CNBP Chief Investigator
& Co-Deputy Director
Prof. Ewa Goldys

# Case Study

## Big Data to Help See Small Cells

### NEW CELL COLOUR TECHNOLOGY
### Prof. Ewa Goldys

Our newly developed technology enables colour to be used as a uniquely powerful diagnostic and detection tool for medicine, with additional applications across the life sciences, manufacturing and the food industry.

Our pioneering hyperspectral imaging technique allows us to extract specific biomolecular information, hidden in the fluorescent colour signatures of living cells and tissues.

Using this information, we can non-invasively determine cell biochemistry. We are able to test hypotheses about the similarity (or otherwise) of cells and cell populations and about the effects of chemical interventions in those cells, such as drug treatment.

In our approach, we obtain fluorescence images of live cells and tissues at a number of selected excitation wavelengths, capturing their fluorescence emission at multiple specified, wavelength ranges. This accurately quantifies their fluorescence (colour).

We then analyse micrographs of cell populations using custom-developed software to gather information about hundreds of quantitative features including cell size, shape, brightness and texture.

This dataset provides richly detailed information about living cells, letting us unveil the presence of biomolecules such as NADH, flavins, retinoids, cytochrome C, and many others, and their cellular content.

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This next-generation methodology allows our team to non-invasively and rapidly detect major health conditions including neurodegeneration, cancer and diabetes. Notably, these cellular and molecular measurements can be done non-invasively, in living organisms. The method offers the potential for healthcare decisions to be based on the health needs of the individual, and their unique biological characteristics.

Using our technique, we will ultimately be able to look at the colour of a patient's cells and tell if the patient is sick or healthy, and how they respond to treatment.

We also see commercial applications for our 'cell colour technology' beyond healthcare, in industrial and environmental monitoring—such as in determining the quality of fresh and processed foods; and in industrial processes to identify microbial contamination.