

## 'Gender-bending' chemicals found to 'feminise' boys [Click to Print](#)

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Andy Coghlan

“Gender-bending” chemicals mimicking the female hormone oestrogen can disrupt the development of baby boys, suggests the first evidence linking certain chemicals in everyday plastics to effects in humans. ■

The chemicals implicated are phthalates, which make plastics more pliable in many cosmetics, toys, baby-feeding bottles and paints and can leak into water and food.

All previous studies suggesting these chemicals blunt the influence of the male hormone testosterone on healthy development of males have been in animals.

“This research highlights the need for tougher controls of gender-bending chemicals,” says Gwynne Lyons, toxics adviser to the WWF, UK. Otherwise, “wildlife and baby boys will be the losers”.

The incriminating findings came from a study of 85 baby boys born to women exposed to everyday levels of phthalates during pregnancy. It was carried out by Shanna Swan at the University of Rochester School of Medicine and Dentistry, New York, US, and colleagues.

As an index of feminisation, she measured the “anogenital distance” (AGD) between the anus and to the base of the penis. She also measured the volume of each boy’s penis. Earlier studies have shown that the AGD is twice in boys what it is in girls, mainly because in boys the hormone testosterone extends the length of the perineum separating the anus from the testicles.

### Undescended testicles

In animals, AGD is reduced by phthalates - which mimic oestrogen - which keep testosterone from doing its normal job. At higher doses, animals develop more serious abnormalities such as undescended testicles and misplaced openings to the urethra on the penis - a group of symptoms called “phthalate syndrome” in animals.

When Swan’s team measured concentrations of nine phthalate metabolites in the urine of pregnant women, they found that four were linked with shorter AGD in sons born to women showing high exposure levels.

Although none of the boys developed abnormal genitals, the quarter of mothers who were exposed to the highest concentrations of phthalates were much more likely to have had boys with short AGDs compared with the quarter of mothers who had the lowest exposures to the chemicals.

And although all the boys had genitals classified as “normal”, 21% of the boys with short AGDs had incomplete testicular descent, compared with 8% of other boys. And on average, the smaller the AGD, the smaller the penis.

## Changing masculinisation

Swan believes that at higher exposures, boys may suffer from testicular dysgenesis syndrome - the human collection of more serious abnormalities which corresponds to “phthalate syndrome”.

“We’re not exactly seeing testicular dysgenesis syndrome, but a cluster of endpoints consistent with it,” said Swan on at an international conference on Endocrine Disrupting Chemicals in San Diego, US.

“If you see this, you’re very likely to see every other aspect of masculinisation changed too,” says Fred vom Saal, professor of reproductive biology at the University of Missouri-Columbia, US.

Vom Saal says this could include behavioural changes like those seen in animals, including an aversion to “rough-and-tumble” play and a reduction in aggressiveness.

## Criticising methods

Environmentalists say the results strengthen the case for a ban or restriction on some phthalates in baby toys, as has been proposed in Europe and California.

But phthalate manufacturers maintain that the chemicals have been thoroughly tested and are safe. They are also critical of aspects of the study. David Cadogan, director of the European Council for Plasticisers and Intermediates, points out that just one urine sample was taken from each pregnant woman, which cannot rule out drastic variations in exposure over time.

Also, he says that all AGD measurements should have been taken in babies exactly the same age, not in babies ranging from three to 24 months in age as in the study. The disparity in ages meant that complicated mathematical analyses had to be applied which may have made it more difficult to distinguish genuine differences in AGD from differences accounted for by age or weight.

Swan’s results will appear in the journal *Environmental Health Perspectives*.

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## Weblinks

Shanna Swan, University of Rochester

<http://www.fcm.missouri.edu/faculty/swan.html>

Endocrine Society Forum on Endocrine Disrupting Chemicals

<http://www.endo-society.org/educationevents/annual/2005/disrupting-chemicals.cfm>

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Environmental Health Perspectives

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