers at the Biodesign Institute of Arizona State University have developed a simple, inexpensive technique using clinically well-established instrumentation to quantify glycans in small quantities (10 microliters / 10 mm^3) of human blood, whole biofluids and tissue samples on the basis of these specific glycan polymer branch points and linkages rather than on the basis of intact glycan structure. This provides a direct surrogate readout for GT activity and, as such, a promising new angle by which to leverage glycans found in fluids and tissues throughout the body as cancer biomarkers. Initial pilot study results in blood plasma from lung, colorectal, and prostate cancer have produced promising results that suggest it may be possible to not only use this technology to detect cancer, but to create "glycan node" biosignatures that distinguish between different types of cancer.

Potential Applications

- Cancer diagnostic
- Chronic disease diagnostic
- Creation of unique cancer/chronic disease-type specific biosignatures

Intellectual Property Status:

Patent Pending

Benefits and Advantages

- Simple procedure – does not require special sample handling or pre-processing
- No biological reagents (no antibodies or enzymes)
- Inexpensive
- Uses clinically established instrumentation (GC-MS)
- Sensitive – works well on limited sample quantity (10 microliters/10 mm^3)

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