



## Pesticides: possible link to male infertility

**Many agricultural pesticides** used in Europe could disrupt male hormones and lead to infertility problems, according to laboratory tests. 'Biomonitoring' studies to investigate the actual behaviour of pesticides in the human body are now urgently needed to clarify the link between pesticide exposure and male reproductive health.

Male fertility is reported to be declining worldwide. Experimental evidence in the laboratory has linked the chemicals present in some pesticides to reduced sperm quality, testicular cancer and reproductive abnormalities. The chemicals work by "blocking" the activity of hormones, known as androgens, which influence the development of the male reproductive system. However, the majority of research has been carried out on pesticides that are now out of use.

The new study, conducted under the EU-funded CONTAMED project<sup>1</sup>, is the first to analyse the hormonal impact of the most commonly used pesticides in Europe. Although pesticides have to pass rigorous tests under EU law before they can be used commercially, their effect on hormonal activity is not yet sufficiently reflected in the test criteria.

The scientists studied 37 pesticides with a "high exposure risk" to humans, based on the concentration of the pesticide in European foods and estimated daily intake. A review of previous scientific studies revealed that 14 of the pesticides had previously been found to be hormone disruptors – or anti-androgens.

To test for anti-androgenic properties in all 37 pesticides, the '*luciferase*' gene of a firefly was injected into human cells which had been exposed to the pesticides. The firefly gene's behaviour is driven by androgen. If no anti-androgenic chemicals were present in the cells, the gene triggered a light. However, where anti-androgenic chemicals were present, they "switched off" the gene by blocking hormonal activity and no light was produced. The scientists used the amount of light emitted when the cells were exposed to varying concentrations of the pesticides to quantify their hormone-disrupting capability.

Of the 37 pesticides tested, 23 were found clearly to be anti-androgens using this method. This confirmed those that had been identified in previous studies, but importantly also highlighted nine new ones (dimethomorph, fenhexamid, quinoxifen, cyprodinil,  $\lambda$ -cyhalothrin, pyrimethanil, fludioxonil, azinphos-methyl, pirimiphos-methyl). Most were fungicides, which can be found in large quantities on food for a long time after harvesting. Also of significance, the study found that the Quantitative Structure-Activity Relationship (QSAR) method, used to predict the likelihood of hormone disruption, underestimated the risks for some pesticides. This could have important consequences for use of this technique in the future.

EU regulations permitting the use of several of these pesticides expired during the study period (2005-2010) (procymidone, prochloraz, vinclozolin, ethoxyquin, endosulfan, azinphos-methyl, bromopropylate, dicofol, and fenitrothion). However, at least one of the suggested replacements is found in this study to be a hormone-disruptor, for example, a pesticide formulation that contains cyprodinil and fludioxonil. Screening for hormone-disruption urgently needs to become compulsory for all existing *and* proposed pesticides, say the researchers.

Despite this strong laboratory evidence, there is still a very poor understanding of the risk to human reproductive health, since there are virtually no studies that monitor pesticide behaviour once in the human body, known as 'biomonitoring' studies. The real world impact is likely to be more complicated than under laboratory conditions, because pesticides may behave differently when combined with other chemicals within the body.

1. CONTAMED (Contaminant mixtures and human reproductive health – novel strategies for health impact and risk assessment of endocrine disruptors) is supported by the European Commission under the Seventh Framework Programme. See: [www.contamed.eu](http://www.contamed.eu)

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