ENDOCRINE SOCIETY

Evaluation of the Rapid Actions of Bisphenol S (BPS) in the Heart: Impact on Arrhythmogenesis and Cardiac Ca2+ Handling

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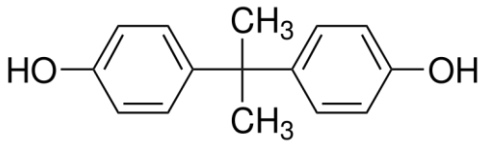
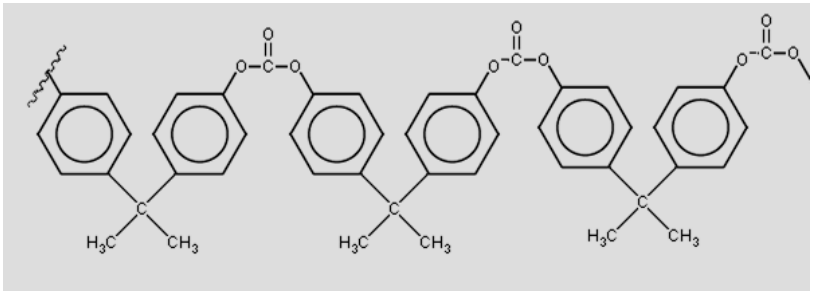
Bisphenol A (BPA): an environmental endocrine disruptor

- BPA is used in the manufacture of polycarbonate plastic, epoxy resins, and as an additive to other plastics and rubber;
- There is well documented and wide spread human exposure to BPA;
- Extensive epidemiological and experimental evidence suggests a potential link between BPA exposure and several adverse health outcomes, including **cardiovascular diseases**.

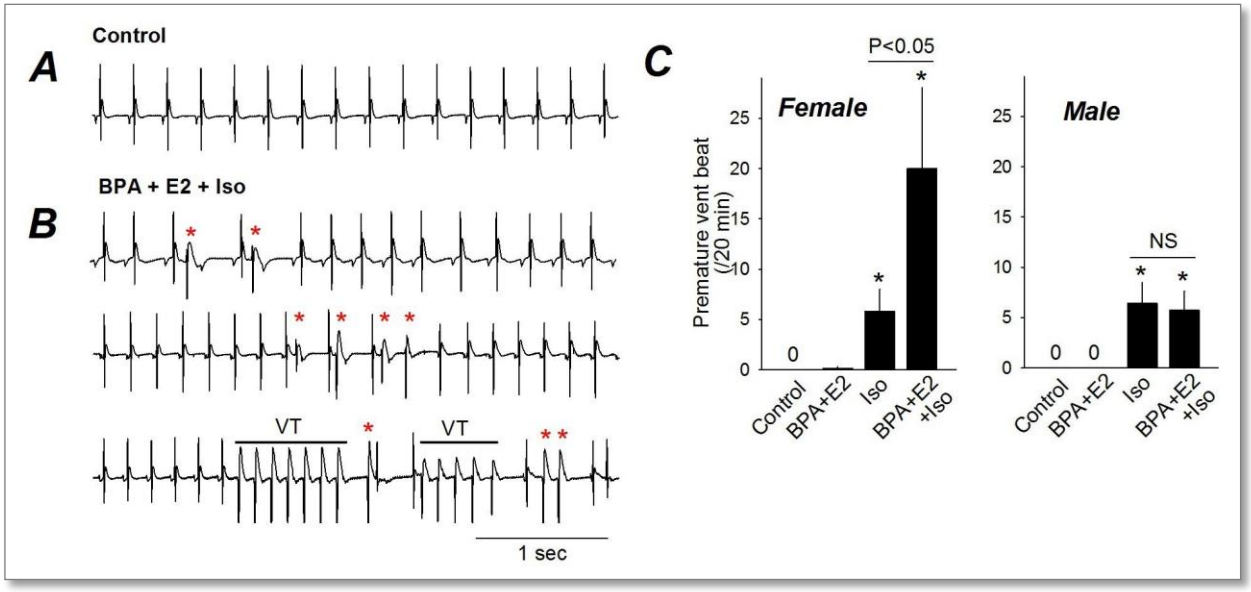


BPA



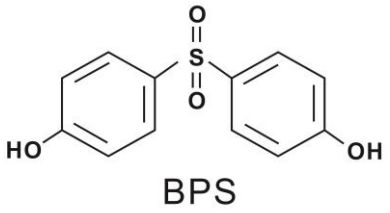
PC

In previous studies, we reported the rapid pro-arrhythmic effect of low dose BPA in female heart and underlying mechanisms

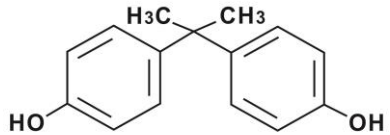


Yan et al, PloS One 2011
Yan et al, Food Chem Tox, 2013
Gao et al, Endocrinology, 2013
Liang et al, EHP, 2014

Bisphenol S (BPS): a BPA substitute used in some "BPA free" plastics and thermal papers



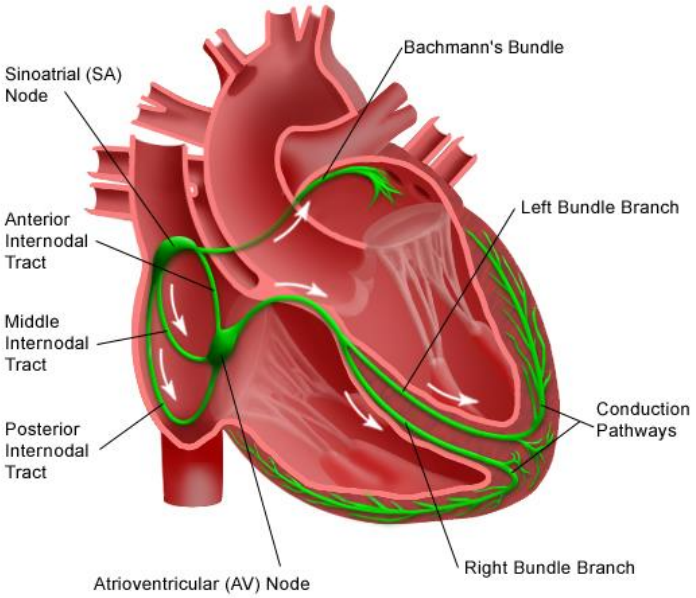
BPS



BPA

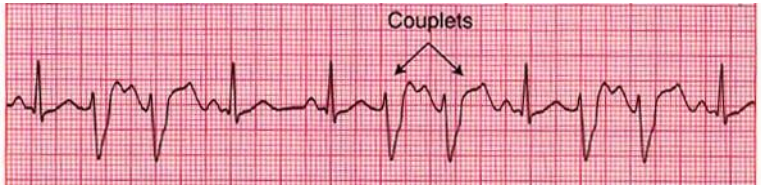
- BPS is detected in 80% of urine samples from US and Asian populations; mean concentration 2.6 nM (Liao et al, 2012);
- Limited but growing evidence suggests that BPS has potential endocrine disrupting activities;
- **The impact of BPS in mammalian native cells or organs is unknown – *Question: is BPS a safer alternative to BPA?***

Arrhythmia – Abnormality of the heart's electric rhythm



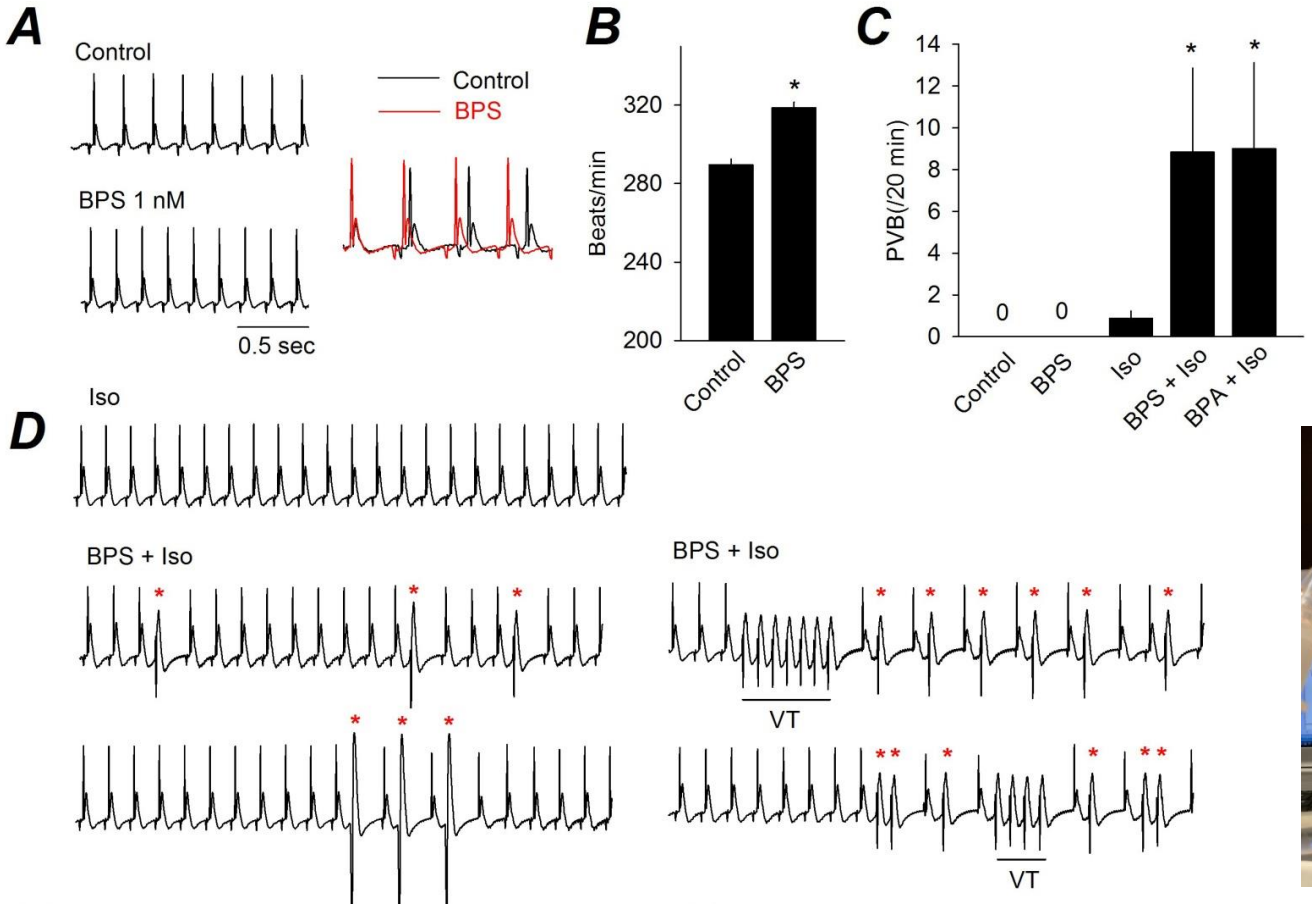
Normal rhythm

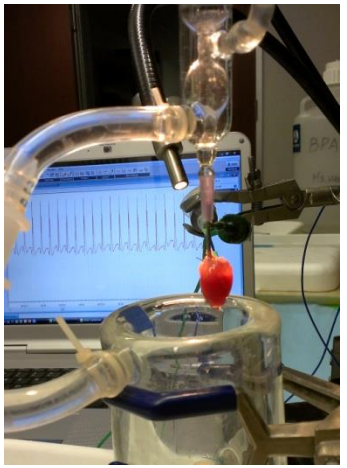
Premature ventricular beats



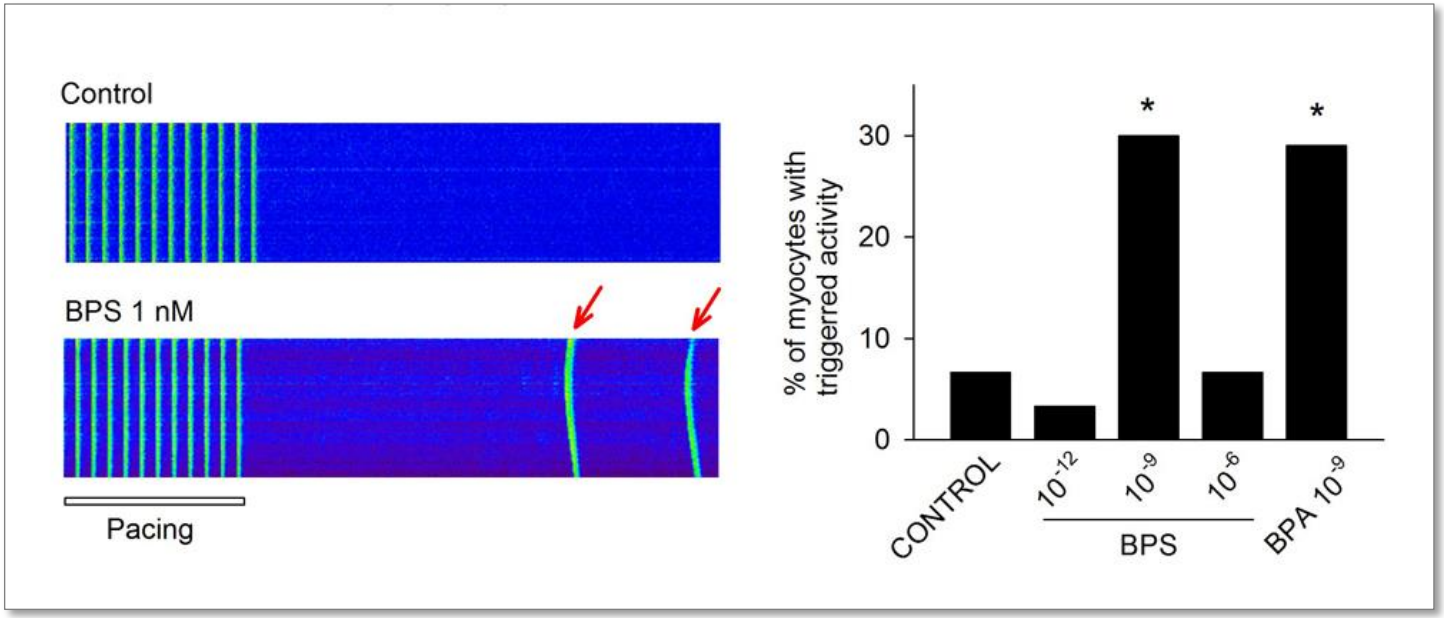
Ventricular tachycardia

Acute exposure to low dose BPS rapidly promoted *ventricular arrhythmias* in <u>female</u> rat hearts under stress condition

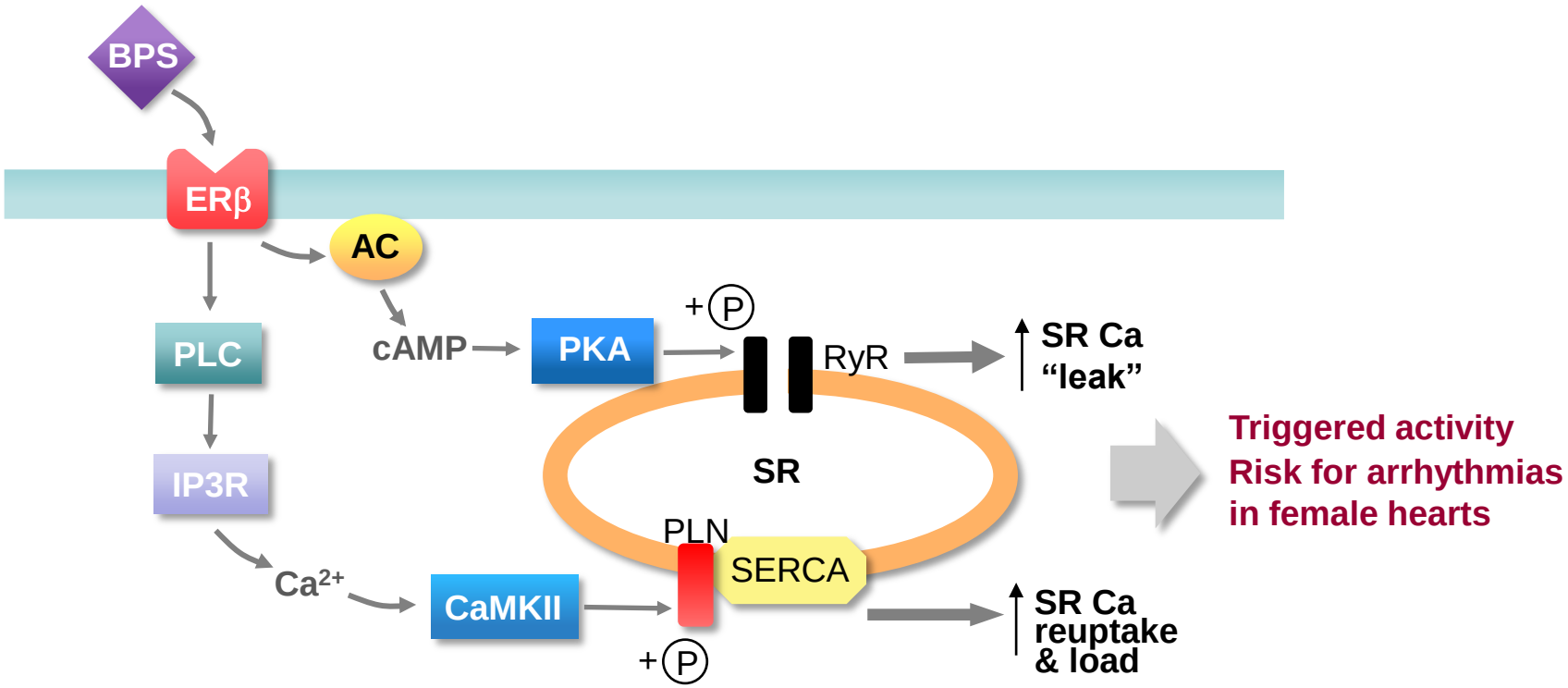




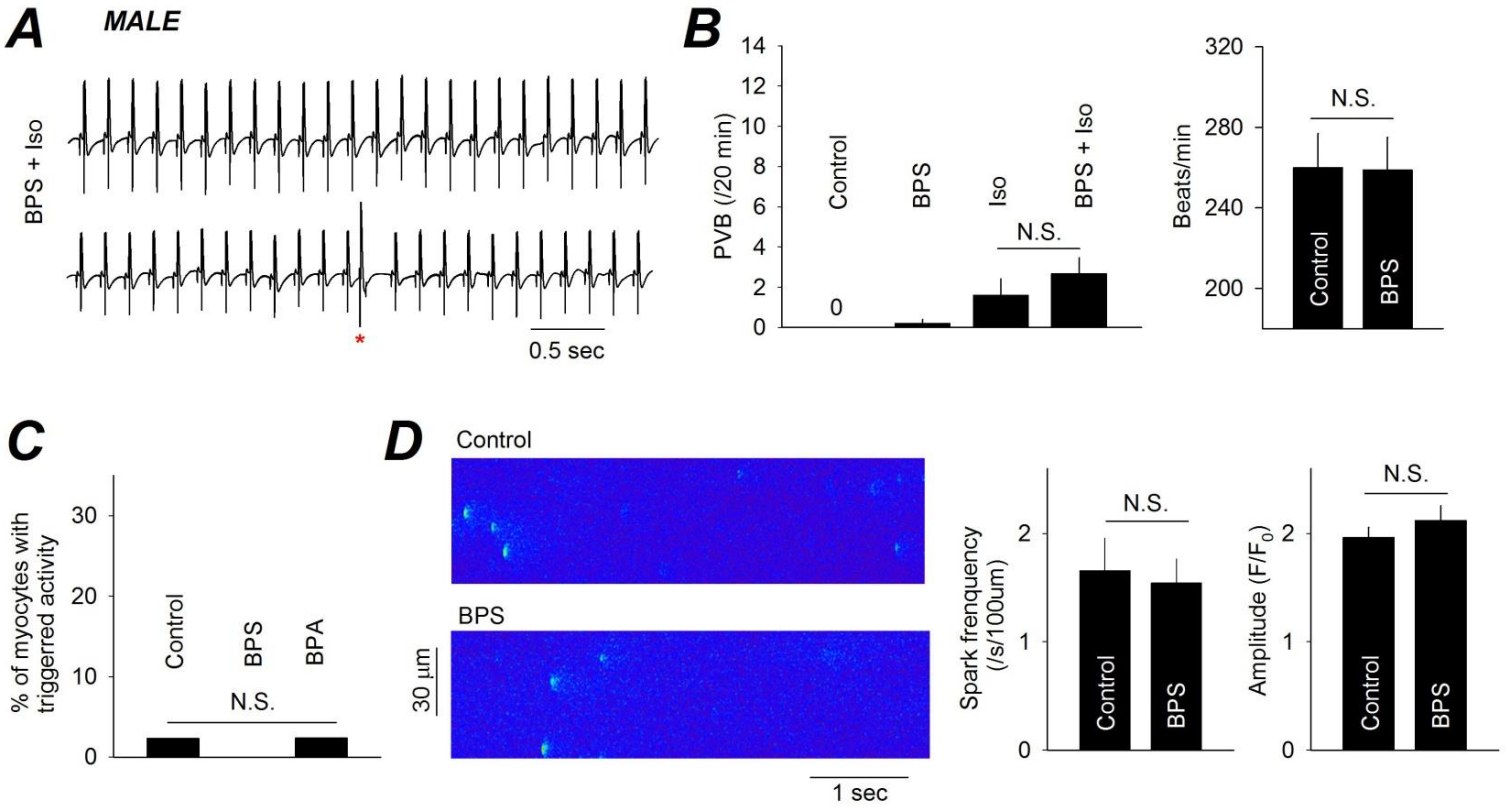
Acute exposure to low dose BPS rapidly promoted the development of aberrant spontaneous beats in cardiac cells from female rat heart



Cellular and Molecular mechanisms underlying the pro-arrhythmic actions of BPS - rapidly alteration of normal cardiac myocyte Ca2+ handling



The pro-arrhythmic impact of BPS in rat hearts was female-specific; male rat hearts were not affected



Summary

- Rapid exposure to low-dose BPS has pro-arrhythmic impact on female rat hearts through alteration of myocyte Ca^{2+} handling;
- The cardiac actions of BPS are similar to those previously reported for BPA;
- BPS, and possibly other BPA substitutes, may share similar endocrine disrupting activities as BPA;
- Comprehensive evaluate of the bioactivity and safety of these chemicals is necessary before they are used in consumer goods.

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