Could data sonification deliver while-you-wait cancer diagnosis? (w/ Video)

July 30 2014

Converting stem cell data into sounds could enable GPs to make instant, non-invasive cancer diagnoses during a routine check-up.

With waiting times for cancer tests at a six-year high, this could significantly reduce the agonising and potentially life-threatening wait for patients and improve Government waiting time targets.* A recent study shows how data sonification (where data is conveyed as audio signals as opposed to visual illustrations such as graphs) can improve standard techniques currently used in spectroscopy stem cell analysis. What could this mean for cancer diagnostics?

Traditional diagnosis might involve taking a biopsy, sending it to the lab and waiting for the results. It is invasive and can take weeks. In the future, GPs could use audio feedback devices to diagnose certain types of cancer on the spot by scanning a patient to detect specific sound signals. With instant medical feedback, a GP can make a fast, more confident diagnosis and react immediately.

When removing cancerous tissues, even a small amount left behind can be dangerous. By listening to data in a patient's body via an audio diagnostic tool or probe, a surgeon is more likely to spot remaining cancerous cells than by visual inspection alone. This provides another layer of assistance and leaves the surgeon's eyes free to focus on the operation. This is likely to reduce surgery time and improve the probability of all cancerous tissue being removed.

Current spectroscopy methods involve firing light from a laser into cells and observing how it reacts. However, analysing the results and determining healthy cells from cancer cells typically involves the use of computational pattern analysis and assigning the cell type by eye, which is time consuming and allows no real-time feedback.

By classifying this data into audio signals, it is easier to differentiate between different types of cell, improving accuracy and allowing researchers to search through large volumes of data very quickly.

The preliminary study was launched recently at the 20th International Conference on Auditory Display. It is a collaboration between GÉANT, the pan-European research and education network; Birmingham City University and the University of Central Lancashire.

Ryan Stables, a researcher for the School of Digital Media Technology in Birmingham who lead the study said:

"This method of identifying cancerous cells is similar to that of using a metal detector. It allows you to identify the characteristics of cancer in real-time, which we hope could have life-changing implications for patients through the development of better diagnostic tools.

We are now looking at using different types of data and are hopeful the research could be used for treating other physical diseases, not just cancer."

Domenico Vicinanza, Product Manager at GÉANT was responsible for the sonification, a process which often requires the use of high-speed networks to distribute large volumes of data between research teams and computing resources. He said:

"Part of my role at GÉANT is to explore new ways for representing data

and discovery through the use of high-speed networks. This study is a great opportunity to assist a potentially life-enhancing project addressing one of society's biggest challenges.

"From a practical point of view, listening to a single sound for a prolonged period of time can be pretty hard on the ears, so I was keen to ensure the sounds were bearable and perceptually interesting."

Provided by Birmingham City University