New technology may help identify safe alternatives to BPA

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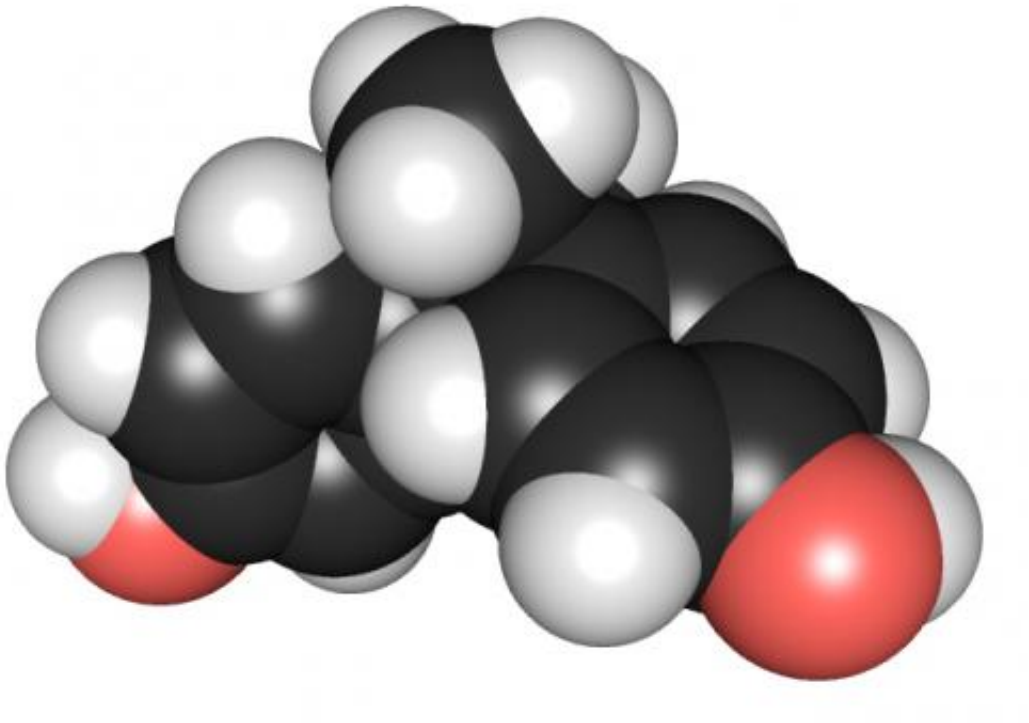

3D chemical structure of bisphenol A. Credit: Edgar181 via Wikimedia Commons

Numerous studies have linked exposure to bisphenol A (BPA) in plastic, receipt paper, toys, and other products with various health problems from poor growth to cancer, and the FDA has been supporting efforts to find and use alternatives. But are these alternatives safer? Researchers

reporting in the Cell Press journal *Chemistry & Biology* have developed new tests that can classify such compounds' activity with great detail and speed. The advance could offer a fast and cost-effective way to identify safe replacements for BPA.

Millions of tons of BPA and related compounds are produced each year. "I think it is fair to say that many of these BPA analogs have not been thoroughly tested, yet they are used in everyday plastics such as water bottles, baby bottles, and the lining of canned goods." says lead author Dr. Fabio Stossi of Baylor College of Medicine.

BPA and BPA analogs belong to a class of compounds called endocrine disruptors, so named because they can interfere with the body's endocrine, or hormonal, system. Using their newly developed assays on living cells, Dr. Stossi and his colleagues characterized how 18 different BPA analogs affect alpha and beta estrogen receptors, which are the primary targets of this class of chemicals. Their studies were conducted using high throughput microscopy and automated image analysis in different cell line models, with varying exposures to BPA analogs.

The investigators were able to record and analyze massive data sets related to BPA analogs. "The high throughput approach that we've refined during the past several years can simultaneously quantify what these compounds are doing to a wide range of processes such as protein levels, nuclear trafficking, DNA binding, protein interactions, transcription, cell cycle, and proliferation," says senior author Dr. Michael A. Mancini, of Baylor and the Texas A&M Health Science Center Institute of Biosciences and Technology (IBT). "The results showed us that various BPA analogs increased or decreased certain receptor activities, while others were receptor specific; clearly, the various BPA analogs can have unique properties."

The investigators found that many BPA analogs have inhibitory effects

on the beta form of the estrogen receptor, a less well-studied steroid receptor that has tumor fighting properties. Many analogs also acted to stimulate the alpha form of the estrogen receptor or they had mixed inhibitory and stimulatory effects. Determining precisely how these effects influence human health will require additional research. "These studies represent a breakthrough in our ability to focus precious resources on those BPA analogs and other endocrine disrupting chemicals of greatest concern," says coauthor Dr. Cheryl Walker of the IBT.

The scientists note that there are likely many more BPA-like compounds that can be found in products and in the environment. The widely applicable technologies used in the study will enable investigators to rapidly test such compounds for any unexpected or undesirable properties.

More information: *Chemistry & Biology*, Stossi et al.: "Defining Estrogenic Mechanisms of Bisphenol A Analogs through High Throughput Microscopy-based Contextual Assays." www.cell.com/chemistry-biology … 1074-5521(14)00147-1

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