PWE-081

IDENTIFYING HUMAN BIOMARKERS OF NAUSEA FOR REFINING ANIMAL STUDIES ON EMESIS

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Introduction The lack of objective biomarkers to assess nausea and susceptibility in humans makes clinical decisions difficult. Furthermore, animal studies unable to identify nausea well is potentially an animal welfare issue. We aim to study the psychophysiological and brain processing response to a novel method of nausea induction.

Methods 10-min video inducing motion sickness and control were used (51 healthy volunteers; age 27 ± 8 years, 22 male) with tests of motion sickness and psychological questionnaires; cardiac sympathetic (cardiac sympathetic index CSI, heart rate HR, mean blood pressure MBP) and parasympathetic (cardiac vagal tone CVT, cardiac sensitivity to baroreceptor reflex CSB) measures; cortisol levels and electrogastrogram (EGG). 9 susceptible subjects had same stimuli again (age 25 ± 5 years, 5 male) with functional MRI analysed with XBAM.

Results All subjects completed without vomiting. Comparing nausea video (NA) to control, NA increased nausea (nausea VAS +57%±11, p<0.01). Furthermore, NA raised sympathetic (HR +4.04±0.94, p<0.01; SBP +2.4±1.75, p=0.18; DBP +2.23±0.98, p<0.05; MBP +2.28±1.12, p<0.05) and lowered parasympathetic activity (CVT −1.36±0.49, p<0.01; CSB −1.27±0.61, p<0.05); raised dominant frequency (EGG 3.0±0.04 vs 2.8±0.05, p<0.02). Comparing nausea susceptible versus resistant, moderate to severe nausea lowered CVT and CSB; raised HR; raised cortisol; reduced EGG dominant power (% change from baseline −20.6±7.7 vs −11.2±0.8, p<0.01; −25.1±9.4 vs 8.2±10.7, p<0.05; 10.4±3.4 vs 0.8±2.2, p<0.05; 16.9±20.2 vs −28.5±4.9, p<0.05; −2.81±1.36 vs −0.17±0.93, p<0.01, respectively). 9 susceptible subjects (fMRI) comparing nausea video to control, show correlations to nausea levels with raised brain activity in the inferior frontal gyrus (p<0.01) and temporal lobe (p<0.01) and reduced brain activity in multiple areas of the occipital lobe (p<0.01) and cerebellum (p<0.05).

Conclusion This model is safe and effective. Nausea susceptible subjects show lowered CVT and CSB; raised HR; raised cortisol; reduced dominant power on EGG from baseline compared to resistant subjects. Nausea susceptible show different brain processing patterns in the NA compared to control. These biomarkers can then be used for reverse translation in animals to potentially improve animal models as well as reduce animal suffering from undetected nausea.

Competing interests None.