Are deficits in emotion processing part of the neurodevelopmental morbidities after transposition of the great arteries (TGA)?

Calderon J. (1,2), Angeard N. (1), Pinabiaux C (1), Bonnet D. (2), Jambaque I. (1)
Inserm U663 Developmental Neuropsychology, University Paris Descartes, Sorbonne Paris Cité, Necker Children's Hospital, APHP, Paris (1); Referral Center for Complex Congenital Cardiac Malformations - M3C, Necker Children's Hospital, APHP, University Paris Descartes, Sorbonne Paris Cité (2)

Introduction
Children with TGA may present neurodevelopmental morbidities including deficits in executive functioning, social cognition and a higher prevalence of subtle autistic-related traits than expected in the general population. Social cognition is a multifaceted neurocognitive ability including the understanding of mental states and the capacity to decode emotions and affective states. No study to date has explored emotion processing outcomes after TGA in spite of its crucial importance in psychosocial and emotional adaptation. The objective of this study is to investigate the different components of emotion recognition and comprehension as part of the social cognition outcomes in children with TGA and to identify potential neonatal medical predictive factors.

Methods
Thirty-eight children (mean age=7y 4mo) with corrected TGA with or without a ventricular septal defect (VSD) were compared to a control group on standardized neuropsychological assessments of three core aspects of social cognition: the recognition of facial emotional expressions by perceptual identification or by verbal labeling, the understanding other's emotions of increasing complexity in typical social contexts and the advanced understanding of complex affective states. IQ and demographic variables were controlled. Pre-, intra-, and post-operative variables were examined.

Results
All children with TGA had normal IQ scores and did not differ from controls in parental socio-economic status and educational levels (ps>0.05). No significant differences between the groups were found on the perceptual identification of facial emotion expressions (p>0.05). However, the group with TGA showed significantly worse scores on the verbal labeling of facial emotional expressions (p=0.02), on understanding of age-appropriate emotions in typical social contexts (p=0.002) and on the comprehension of complex mental and affective states (p=0.03; p=0.01). Multivariate regression analyses demonstrated that the presence of a VSD (p=0.02; R²=0.32), a younger age at the arterial switch operation (p=0.03; R²=0.56) and a prenatal diagnosis of TGA (p=0.02) were significantly associated with better outcomes.

Conclusions
Despite normal intelligence scores, children with TGA may exhibit specific neurocognitive deficits including impaired emotion processing abilities. Preoperative factors associated to reduced neonatal morbidity may have a long term impact on neurodevelopment. Hypotheses concerning the neurological patterns of anomalies resulting in such alterations are discussed.