

# Researchers discover adverse effects of Bisphenol A on calcium channels

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(Medical Xpress)—Bisphenol A, a substance found in many synthetic products, is considered to be harmful, particularly, for fetuses and babies. Researchers from the University of Bonn have now shown in experiments on cells from human and mouse tissue that this environmental chemical blocks calcium channels in cell membranes. Similar effects are elicited by drugs used to treat high blood pressure and cardiac arrhythmia. The results are now presented in the journal *Molecular Pharmacology*.

The industrial chemical bisphenol A (BPA) is worldwide extensively utilized for manufacturing polycarbonates and synthetic resins. "This substance has been shown to affect the hormonal system and may have negative effects on the function of enzymes and carrier proteins," reports Prof. Dr. Dieter Swandulla from the Institute of Physiology II at the University of Bonn. BPA is associated with heart disease, diabetes, obesity, cancer, and neurological dysfunction. "It seems that fetuses and newborns are particularly sensitive to BPA," adds the physiologist. Due to its unpredictable effects, the EU Commission banned the use of BPA in baby bottles in 2011 as a precaution.

## **Bisphenol A blocks multiple essential calcium channels**

The team of researchers around Prof. Swandulla now reports that BPA reversibly blocks calcium channels essential for cell function in mouse

and [human cells](#). [Calcium ions](#) flowing through these pore-like so-called channel proteins into living cells, control e.g. the contraction of [heart muscle cells](#), the activity of enzymes, and the communication of [nerve cells](#) with each other. "Drugs such as those used to treat high blood pressure and cardiac arrhythmia on the one hand, and neurotoxins, such as [heavy metals](#), on the other hand act on exactly the same calcium channels," explains the physiologist from the University of Bonn. "This indicates that BPA can indeed have adverse effects on human health." Since BPA binds to the [calcium channels](#) reversibly, there is at least the possibility of the chemical being eliminated from the body.

## **Bisphenol A and its derivatives are ubiquitous**

Nowadays BPA and its related substances can be detected almost everywhere in the environment. Effective doses are found in CD's, paper money, thermal paper, food cans, dental fillings and flame retardants, even in the breathing air and in house dust. Humans are meanwhile chronically exposed to these compounds. "This is why it would be desirable to completely stop the production of BPA," says Prof. Swandulla. "Due to the high-volume production and its widespread occurrence, it would, however, take a very long time to remove this chemical from the environment and the human organism." Consequently, alternatives to BPA should be utilized which are harmless to humans and other organisms.

**More information:** Bisphenol A inhibits voltage-activated Ca<sup>2+</sup> channels in vitro: mechanisms and structural requirements, *Molecular Pharmacology*, [DOI: 10.1124/mol.112.081372](https://doi.org/10.1124/mol.112.081372)

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