Individual profiles of emotional contagion and social behaviour: modulation by Methylphenidate in a mouse model of callousness

Francesca Franchi, Francesca Zoratto, Simone Macrì, Giovanni Laviola

Reference Centre for Behavioural Sciences and Mental Health, Istituto Superiore di Sanità, Rome (Italy)

Aim: Deficits in empathy are a distinctive feature of several psychopathologies, including conduct disorder (CD). The co-occurrence of callous-unemotional (CU) traits, repetitive aggressive behaviours and violation of societal norms confers specific risk for adult psychopathy. Specific drug for the treatment of CD have not been developed yet. Here, we tested the therapeutic potential of methylphenidate (MPH), the off-label drug treatment of choice, in a putative murine model recapitulating the core phenotypic abnormalities of CD.
Methods: We used a paradigm based on the evaluation of the social transmission of emotional states to identified two subgroups of BALB/cJ male mice exhibiting opposite profiles of emotional contagion, labelled as "Emotional Contagion-Prone" (EC-P) and "Emotional Contagion-Resistant" (EC-R). Animals belonging to these subgroups were assessed, with or without MPH administration (0.0, 3.0 or 6.0 mg/kg i.p.), for reactive aggression, sociability, attention control, anxiety-related behaviours and locomotor activity.
Results: Our data indicate that animals selected for excess callousness were also characterised by stability of the low emotional contagion trait, increased aggression and reduced sociability. MPH reduced aggression and increased sociability in callous mice, but it failed to restore the low responsiveness to the emotions of a conspecific in pain.
Conclusions: Collectively, our data indicate that mice selected for excess callousness exhibit phenotypic abnormalities isomorphic to the symptoms of CD. MPH may contribute to the management of excess aggression in CD patients but additional preclinical and clinical studies are deemed necessary to identify specific treatments to target the callousness domain.