Glycomics Cancer Diagnostics - How it will work!

Report on Europe, China, Japan, Russia and US

Smart Sugars Lesson #24

by JC Spencer

International teams with expertise in glycomics and bio-sensors are developing a new sugar-testing technology. Medical scientists in universities around the world are studying the glycocode of sugar receptors on the surface of human cells.

The objective is to develop a simple blood test in a clinical setting for a quick diagnostic turnaround. The test will monitor the glycosylation of sugars (pronounced glī'käs·ə'lā·shən). Decoding these arrangements of sugars will give us the gold standard for diagnostics.

All cells and most proteins in blood are glycosylated, that is they are coated with sugars. Royal Sugars are known to be altered in many diseases, especially cancer where these sugars are diminished on the cancer cells.

The future of medical diagnostics is hidden in the biomarker of glycosylation of the human cells. Evaluating the quality and quantity of glycoproteins is the biomarker. Healthy cells have a forest of glycoproteins while cancer cells are void of these trees of life.

The EU Commissioner for Research, Innovation and Science, Máire Geoghegan-Quinn and scientists at the National University of Ireland, Galway (NUI Galway) are leading a team of experts from Europe, China and Japan in a Sino-European research project for early cancer detection.

Other countries including US and Russia are racing to develop bioinformatics for glycan expression. Joint efforts include NIH development projects.

High-throughput technologies to analyze these altered sugars, or glycobiomarkers, will allow scientists to diagnose different forms of cancer from a simple blood test without a biopsy.

DNA microarray technology has been a tremendous success where literally thousands of discrete interactions are observed at once. It is this microarray capability that is opening the door for rapid profiling of glycoconjugates.

Conventional methods including chromatography, electrophoresis, mass spectrometry, and nuclear magnetic resonance have limited the throughput where microarray brings to the lab the needed high-throughput technology.

We are in the early stages of understanding the glycocode. The glycome possibilities may be thousands of times more complex than the genome project. It will be significant to know the meaning of the possible arrangements (folding) of the different sugars with antibodies, lectins, and proteins and the projected outcome of the glycan structures.

EU Commissioner Geoghegan-Quinn said: “This project on early non-invasive cancer diagnosis is a typical example of the added value that our collaboration can bring. This is why I want us to create many more opportunities to bring Chinese and European researchers together, working on common problems and with common objectives, in European and Chinese research programmes.”

The GlycoHIT (Glycomics by High throughput Integrated Technologies) consortium, led by National University of Ireland at Galway, is aimed at developing reliable and fast diagnostic tests for the early detection of cancer.

Source:

http://lsdis.cs.uga.edu/projects/glycomics/index.php?page=3
http://www.imt.ie/news/uncategorized/2011/06/nuig-leads-sino-eu-research-into-early-cancer-detection.html
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1297640/?tool=pmcentrez