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U of L post-doc examines long-term effects of environmental exposures during pregnancy, including glyphosate

Dr. Stephanie King, a post-doctoral fellow at the University of Lethbridge, has long been interested in the effects of stress on the developing fetus and how those effects show up in subsequent generations.

While a PhD student at Washington State University, King was involved in a study that looked into whether glyphosate, the primary ingredient in the herbicide Roundup, increased susceptibility to disease across several generations.



“Glyphosate has been a very controversial compound in the public eye, primarily due to the creation of genetically modified Roundup-resistant strains of vegetables and legumes, like corn and soy,” says King. “Many studies have found that glyphosate appears to be safe for single exposures. However, in 2019, there were several studies that called its safety into question.”

One study showed an increased risk of developing Non-Hodgkin’s lymphoma in individuals with prolonged high-dose exposure to glyphosate, such as agricultural workers. Another study found people living within one kilometre of where glyphosate was sprayed had an increased risk of dying from Parkinson’s disease below the age of 75.

“We really wanted to investigate things further, especially because it is a very contentious compound,” says King.

Pregnant rats were exposed to a single non-toxic dose of glyphosate during the time when the gonads — the testes and ovaries — were developing in the fetus. Then these rats were bred out for three generations, none of which had any exposure to glyphosate. The grandchildren and great-grandchildren of the rats who were initially exposed to glyphosate were then examined for various factors, such as size of litter, weight at weaning and any abnormalities. Among the results, the researchers found a significant increase in difficult labours in the female offspring of the second and third generations.

“Roughly one-third of the litters of the grandchildren and great-grandchildren had difficult labours that involved the death of the mother and/or her pups during birth or immediately after,” says King. “We also found an increase in prostate disease and ovarian disease. In our female animals, we identified an increased susceptibility to kidney disease and, in all animals, an increased risk for obesity.”

King says the results should be interpreted with caution, as it’s very difficult to prove the same with human exposures, since many different factors, including lifestyle, are at play.

“It will take some time and more studies before we can reach a scientific consensus,” she says. “One of the primary messages from this study is that it’s important to go beyond just looking at direct exposure. Future toxicological studies should also investigate potential effects on future generations, especially in-utero exposures.”

King is now continuing her work in Dr. Gerlinde Metz’s lab at the Canadian Centre for Behavioural Neuroscience. Specifically, she’s looking at the effects of ancestral stress on the fetus and the placenta.

“Pregnancy is already a stressful time. Traumas like domestic violence can really affect the outcome of a pregnancy,” she says.

King has found the great-grandchildren of rats who were exposed to stress as fetuses show differences in several molecular factors and those differences are reflected in both the placenta and the fetus.

“This is fascinating because normally they express very different things,” says King. “Theoretically, that means we could use the placenta as a biomarker to have an idea of shifts that could also be taking place in the fetal brain.”

This news release can be found online at [glyphosate research](#).

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