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Link Between Smoking In Pregnancy And Sudden Infant Death Syndrome Explained

ScienceDaily (Jan. 29, 2008) — A new study sheds light on the relationship between women who smoke while pregnant--or are exposed to second-hand smoke--and an increased risk of SIDS to their babies.

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Researchers at McMaster University have found a mechanism that explains why an infant's ability to respond to oxygen deprivation after birth--or a hypoxic episode--is dramatically compromised by exposure to nicotine in the womb, even light to moderate amounts.

"While cigarette smoke contains many different compounds, we found there is a direct impact of one component, nicotine, on the ability of certain cells to detect and respond to oxygen deprivation," says Josef Buttigieg, lead author and a PhD graduate student in the department of Biology. "When a baby is lying face down in bed, for example, it should sense a reduction in oxygen

and move its head. But this arousal mechanism doesn't work as it should in babies exposed to nicotine during pregnancy."

The research, which was conducted on laboratory rats in collaboration with Dr. Alison Holloway, explains the critical role that catecholamines--a group of hormones released by the adrenal glands--play in a baby's transition to the outside world.

During birth, the baby is exposed to low oxygen, which signals the adrenal glands to release the catecholamines, which contain adrenaline, or the 'fight or flight' hormone, explains Buttigieg.

It is these catecholamines that signal the baby's lungs to reabsorb fluid, to take its first breath, and help the heart to beat more efficiently. And for some months after birth, the adrenal gland still acts as an oxygen sensor, aiding in the baby's arousal and breathing responses during periods of apnea or asphyxia. But the ability to release catecholamines during these moments--a critical event in the adaptation of life outside the womb--is impaired due to nicotine exposure.

"At birth, the nervous control of the adrenal gland is not active and so a baby relies on these direct oxygen sensing mechanisms to release catecholamines," says Colin Nurse,



Josef Buttigieg, a PhD student in the Department of Biology, and his academic advisor, Colin Nurse, professor in the Department of Biology. (Credit: Photo by Susan Bubak)

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academic advisor on the study and a professor in the department of Biology. "But nicotine causes premature loss of these mechanisms, which would normally occur later in development after nervous control is established. Thus, the infant becomes much more vulnerable to SIDS."

The findings are published online in the journal Federation of American Societies for Experimental Biology (FASEB) and will appear in the May 2008 print issue.

The study was funded in part by the Heart & Stroke Foundation of Ontario, Canadian Institutes of Health Research, and Focus on Stroke.

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