An investigation into the DNA methylation patterns of risk and time preference in older individuals

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How do risk and time preferences for a group of individuals associate with their epigenetic methylation profile?

NICOLA: Risk Preference
- For each of these choices below, which income do you choose?
  - Income A, which will give you £1,500 per month for the rest of your life?
  - Income B, which will give you a 50-50 chance of £3,000 and a 50-50 chance of £1,000 / £1,200 / £1,300 per month for the rest of your life?

NICOLA: Time Preference
- Would you rather have:
  - £1,500 now?
  - £1,506 / £1,512 / £1,518 / £1,524 / £1,536 / £1,548 / £1,596 a month from now?

Procedure
- Step 1: NICOLA participant data and blood collection
- Step 2: MethylationEPIC (Illumina): Evaluation of >850,000 CpG sites
- Step 3: Data quality control and analysis: Partek Genomics Suite v7.0

Differential Methylation Analysis
- ANOVA tests were carried out to determine CpG sites with a differential methylation status (p<10⁻⁶):
  - Patient vs impotent population groups
  - Risk averse vs risk seeking population groups
  - Gene ontology analysis was also conducted

Results: Risk Preference
- Top-ranked CpG sites: risk averse vs risk seeking
  - cg05157098 THAP2: Decreased in risk averse group
  - cg15810171 YRDC: Decreased in risk averse group
  - cg20249556 NWD1: Decreased in risk averse group
  - cg05308904: Increased in risk averse group

Results: Time Preference
- Top-ranked CpG sites: patient vs impotent
  - cg0535328 ANKRD27: Increased in patient group
  - cg0246350 NINJ2: Increased in patient group
  - cg02895509: Decreased in patient group
  - cg19912619 ABCB5: Increased in patient group

Conclusion
- DNA methylation may represent potential important biomarkers of accumulated, complex environmental determinants of these traits and their relationship to health behaviours
- Several striking results from this study support the need for further analysis of DNA methylation as an important link between measurable biomarkers, health outcomes and additional exploration of the functional significance of these particular genetic loci
- Data from longitudinal cohorts provide the opportunity to monitor the relationship between time and risk preference, health behaviours (such as diet physical activity and smoking) and health outcomes

Acknowledgements
- We are grateful to all the participants of NICOLA, and the whole NICOLA team, which includes nursing staff, research scientists, clerical staff, computer and laboratory technicians, managers and receptionists. This work was supported by the following funders who provide core financial support for the NICOLA Study: the Atlantic Philanthropies, the Economic and Social Research Council, the UKCRC Centre of Excellence for Public Health Northern Ireland, the Centre for Ageing Research and Development in Ireland, the Office of the First Minister and Deputy First Minister, the Health and Social Care Research and Development Division of the Public Health Agency; the Welcome Trust/Wolfson Foundation; and Queen’s University Belfast.