DEVELOPING A WORLD CLASS RESEARCH RESOURCE IN WA: THE ORIGINS PROJECT

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A Global Pandemic of Chronic NCDs

Chronic inflammatory diseases of virtually all organ systems:

All dramatically increasing in modern societies

A significant component of risk for these NCDs is programmed early in life
NCDs are a global threat to social and economic stability

- More than 36 million deaths per year
- 9 million in younger people
- 60% of all global deaths
- 80% in underprivileged developing countries

Most NCDs are inherently preventable

Ban Ki-Moon
Secretary General
United Nations 2011
Examples of diseases that are developmentally programmed

The basis of ‘DOHaD’ a new health discipline (Developmental Origins of Health and Disease)
Joondalup-Wanneroo one of the fastest growing regions in Australia. Increase in Child NCD's.
ORIGINS PROJECT: Collaboration between Joondalup Health Campus & Telethon Kids Institute

A local Project with a Global Vision

Change begins in our community. We cannot underestimate the power or the importance of this
1. To improve the health of the next generation through a better understanding of how to optimise the early environment, early identification to enable timely interventions.

2. Developing a robust biobank and databank including a data management system.

3. To initiate and integrate harmonised nested clinical trials within this framework.
4. To understand the interaction of newly recognised exposures, such as the gut microbiome and utilise new technologies (such as epigenetics, metagenomics, metabolomics, proteomics) to further this field of research.

5. To integrate medical education, research and clinical care at Joondalup Health campus.
ORIGINS Data & sample capture points:
10,000 consent (5,000 deep sampling) follow for 5 years

<table>
<thead>
<tr>
<th>10-24 wks</th>
<th>36 wks</th>
<th>BIRTH</th>
<th>2 mts</th>
<th>4 mths</th>
<th>6 mths</th>
<th>9 mths</th>
<th>1, 2.5, 5 year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antenatal clinic</td>
<td>Antenatal clinic</td>
<td>Delivery</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ORIGINS’ clinic visit</td>
</tr>
</tbody>
</table>

Biological sample collection, all points except at 9 months

Web-based data collection, with extra mail-out Qs before 1st antenatal visit

ORIGINS’ clinic visits continue at 2½ & 5 years
Web-based data collection continues at 18 months, 2, 2½, 3, 4 and 5 years

ASQ 4,9,12 and 30 months
Conners Q: 30 mts and 5 years
Griffiths on a selection
Clinical psychologist assessment at 5
Detailed Prospective Data Collections

Detailed early environmental data:
- Maternal health and pregnancy data
- Diet and nutrition, breastfeeding
- Environmental pollutants, smoking
- Infections, vaccines, medications, IVF
- Nature Relatedness Physical activity
- Work and sleep patterns, technology use
- Stress, social and economic circumstances

Biobank for biological measurements:
- Genomics
- Epigenetics
- Metagenomics
- Metabolomics
- Stress Responses
- Immune Programming

Detailed clinical outcome measures:
- Growth and adiposity
- Brain, behaviour, learning and development
- Metabolic and cardiovascular
- Sleep
- Asthma
- Dental health
- Eczema & food allergy
- Musculoskeletal health
## Summary of Specimen Collections

### Summary of Biological Sample Collection Events

<table>
<thead>
<tr>
<th>Sample Type</th>
<th>18-24wks GA</th>
<th>32-36wks GA</th>
<th>Birth 2mths</th>
<th>4mths</th>
<th>6mths</th>
<th>1yr</th>
<th>2.5yrs</th>
<th>5yrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood</td>
<td>M,F</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>Saliva</td>
<td>M,F</td>
<td>M</td>
<td>F,C</td>
<td>M,C</td>
<td>C</td>
<td>M,C</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>Buccal swab</td>
<td>M,F</td>
<td>M</td>
<td>F</td>
<td></td>
<td></td>
<td>M,C</td>
<td>M,C</td>
<td>C</td>
</tr>
<tr>
<td>Stool</td>
<td>M</td>
<td>M</td>
<td>C</td>
<td>M,C</td>
<td>M,C</td>
<td>M,C</td>
<td>C</td>
<td>C</td>
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<tr>
<td>Urine</td>
<td>M</td>
<td>M</td>
<td>C</td>
<td></td>
<td></td>
<td>M,C</td>
<td>M,C</td>
<td>C</td>
</tr>
<tr>
<td>House dust</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>M</td>
<td>M</td>
<td>M</td>
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<tr>
<td>Hair</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>M,F</td>
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<tr>
<td>Cord blood</td>
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<td></td>
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<td>C</td>
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<tr>
<td>Placenta sample</td>
<td></td>
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<td>C</td>
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<tr>
<td>Meconium</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>C</td>
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<tr>
<td>Colostrum</td>
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<td></td>
<td></td>
<td>M</td>
<td></td>
</tr>
<tr>
<td>Breast milk</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>M</td>
<td>M</td>
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ORIGINS Project Platform: 1/10 YEARS

2,114,991 data-points
37,626 aliquots

RESULTS

Current ORIGINS
1000 mums
400 babies
9 nested studies

20,000+ ('no' participant burden)

ORIGINS COHORT
10,000

ROUTINE HEALTH CARE
biological and clinical data collected from all pregnant women

OBSERVATIONAL COHORT
Participate in 'active' follow-up: with more intensive data collection on early exposures, clinical and biological outcomes (e.g. questionnaires, blood, stools)

INTERVENTIONS (CLINICAL TRIALS)
targeting specific high risk groups (e.g. allergic women, obese women, smoking women) with separate consent. Women will be given information for clinical trials and screened for eligibility if they are interested.

Linked to government (PBS) and non government data sets
We are not going to just observe NESTED STUDIES

Testing early interventions for disease prevention with a series of integrated harmonised clinical trials

<table>
<thead>
<tr>
<th>SYMBA Allergic disease</th>
<th>TALK Brain development</th>
<th>PLAN Childhood obesity</th>
<th>CARE-Dads Paternal health</th>
</tr>
</thead>
<tbody>
<tr>
<td>240/652</td>
<td>150/500</td>
<td>57/57</td>
<td>100/1000</td>
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<table>
<thead>
<tr>
<th>Raine comparison</th>
<th>Examining sub fertility</th>
<th>Screen use Technology</th>
<th>NOSE Respiratory</th>
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<table>
<thead>
<tr>
<th>Cashew nut Allergies</th>
<th>BENEFIT Breastfeeding</th>
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Developing Creative interventions that positively change the ‘exposome’

Nature relatedness, mindfulness and positive emotions.
Watch this space
Personalised medicine
Developing an OMICS platform
ORIGINS Research Interest Groups

- **Fathering**: 10 members
- **Mental Health and Well-Being**: 32 members
- **Allergy, Immunity and Inflammation**: 22 members
- **Physical Environment**: 12 members
- **Nutrition and Metabolism**: 32 members
- **P4 ‘Omics and Systems Biology**: 10 members
- **Growth and Physical Development**: 6 members
- **Child development, nature relatedness**: To be formed
- **Fertility, Health Economics, Physical Activity/Lifestyle, Sleep, Respiratory**: To be formed
Engagement and Collaborations

[Logos of various institutions and organizations]
Consumer and Community Engagement and Collaboration

- Community reference group
- Participant reference group
- Community and consumer representation in the governance structure
- ‘Coffee and Connect’ sessions
- Family fun day
- Newsletters
SUMMARY
A Major Showcase Project
With a community focus on preventing Non-communicable diseases

“Developing Joondalup Health Campus/ Ramsay Heath Care as a globally recognised centre of teaching and research excellence”
Telethon 2017 Perth: $26 million pledge by Prime Minister, foundation for children's health

Regina Titelius, PerthNow
October 22, 2017 12:00am

PERTH will host one of the nation's most comprehensive studies into chronic child health problems thanks to a combined $26 million pledge last night to the Telethon Kids Institute and Joondalup Health Campus.
Thanks to the TEAM & FAMILIES