

Dietary restrictions may benefit children with premature aging disease

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Zoe Gillespie studies how to slow down progeria, a disease that makes children age faster than normal. Credit: Dave Stobbe

Progeria, which develops from a rare genetic mutation, causes the same symptoms in children as in 80-year old people: brittle bones, longer

healing times, and heart disease, among others. Affecting randomly about one in every four million children worldwide, it usually leads to death around age 14 due to strokes or heart attacks.

USask Ph.D. student Zoe Gillespie tested metformin, a well-known treatment for type 2 diabetes, on [cells](#) of patients with [progeria](#). She showed that the [drug](#), which mimics a state of dietary restriction, improves the function and lifespan of cells—a finding that could also improve the quality of life of the elderly and people with obesity.

"I have found that the drug "tricks" the cells into thinking that the body is eating less, and puts them into a "saving energy" mode," said Gillespie. "At a patient level, this means that we could possibly help extend the lifespan of children affected by progeria and offer them a better quality of life because their cells function better."

Because cells "think" that there are fewer food nutrients available to use as energy "fuel," they go into a repair state where they break down and recycle already available cell materials including progerin, the protein that causes progeria. This would make cells not grow as fast and would help slow down the progression of the disease.

Gillespie has presented her results at international conferences in Germany and California.

The cells affected by progeria have irregular shapes that hinder their functions because the chromosomes, the "puzzle pieces" of genetic material inside the cells that tell cells what to do, are misplaced.

Gillespie has proven that the drug metformin has shown promising results for bringing the chromosomes back to their normal place, improving the shape and function of sick cells. This widely tested drug is also safe to use with minor side effects.

Gillespie said that metformin may not be the only way to improve the health of children with progeria.

"Because the drug produces a dietary restriction state, it may be enough to develop a special diet that reduces nutrient intake without causing malnutrition, and helps produce the same results as the drug," she said.

Gillespie and her supervisor Christopher Eskiw, USask food and bioproduct science professor, are at the center of a novel research field.

"Our research is unique because it considers the role of environment, in particular our diet, in influencing how our genetic material functions," said Eskiw. "Our research demonstrates that you can influence how genes are expressed using diet or drugs that imitate caloric restriction to increase health."

While the USask team's results are promising, the next step is to understand how and why metformin affects cells at genetic level, and to test it on mice and on healthy cells to study further the effects on people not affected by progeria.

Provided by University of Saskatchewan

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