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Big Questions, Six Billion Tiny Answers

An Interview with Professor Brendon Frey, Computer Engineer
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What is genomics?

Every cell in your body has a copy of your personal DNA or genome. So it's 6 billion letters A, C, G's, and T's, and basically that's the code for life. So we can actually sequence your genome for about a thousand dollars. In a couple of years, it will cost less than a trip to the grocery store to sequence your genome, to read out those six billion letters. But we can't do anything with it. So if there's a mutation in your text, it could lead to cancer, it could lead to Alzheimer's Disease, but we can't figure out that relationship. I call that the phenotype-genotype gap, and that's the most pressing problem for society right now.

How is genomics affecting modern medicine?

So we are seeing a really massive sea change in how we think about medicine in the context of genomics in particular. Biology has in the past been very hypothesis-driven: You ask a question, you get some data, and then you get the answer to your question. What we're seeing now, because we have an exponential growth in the amount of data that's available to understand our biology, is we're shifting to an informatics-based approach to medicine. So instead of a hypothesis-driven approach – is this what's going wrong? Yes or no – we have an enormous amount of data telling us what's going on inside of your body, and the question is how to cultivate that data, combine that data and interpret that data to figure out what's going wrong. There's a massive paradigm shift. Putting together the right resources to make this happen is very crucial, and there are different components we need. One of them is networking, and the Canadian Institute for Advanced Research has been very helpful in providing networking opportunities. So I'm part of the Genetic Networks program, and also part of the Neuro-Computation program, and these programs have been excellent for bringing different people together and bringing world-leading experts together, to create new interdisciplinary programs of research. It enables us to ask and answer the most important questions that are facing genome biology and artificial intelligence today.

TODAY'S RESEARCH. TOMORROW'S REALITY.