Tiny protein ‘voices’ could offer big health clues, UVic team says

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University of Victoria engineering professor Reuven Gordon: “It’s been known for a long time that all proteins have characteristic sounds that distinguish them and make them all look different. We figured out a way to actually listen to them.” Photograph By University of Victoria

Proteins could have something to say about treating disease.

University of Victoria engineering professor Reuven Gordon says he and his group of researchers have found a way to hear the “voice” of proteins, something that could speed up the process of discovering drugs for diseases such as cystic fibrosis and cancer.

“It’s been known for a long time that all proteins have characteristic sounds that distinguish them and make them all look different,” Gordon said. “We figured out a way to actually listen to them.”

He said it was “kind of a crazy idea” that led to an exciting result, with the group recently producing a paper for the scientific publication Nature Photonics.

Gordon said they demonstrated that placing a protein between two lasers allowed the sound of vibrations to be pinpointed. A patent is being sought for the process, called extraordinary acoustic raman spectroscopy, or EAR.

“It’s like kind of a characteristic ID, a voice ID,” he said. “We can tell the difference between mutant and regular types of proteins.”

Learning about proteins holds big potential, Gordon said. “There’s a lot of different things we’re interested in attacking here. First of all, there’s a lot of diseases that relate to protein ‘misfolding.’

Proteins are strings of amino acids that are meant to form or fold in a certain way. Misfolded proteins can indicate a mutation like those found in cystic fibrosis or cancer, Gordon said.

“If you can go in and introduce some small molecule that corrects that misfolding, then you can correct the protein.”

Work is being done with Vertex Pharmaceuticals, which has already developed a cystic fibrosis drug through protein research.

The scale of what the UVic team is doing is infinitesimally small, with the proteins being used a couple of nanometres in size — “a million times smaller than an ant,” Gordon said.

As for the sounds created, “we have to bring down the frequency by a billion times to actually be able to hear them.”

“It’s still sound. A bat makes high-pitched sounds we can’t hear but you can still record them in some way.”

Gordon hopes that biochemists and others “who know how to ask the right questions” pick up on what has been done so far.

“We’re developing the tools, we’re engineers.”

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