

NAME OF PRESENTING AUTHOR: Veronika Odintsova

EMAIL ADDRESS OF PRESENTING AUTHOR: v.v.odintsova@vu.nl

LOCATION OF PRESENTING AUTHOR: Europe

TIME ZONE OF PRESENTING AUTHOR: CET

TYPE OF SUBMISSION: Oral paper

MEMBER STATUS: Associate

ELIGIBLE FOR THOMPSON AWARD: Yes

ELIGIBLE FOR ROWEWARD: No

TITLE: Epigenetics and Handedness

FULL AUTHOR LIST:

Veronika V. Odintsova¹, Matthew Suderman², Fiona A. Hagenbeek¹, Doretta Caramaschi², Jouke-Jan Hottenga¹, Lannie R.S. Ligthart¹, Catharina E.M. van Beijsterveld¹, Gonneke Willemsen¹, Erik A. Ehli³, Gareth E. Davies³, Eco de Geus¹, Caroline Relton², Dorret I. Boomsma¹, Jenny van Dongen¹

AFFILIATIONS:

¹ Department of Biological Psychology, Vrije University Amsterdam, Amsterdam, The Netherlands

² MRC Integrative Epidemiology Unit, Bristol Medical School, Population Health Science, University of Bristol, Bristol, UK

³ Avera Institute for Human Genetics, Sioux Falls, South Dakota, USA

KEYWORDS: handedness, epigenome-wide association studies, methylation scores

ABSTRACT:

The etiology of handedness has been investigated extensively in terms of heritability and in relationship with behavioral and neurological traits and yet remains largely unexplained. The heritability of handedness is relatively low: additive genetic effects explained about 25% of the variance in handedness in large-scale twin studies¹. A genome-wide association study that included more than 1.5 million right-handed and 194 thousand left-handed individuals found 42 genetic loci associated with left-handedness². To investigate this mostly non-genetic trait, we performed an epigenome-wide association study in peripheral tissues (buccal cells and blood) and at different ages from birth to adulthood, combining data from two large cohorts: the Netherlands Twin Register (NTR) children (N=946) and adults (N=2,682) and the Avon Longitudinal Study of Parents and Children (ALSPAC) children (N=729) and parents (N=1,232). No meta-analyzed associations of the NTR and ALSPAC adults survived adjustment for multiple testing (Bonferroni-adjusted $p < 0.05$). Top CpGs were associated with *ATP6V1B2*, *LRRC2*, *CKAP4*, *C13orf18*, *RING1* genes. Several differentially methylated regions were associated with handedness in both buccal cells and blood in children. Created DNA methylation scores of handedness explained little variance in children and more less in

adults.

1. Medland, S. E. *et al.* Genetic influences on handedness: data from 25,732 Australian and Dutch twin families. *Neuropsychologia* **47**, 330–337 (2009).
2. Partida, G. C. *et al.* Genome-wide association study identifies 49 common genetic variants associated with handedness. *bioRxiv* 831321 (2019).

GRANT SUPPORT: Amsterdam Public Health Institute travel grant VVO; KNAW Academy Professor Award (PAH/6635) to DIB.

The UK Medical Research Council and Wellcome (Grant ref: 102215/2/13/2) and the University of Bristol provide core support for ALSPAC. A comprehensive list of grants funding is available on the ALSPAC website (<http://www.bristol.ac.uk/alspac/external/documents/grantacknowledgements.pdf>).

This research was specifically funded by the BBSRC (grant numbers BBI025751/1 and BB/I025263/1). C.R. and D.C. are funded by the MRC (grant numbers MC_UU_00011/5 and MC_UU_00011/1). “Aggression in Children: Unraveling gene-environment interplay to inform Treatment and InterventiON strategies” project (ACTION; BBMRI –NL: Biobanking and Biomolecular Resources Research Infrastructure grant nr 184.021.007 and 184.033.111; Eu-FP7 grant agreement no 602768). Netherlands Twin Registry Repository NWO 480-15-001/674: Netherlands Organization for Scientific Research (NWO). JvD is supported by the NWO-funded X-omics project (184.034.019).
