Seralini study is given new life, but where's the new data?

June 25 2014

Gilles-Éric Séralini. Credit: Alberto Novi/Flickr, CC BY-NC-SA

A controversial 2012 paper on the effects of genetically modified (GM) maize and the herbicide glyphosate on tumour growth in rats – a paper

later retracted by the journal – has been republished, with minor modifications, in another journal, *Environmental Sciences Europe*.

When the paper by French molecular biologist Gilles-Éric Séralini and colleagues first appeared in Food and Chemical Toxicology, it prompted many letters to the journal criticising the quality of data and their interpretation.

In response, the Editor-in-Chief, A. Wallace Hayes, requested the authors provide him a set of the raw data so that he could review it in depth.

After analysing the complete dataset, the Editor-in-Chief formed the opinion that, because of the small sample size, no definitive conclusions could be reached.

He felt that, given the high incidence of tumours in aged rats of this strain, the possibility the differences observed were due to normal variability could not be excluded. He justified retracting the paper on the grounds that the results were inconclusive.

Séralini's team has said that this retraction was an example of censorship of research, but the retracted paper is still available from the journal's website. It is normal practice for retracted papers to remain available, but they are marked "retracted" to alert readers.

In my opinion, rather than retract the paper, the Editor-in-Chief should have published the complete dataset as part of an editorial note of concern, so that everyone can make up their own minds.

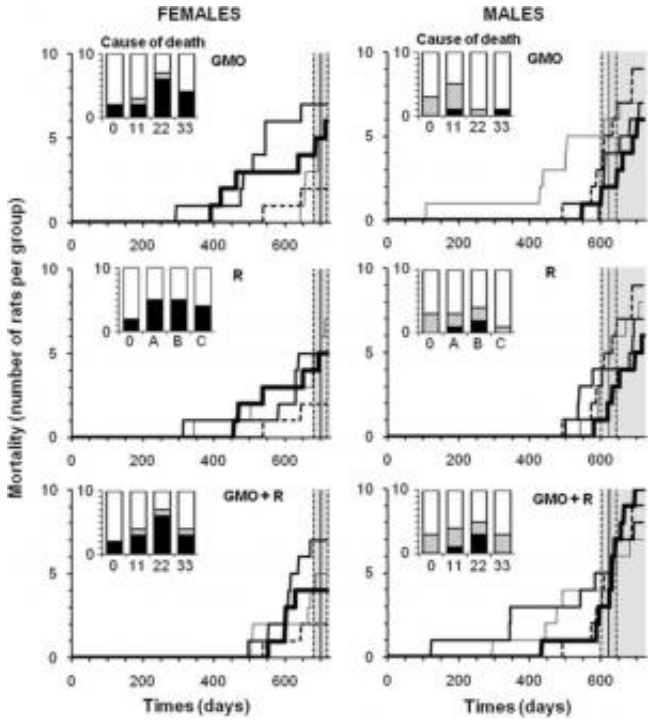
What's new in the republished paper?

In short, not much.

As the republished paper contains the same tables and figures as the original one (some of the figure numbering has been changed, and some of the text has been modified), the same criticisms made of the original paper can be made of the republished version.

Under normal laboratory conditions, 70 to 77% of male and 87 to 96% of female Sprague-Dawley rats develop tumours. None of the groups of rats studied by Séralini and colleagues had a lifespan or tumour incidence that was unusual for this strain of rats.

The authors did not determine the cause of death of all of the rats on the normal diet, but just assumed those that lived beyond 725 days died due to "ageing". This means that the experiments were not conducted in a blinded fashion, so that only the rats on an experimental diet were fully assessed. It introduced bias, because the control and experimental groups were treated and analysed differently.



Credit: Séralini et al. Environmental Sciences Europe 2014 26:14
doi:10.1186/s12302-014-0014-5, CC BY

Figure 6 (above) in the republished paper illustrates some of the problems with the data. The graphs in figure 6 show the cumulative mortality of each of the groups of 10 rats.

While the experimental lines differ for the groups fed differing amounts of GM maize or glyphosate, the controls (the dotted lines) are not grossly different from the other cohorts. The survival and tumour incidence for all the groups is similar to that seen under normal conditions.

Although the mortality of the controls looks very consistent, this is because the same lines for the controls are copied into each the three panels of male and female rats.

The mortality lines reflect deaths due to euthanasia as well as spontaneous deaths, so because the experiments were not blinded, it is possible the researchers had a higher threshold for killing a sick rat if they knew it was from the control group. And as there were only 10 control male and 10 control female rats in the entire experiment, a delay in the death of a single control animal would skew the whole study.

Furthermore, as all of the graphs finish at 725 days, it is impossible to tell what the overall survival was. If GM maize *increased* the longevity of some rats, we would never know.

Perhaps what is most disappointing is that the authors are republishing the same figures that previously appeared in Food and Chemical Toxicology. The original paper was published in September 2012, so the

intervening years could have been used to generate more, and better, data.

Instead of performing new experiments, in which more control animals were included, the animals were randomised and treated in an unbiased and blinded fashion, the results analysed with robust statistics, and the full dataset provided in the supplementary material, the authors have repackaged the same data as before, but have found a journal with lower standards for publication.

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