**Does eating GM crops harm the digestive tracts of rats?**

**A review of the scientific evidence.**

By Dr Judy Carman

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This is a briefing about a new, peer-reviewed scientific paper titled: GM crops and the rat digestive tract: A critical review, by Irena Zdziarski, Dr John Edwards, Dr Judy Carman and Dr Julie Haynes\*. The paper is a review done by researchers at the University of Adelaide, Flinders University and the Institute of Health and Environmental Research, all based in South Australia. The paper reviewed published studies where the health of rats was assessed after the rats were fed certain GM crops.

The most common types of GM crops are designed to do one of two things. The first type has a gene inserted into it (often the *EPSPS* gene) which causes the plant to make a new protein that allows the plant to survive being sprayed with a herbicide such as glyphosate. The most common of these are called Roundup Ready crops. The second type of crop has a gene inserted into it (often the *cry1Ab* or *cry3Bb1* genes) so that the plant makes a new protein that is an insecticide, so that when an insect eats the plant, the insect also eats the new insecticidal protein, which results in the insect dying. GM crops are often now grown with two or more of these genes in them at the same time.

We wanted to see how much evidence there was for the safety of crops containing these three genes for animals that eat them. We looked at the evidence for the digestive tract because this is the first place these new proteins go when they are eaten, and where they stay the longest. Therefore, if these new proteins are toxic to animals (and people) that eat them, it is most likely that the effects would be seen in the digestive tract. The digestive tract includes the stomach and intestines.

Because it is sometimes very difficult to see if there is damage to tissues without the aid of a microscope, we only considered evidence that involved looking through a microscope. These are called histopathology studies. We also only looked at studies done on rats as these animals are the standard animals used for these sorts of studies.

We found that there were 47 crop varieties approved by government regulators for animal or human consumption that contained these three GM genes. But we could only find published studies for 9 of these crop varieties. We could find no studies whatsoever for the other 38 approved varieties. This means that we could not find any published histopathology studies for 81% of the approved crop varieties.

Most of the studies were general health assessments of the GM crop on rat health but most of these (76%) were done after the crop had been approved for human or animal consumption, with half of these being published at least nine years after approval.

But what is worse is that we could not find a single study that was properly conducted or reported. Faults included: investigators were inconsistent or not transparent in their methods, investigators didn’t define what they considered to be a toxic or pathological finding, or they were not transparent in what they found. Many of the studies contained several such faults.

We therefore concluded that there is a lack of evidence to prove that these crop varieties are safe to eat. We also call for detailed guidelines to be developed for how histopathology studies should be done so that these studies can be done properly, studies between investigators can be compared, and the work of one investigator can be repeated by another. We also describe how these histopathology studies should include several specialised methods to better find the beginning of any pathological change. In this way, we can better determine if GM crops are safe for animals and people to eat.

\* Zdziarski IM, Edwards JW, Carman JA, Haynes JI. GM crops and the digestive tract: A critical review, Environment International (2014), http://dx.doi/10.1016/j.envint.2014.08.018.