Proceedings of the Nutrition Society (2010), **69 (OCE4)**, E338 doi:10.1017/S0029665110001473

Winter Meeting, 15 December 2009, Food supply and quality in a climate-changed world

Gender differences in the relative abundance of RGS2 mRNA in brain-stem, cortex, cerebellum and midbrain and the effects of chronic alcohol feeding

T. Nakahara[1], K. Hashimoto[1], M. Hirano[1], R. Rajendram[2], C. R. Martin[3], Ar[4] and V. R. Preedy[2]
[1]*National Hospital Organization, Hizen Psychiatric Center, Kanzaki, Saga 842–0192, Japan,* [2]*Nutritional Sciences Division, King's College London, London SE1 9NU, UK,* [3]*School of Health, Nursing and Midwifery, University of the West of Scotland, Ayr KA8 0SR, UK and* [4]*Centre for Health Service Studies, University of Kent, Canterbury, Kent CT2 7PD, UK*

The regulator of G-protein signalling (RGS) family of proteins has contributory roles in cellular biochemistry and function. In the brain, RGS2, for example, acts as a GTPase, modulates dopamine function and serves as a "negative regulator" of synaptic plasticity(1). It also suppresses protein synthesis by binding one of the subunits of eukaryotic initiation factor 2B(2). We hypothesised that RGS2 gene expression shows regional and gender variation and may be up-regulated by alcohol feeding. To test these hypotheses, we measured RGS2 mRNA in a well-validated rat model of alcohol exposure where male or female Wistar rats were fed nutritionally complete liquid diets containing ethanol as 35% of total dietary energy. Controls were pair-fed identical amounts of the same diet in which ethanol was replaced by isocaloric glucose. At the end of 6 weeks, the rats were killed and the midbrain, cortex, brain-stem and cerebellum were dissected. The relative abundance of mRNAs encoding RGS2 was then measured by quantitative RT–PCR relative to beta-actin. Data were analysed by two-way ANOVA and posteriori simple effects analysis. The results showed that the levels of RGS2 mRNA in male rats were similar in brain-stem, cerebellum and midbrain, i.e., approx 0.4 densitometric units but in the cortex levels were approx. 0.8 densitometric units. However, in the cortex there was no effect of either gender or alcohol. In both the midbrain and cerebellum higher RGS2 levels were observed in brains of female rats ($P<0.05$ in both instances). In the brain-stem, a statistically significant main effect of gender ($F(1,32)=6.19$, $P=0.02$), was observed with the female group having higher levels of RGS2 mRNA than the male group (Fig. 1). A posteriori simple effects analysis was conducted to reveal a borderline statistically significant difference, ($F(1,35)=3.73$, $P=0.06$), between female groups with the control female group having higher levels of RGS2 mRNA than the alcoholic female group. A further posteriori simple effects analysis revealed a highly statistically significant difference, ($F(1,35)=9.46$, $P<0.01$), between the male and female control groups. In conclusion, there are significant regional and gender differences in the levels of RGS2 mRNA but alcohol feeding has very little effect.

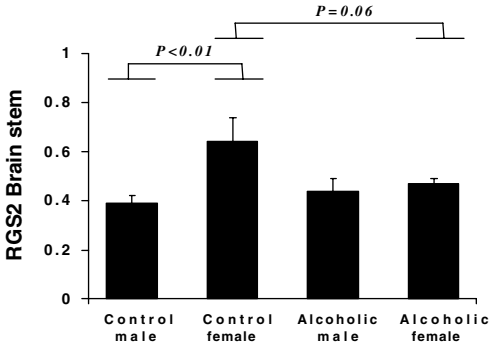

Fig. 1. Relative levels of RGS2 mRNA. Male and female rats were fed nutritionally complete liquid diets containing ethanol or isocaloric glucose and after 6 weeks the relative levels of mRNA encoding RGS2 were analysed by quantitative RT–PCR. Data are presented as a ratio of beta-actin mRNA and are expressed as means ± SEM for 8–10 observations in each group.

1. Hutchison RM, Chidiac P & Leung LS (2009) *Hippocampus* **19**, 687–691.
2. Nguyen CH, Ming H, Zhao P *et al.* (2009) *J Cell Biol* **186**, 755–765.