

Smoking causes asthma in second generation offspring

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The dangers of smoking on smokers and their children are widely known but new research published in BioMed Central's open access journal *BMC Medicine* demonstrates that nicotine exposure also causes asthma in the smoker's grandchildren.

Asthma is a major public health problem. It is the most common chronic disease of childhood. While there are many factors which contribute to asthma maternal smoking during pregnancy is a well known, and avoidable, risk.

During pregnancy nicotine can affect a developing foetus' lungs, predisposing the infant to [childhood asthma](#). Researchers from Harbor-UCLA Medical Centre, California, tested the effect of [nicotine exposure](#) during pregnancy on rats, looking not only at their pups (F1) but also at second generation pups (F2).

Exposure inside the uterus resulted in both male and female (F1) offspring having reduced lung function consistent with asthma. It also impaired lung function of their own offspring (F2), even though the F1 rats were not themselves exposed to nicotine once they were born. Levels of proteins increased by maternal smoking in the lungs of their offspring such as fibronectin, collagen and nicotinic acetylcholine receptors, were also found to be raised in the grandchildren. Similarly the expression of PPAR γ , a normal [lung development](#), was reduced in first and second generation offspring.

Dr Virender Rehan, who led this study commented, "When we looked at the effect of nicotine on DNA in the testes or ovaries of the rats they found that nicotine increased the level of methylation in the testes but reduced it in the ovaries. Nicotine also altered methylation of histones in a sex-dependent manner. These epigenetic marks may be the mechanism behind how nicotine-induced asthma is transmitted from one generation to the next."

Treating the mothers with a synthetic version of PPAR γ , known to normalise lung function in nicotine exposed offspring also prevented [lung damage](#) to F2 offspring and restored normal histone modification patterns in their lungs.

The effects of smoking during pregnancy are, it seems, very long lasting. Stop smoking education and intervention aimed at mothers-to-be and women planning pregnancy needs to take into account the fact that nicotine itself contains dangers to their children and their children's children.

Provided by BioMed Central

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