

Title: Transgenerational Epigenetic Effects of War Stress in Finland

Authors:

Saara Marttila*, Ilari Taskinen*, Virva Liski, Pashupati Mishra, Mika Kähönen, Terho Lehtimäki, Olli Raitakari, Emma Raitoharju[#] and Ville Kivimäki[#]

Keywords:

Epigenetics, Stress, Inheritance of acquired traits, Epidemiology, Genomics

Abstract

Epigenetic inheritance of psychosocial stress has been shown in rodent models. In humans, transgenerational inheritance of acquired traits remains controversial. Extreme psychosocial stress has been indicated to have transgenerational effects, but this has only been studied in small case-control settings on holocaust survivors.

We set out to investigate the possible effects of paternal war stress in three generations of offspring in the multigenerational Young Finns Study (YFS-3G). We have explored the war records of 1430 Finnish men (born 1887-1937) who are the ancestors of the participants of YFS-3G. We will investigate the associations of the soldiers woundings, acute battle stress and accumulative risk of mortality and the epigenetic profiles (DNA methylation and ncRNA expression) of their children, grandchildren and great-grandchildren.

We are currently refining the wars stress variables and starting the epigenetic analyses. So far, we have identified 357 soldier - child, 352 soldier - paternal-grandchild and 357 soldier - maternal-grandchild pairs, with war stress data and offsprings DNA methylation data available. We can also show that in these settings the height of the soldier is a significant predictor of the adulthood height of the child/grandchild (beta 0.332-0.395 and p-value $< 2 \cdot 10^{-9}$ for each) confirming the validity of our data. In addition, our data contains 390 greatgrandchildren of the studied soldiers with DNA methylation data available.

In the coming months we will utilize this data to discover whether the second world war in Finland has left a permanent mark in the Finnish epigenome.