

POSTER PRESENTATION

Open Access

# 17 $\beta$ -estradiol and methylation of migraine-related genes

S Labruijere\*, M Verbiest, R De Vries, AHJ Danser, AG Uitterlinden, L Stolk, A MaassenVanDenBrink

From The European Headache and Migraine Trust International Congress  
London, UK. 20-23 September 2012

Migraine is much more common in women than in men, especially during the reproductive part of their lives. Fluctuations in the female hormone 17 $\beta$ -estradiol throughout the menstrual cycle are thought to be an important factor in causing migraine attacks in women. Although it has been shown that 17 $\beta$ -estradiol can change vascular sensitivity to CGRP, it is still unknown how 17 $\beta$ -estradiol causes these effects. GWAS studies have identified genes that may be relevant for migraine, but an influence of environmental factors is likely. Interestingly, the prophylactic effectivity of valproate, a DNA methylation inhibitor, may point to the involvement of epigenetic mechanisms in migraine. 17 $\beta$ -estradiol is known to be involved in epigenetic mechanisms and recently it was shown that CGRP can be regulated via epigenetic mechanisms. Therefore, the aim of this study was to investigate the role of 17 $\beta$ -estradiol in the methylation of migraine-related genes. Female SD rats were ovariectomized (ovx) and treated with 17 $\beta$ -estradiol or placebo pellets. DNA was isolated from blood, aorta, dura mater, trigeminal caudal nucleus and trigeminal ganglion. PCR was performed for 10 migraine- and female hormone-related genes (MTHFR, eNOS, ESR1, GPER, CGRP, USF1, USF2, RAMP1, CRCP and CRLR) and DNA methylation was assessed through bisulfite treatment and sequenom mass spectrometry. No difference in DNA methylation was seen between control animals, ovx placebo-treated or ovx 17 $\beta$ -estradiol-treated animals for the MTHFR, GPER, eNOS, CGRP, USF1 and USF2 genes. Tissue-specific differences in methylation were seen for the ESR1, CRCP, eNOS and CRLR genes. Remarkably, our results point to an increase in methylation of the CRCP gene in the trigeminal caudal nucleus in the 17 $\beta$ -estradiol-treated animals. These results indicate a possible epigenetic

regulatory mechanism for one part of the CGRP receptor in the trigeminal caudal nucleus.

Published: 21 February 2013

#### Reference

1. Park KY, et al: Epigenetic regulation of the calcitonin gene-related peptide gene in trigeminal glia. *Cephalalgia* 2011, **31**(5):614-24.

doi:10.1186/1129-2377-14-S1-P29

**Cite this article as:** Labruijere et al: 17 $\beta$ -estradiol and methylation of migraine-related genes. *The Journal of Headache and Pain* 2013 **14**(Suppl 1):P29.

### Submit your manuscript to a SpringerOpen<sup>®</sup> journal and benefit from:

- Convenient online submission
- Rigorous peer review
- Immediate publication on acceptance
- Open access: articles freely available online
- High visibility within the field
- Retaining the copyright to your article

Submit your next manuscript at ► [springeropen.com](http://springeropen.com)

Erasmus Medical Center, Netherlands

 SpringerOpen

© 2013 Labruijere et al; licensee Springer. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/2.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.