Why are we studying twins?

1. To study similarities and differences in epigenetics at birth and early childhood
2. To determine genetic and environmental factors that influence epigenetics
3. To discover how individuals with identical genes can develop differences in health, appearance and personality within pairs
4. We are particularly interested in how the environment in the womb affects how babies’ genes act and whether their genes ‘remember’ this experience as they age

What we have found

1. When a specific epigenetic mark in 5 tissues in 2 genes involved in growth in 56 “identical” and 35 fraternal twin pairs was measured:
   - Genetically-identical twins can be born epigenetically different, meaning that they must experience different environments in the womb.
   - “Identical” twins are more similar epigenetically than fraternal twins, meaning that genetic differences can cause epigenetic differences
   - Different tissues have different epigenetic marks.
   - In unpublished work, we found evidence that epigenetics can be influenced by a mother’s diet and by differences between the placenta and umbilical cords.

What is PETS?

- 251 twins born between March 2007 and November 2009 and their mothers
- We recorded details of mothers diet and lifestyle during pregnancy
- Infants measured at birth and biological samples collected (below)
- At infant age 18 months: health information, measurements, cheek cells and blood cells collected
- Now age six years re-consenting: focus on links between oral, heart and gut health, Measurements, blood, cheek cells, and dental information collected

As we turn six

- To explore links between oral, heart and gut health
- Record details of diet, lifestyle and oral hygiene behaviours and habits
- Dental examination
- Oral samples: saliva, plaque, cheek cells
- Blood cells, faecal samples
- Anthropometric measures (height, weight, skin fold thickness, blood pressure, chest & arm circumference

Samples/data collected at age six years

- Saliva
- Cheek cells
- Caries & plaque
- measurements

Specific epigenetic mark at >14,000 genes measured in 3 tissues from 22 “identical” twins & 12 fraternal twins found “identical” twins are, on average, more epigenetically similar

However, some “identical” twins are more epigenetically different than fraternal twins. This tells us that both genes and environment can cause twins to be different

The PETS team

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The Peri/Postnatal Epigenetics Twin Study (PETS)