

## D12-41

**BRAIN-BEHAVIOURAL LATERALIZATION IN HONEYBEES: ODOUR DEPENDENT ASYMMETRY AND A FIRST MORPHOLOGICAL COMPARISON OF THE PRIMARY OLFACTORY CENTRE***E. Rigosi<sup>(1,2)</sup>, E. Frasnelli<sup>(3)</sup>, G. Anfora<sup>(1)</sup>, G. Vallortigara<sup>(2)</sup>, A. Haase<sup>(4)</sup>*<sup>(1)</sup> IASMA Research and Innovation Center, Fondazione E. Mach, Italy.<sup>(2)</sup> CIMEC, Centre for Mind/Brain Sciences, Università degli Studi di Trento, Rovereto, Italy.<sup>(3)</sup> Konrad Lorenz Institute for Evolution and Cognition Research, Altenberg, Austria.<sup>(4)</sup> BIOTech, Biomedical Technology Research Center, University of Trento, Mattarello, Italy.

Recently, a striking lateralization in the recall of odour memories was revealed in the honeybee, *Apis mellifera*, showing a right side dominance in short-term retrieval. Further asymmetries were demonstrated at the antennal level, with a higher number of olfactory sensilla, the locations of olfactory receptor neurons on the right antenna and in odour reception where the right antenna showed a higher level of overall neuronal depolarization after odour presentations. Here we investigated whether a morphological asymmetry can be observed in the volume of the primary olfactory centres of the central nervous system, the antennal lobes (ALs). A subset of ALs functional units, the glomeruli, has been imaged using two-photon microscopy and the volume of these glomeruli have been reconstructed and compared between the right and the left side of the ALs. Those glomeruli were chosen which showed the highest morphological plasticity after long-term odour conditioning. Furthermore, single-antenna olfactory recall experiments were performed, conditioning the proboscis extension reflex for the odours that provoke functional responses mostly in the selected subset of glomeruli. Anatomical analysis did not reveal significant differences between the sides. The behavioural test instead showed strong odour dependence of the degree of response lateralization. While floral key compounds triggered a highly asymmetric response, the effect vanished for more ubiquitous volatiles. These data provide new evidence of the odour effect on behavioural asymmetries in honeybees and new upper limits for an anatomical asymmetry beyond the lateralized behaviour.

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**SPATIAL MEMORY AND EARLY METABOLIC BRAIN CHANGES IN A MODEL OF HEPATIC ENCEPHALOPATHY***N. Arias<sup>(1)</sup>, M. Méndez<sup>(1)</sup>, M.A. Aller<sup>(2)</sup>, J. Arias<sup>(2)</sup>, J.L. Arias<sup>(1)</sup>*<sup>(1)</sup> Laboratorio de Neurociencias, Departamento de Psicología, Universidad de Oviedo, Spain.<sup>(2)</sup> Departamento de Cirugía I, Facultad de Medicina, Universidad Complutense de Madrid, Spain.

Portal hypertension is a major complication of cirrhosis that frequently leads to a neuropsychiatric disorder that affects cognition. The present study was undertaken in order to compare the performance of sham-operated rats (SHAM) and portal hypertension rats (PH) at early evolutive phase of PH in reference memory tasks in the Morris water maze (MWM). Our work shows that spatial learning in the MWM is not impaired in PH group ( $p=0.007$ ) although it showed a one-day delay in the task acquisition respect to the SHAM group ( $p=0.006$ ). We assessed the brain metabolic activity of the animals by means of cytochrome c-oxidase (COx) histochemistry. We found no differences between groups in metabolic activity in infralimbic cortex, prelimbic cortex, the cingulate cortex and CA1 subfield of the dorsal hippocampus. However, significative changes were found in the CA3 ( $U = 166.000$ ,  $n_1 = 11$   $n_2 = 12$ ;  $p = 0.039$ ), dentate gyrus ( $U = 171.000$ ,  $n_1 = 11$   $n_2 = 12$ ;  $p = 0.018$ ), basolateral ( $U = 165.000$ ,  $n_1 = 11$   $n_2 = 12$ ;  $p = 0.045$ ), medial ( $U = 173.000$ ,  $n_1 = 11$   $n_2 = 12$ ;  $p = 0.013$ ), lateral ( $U = 165.000$ ,  $n_1 = 11$   $n_2 = 12$ ;  $p = 0.045$ ) and central ( $U = 168.000$ ,  $n_1 = 11$   $n_2 = 12$ ;  $p = 0.029$ ) amygdala showing lower COx activity in the PH group as compared to the SHAM group in all cases. In fact, different neural networks were established to performance the task. The present study extends previous findings on the brain metabolic activity changes without alteration of spatial memory at early evolutive phases of PH