Culturally-Informed Guidelines for Biobanking and Medical Genomics Research with Māori

Maui Hudson, Angela Beaton, Moe Milne, Dr Waiora Port, Prof. Khyla Russell, Dr Barry Smith, Lynley Uerata, Valmaine Toki and Dr Phillip Wilcox.

Te Mata Ira Project Team 2015

Presented by Dr Phillip Wilcox, University of Otago

(Ngāti Rakaipaaka, Ngāti Kahungunu ki Wairoa, Rongomaiwahine, Ngāti Pakeha)
KO WAI AHAU?

Science Roles:
- Programme leader, Virtual Institute of Statistical Genetics
- Formerly senior Scientist, Scion:
  - Project leader, Genomic sequencing of radiata pine*
  - Technical leader, molecular breeding and genomic selection in radiata pine
- Sen Lecturer, Dept Stats and Maths, Uni Otago

Māori Engagement Research:
- Established Te Arotūruki and co-developed TA Process (JRSNZ 2008)
- Otago University ‘Full Circle Theme’
- University of Waikato ‘Te Mata Ira’ & ‘Te Hau Mihi Ata’ projects
- Kaihautu Maori, BioHeritage NSC

Iwi Roles:
- Mandated representative for Ngāti Rakaipaaka
- Advisor for various iwi initiatives
  RHAS1
  RHAS2
- Science advisor for various proposals in Wairoa/Mahia area
1. Cancer and Māori
2. Biobanking – NZ context
3. Contemporary Māori Context
4. Te Mata Ira Project
5. Data Collection
6. Some results: Emerging Themes
7. Frameworks
   • Medical genomics
   • Biobanking
8. Summary
9. Acknowledgements
Cancer disparities in indigenous Polynesian populations: Māori, Native Hawaiians, and Pacific people

Gabi U Dachs, Margaret J Currie, Fiona McKenzie, Mona Jeffreys, Brian Cox, Sunia Foliaki, Loïc Le Marchand, Bridget A Robinson

Figure 2: Cancer incidence and mortality by ethnicity in men (A) and women (B) in the Pacific

• Dachs et al. (2008) also state there are ‘differences in knowledge of tumour biology and cancer management between majority and minority populations’

• Also, Lancet (2012) states:

‘Māori …. have higher rates of smoking and poverty, and lower educational attainment than the overall population. In terms of health, Māori have greater unmet needs in primary care, lower quality secondary care, and poorer outcomes for a range of common diseases; average life expectancy is 8 years less than other citizens. Disparities have changed little for either the Māori or for Pacific peoples (who together constitute a fifth of the population in New Zealand) in the past two decades.’
### 2. BIOBANKING IN AOTEAROA/NEW ZEALAND

**Research biobanks**
- Cancer society tissue bank in Christchurch
- Middlemore tissue bank
- Pancreatic cancer bank North Shore Hospital
- Colorectal cancer tissue bank Dunedin
- Cardiovascular sample bank Dunedin
- Brain bank Auckland
- Arthritis sample bank Dunedin
- Glioblastoma and Wilms tumour banks Dunedin
- NZORD (rare diseases) bank Dunedin
- Melanoma tissue banks being established in several centres around New Zealand
- Neuroendocrine Tumour (NET) collection Auckland and national

**Transplant biobanks**
- Cord blood bank (private)
- Fertility tissue banks (private and public)
- Placenta bank Dunedin
- Eye bank Auckland

**Other**
- Guthrie card (newborn heel prick test) long term repository (National Screening Unit, Ministry of Health)
- Banked samples from longitudinal studies samples (eg Christchurch and Dunedin studies, and Growing Up in New Zealand)

Source: K. Bartholomew, H. Wihongi and T. Stewart, unpubl. report
2. BIOBANKING IN AOTEAROA/NEW ZEALAND

Also

• Increasing collections by individual researchers and institutions
• International researchers wanting access to NZ biobanks & vice versa
• Trend toward biobank networks (incl. international)

Why?

• Leveraging huge power of modern ‘omic’ technologies for prognostic, diagnostic, drug treatments and new therapies...

3. CONTEMPORARY MĀORI CONTEXT

• Approx 15% of NZ population (and growing…)

• Increasing autonomy and self-determination of Māori communities, e.g.,
  • Treaty settlements
  • Co-management of natural resources
  • Health provision and education
  • Whanau Ora programme
  • Vision Mātauranga framework for prioritising research funding (HRC and MBIE)

➢ Expectations of participation, influence, and control over own resources…

• Negative experiences with genomics and gene technologies*
  • Warrior gene saga, GE debate (& litigations), WAI262
  • Mirror experiences of other indigenous peoples, e.g., Havusupai

3. CONTEMPORARY MĀORI CONTEXT - BIOBANKING

- No **national** guidelines informed by Māori cultural perspectives and context
- Differences between biobanks in nature and extent of engagement/governance/incorporation of Māori
- Risk of repeating negative experiences… and
- Conversely, risk of underrepresenting Māori thus under-delivering to Māori communities…
4. TE MATA IRA: CULTURALLY INFORMED GUIDELINES FOR BIOBANKING AND GENOMIC RESEARCH

- Builds on best practice and ethical guidelines on research involving Māori
- Big science needs big data needs big ELSI
- National Science Challenge: Healthier lives – Social license for next generation biorepository research – co-ordinated tissue banks, genomic data repositories and clinical registers
- **Team:** Maui Hudson, Angela Beaton, Moe Milne, Dr Waiora Port, Prof. Khyla Russell, Dr Barry Smith, Lynley Uerata, Valmaine Toki and Dr Phillip Wilcox
- **Skills:** ethics, legal, social science, tikanga and Mātauranga Māori, genomics, genetic counselling
5. TE MATA IRA – ‘DATA’ COLLECTION

• **Years 1-2**
  
  **Iwi hui** – Ngāti Rakaipaaka*, Ngāti Hine, Ngāti Whatua o Orakei*, Ngai Tahu (x 2), Ngāti Porou*
  
  • *involved in human medical genomics research

• **Key informant** interviews:
  
  • Whanau (various)
  
  • Critical interviews (6)
  
  • Māori and Indigenous Health Institute (MIHI), University of Otago, Christchurch

• **Wānanga (2)**
  
  • Experts in tikanga Māori = identify themes

• **International advisory board** – Indigenous Genomics Alliance
  
  • Native American, Kanaka Māoli (Hawai’i), Māori, Australian
6. EMERGING THEMES...
• Whānau (= families) make decisions
• Iwi (= tribe) support interests

🤔 Experience loss of control (over time)
🤔 Lack of return of results and tissues... researchers obtain samples then leave & don’t return results...

✨ Outcomes for participants & communities
✨ Education and awareness
KEY INFORMANT INTERVIEWS

- **Protection** of Māori rights and interests
- **Control** over samples and data
- Focus on **Māori Health priorities**
- **Robustness** of genomic research methods
- Expectations of **consultation**
- Expectations of **consent and re-consent**
- Ongoing **feedback and communication**
WĀNANGA – EMERGING THEMES

Kawa (principles)

- **Tissue AND Data are taonga** - He taonga, he tapu
- Kia tau te wairua o te tangata (level of comfort)
- Kia pūmau te mana o te tangata (level of control)
- Mauri (Tissue)
  - Take – Te Tuku i te Taonga
  - Utu – Te Hau o te Taonga
  - Ea – Te Whakahoki i te Taonga

NB: Taonga = emotionally/spiritually valued item(s)
TIKANGA - PROTOCOLS

Tikanga – protocols regarding gifting...

• Na te tapu i puta mai te tikanga...
• Take-utu-ea (circle of reciprocity)
• Tissue
  • Te Tuku i te Taonga (giving the gift) mauri tangata
  • Te Hau o te Taonga (spirit of the gift) mauri kikokiko
  • Te Whakahoki i te Taonga (return of the gift) Mauri Taputapu
• Data is a representation of tissue
  • Subject to the same kawa
  • Specific protocols applied for context
  • Protection via exclusion, protection via inclusion
7. FRAMEWORKS

Require separate frameworks for biobanking and medical genomics... underpinned by same research

- **Biobanking**
  - In development ...

- **Medical genomics framework**
  - Near complete – developed and validated
  - Structure... phases/component/principles/questions+ guidance tables
### 7A. MEDICAL GENOMICS FRAMEWORK

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<th>Preparing for Dialogue</th>
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<td>Mana</td>
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MEDICAL GENOMICS FRAMEWORK

Preparing for Dialogue
- Mana
- Tika
- Manaakitanga
- Whakapapa

Consultation
- Kawa
- Purpose
- Benefit
- Governance

Research
- Tikanga
- Methodology
- Communication
- Consent

Translation
- Kaitiaki
- Translation
- Education
- Accountability
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‘OPERATING PRINCIPLES’ & QUESTIONS
# MEDICAL GENOMICS FRAMEWORK

## Preparing for Dialogue
- **Mana**
- **Tika**
- **Manaakitanga**
- **Whakapapa**

## Consultation
- **Kawa**
- **Purpose**
- **Benefit**
- **Governance**

## Research
- **Tikanga**
- **Methodology**
- **Communication**
- **Consent**

## Translation
- **Kaitiaki**
- **Translation**
- **Education**
- **Accountability**
KAWA – OPERATING PRINCIPLES

• Relationship between researchers and community
• Right to say ‘NO’
• Principles that underpin the use of samples and data
• Maintain trust and communication in an age of sample and data-sharing
• Level of comfort
• Level of control
• Level of integrity
• What type of relationship are you looking for?
• Can iwi modify the focus of the research?
• What principles inform the research project?
• What principles are used to make decisions about the use of samples and data?
• How will Maori rights and interests be recognised and acknowledged?
  • Intellectual property
• What impact will the research have?
• How can we ensure our tikanga is upheld?
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GOVERNANCE – OPERATING PRINCIPLES

- Controlling access to samples and data is the primary means of protecting interests and limiting unauthorised use
- Governance occurs at multiple levels
- There are a range of protective mechanisms that can be put in place
- Ethics approval
- Community consultation processes incl Community advisory board
- Biobank processes for accessing samples
- Negotiated agreements with communities, Conditional use rights
- Access to DNA samples
- Access to whakapapa
- Access to clinical data
- Access to genetic data (genotype or Whole Genome Sequencing)
- Restrict/review storage location/duration
QUESTIONs - GOVERNANCE

• What governance arrangements are in place?
• How can we be involved in the governance of samples, research information and genetic data?
  eg. Use for different purposes
• Who holds the research information and genetic data, for how long and who can access it?
• What rights do donors have to control use?
  • Through dynamic consent or re-consent
  • Will donors receive communication about each use?
  ▪ Who will own the research once it is completed?
MEDICAL GENOMICS FRAMEWORK

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  - Purpose
- Benefit
- Governance

Research
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  - Methodology
  - Communication
  - Consent

Translation
- Kaitiaki
  - Translation
  - Education
  - Accountability
• Screening protocols for users
• Purpose of the research
• Integrity of the researcher
• Intended outcomes
QUESTIONS - PURPOSE

• He aha te putake o te rangahau?
• What is the purpose of the research?
• Who is funding the research?
• Why is the research important for our community and for Maori generally?
• What outcomes are researchers aiming to achieve?
• Who is involved in the research team?
  • Are there any iwi/Maori researchers?
  • What experience does the team have working with Maori communities?
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MEDICAL GENOMICS FRAMEWORK:
GUIDANCE TABLES
<table>
<thead>
<tr>
<th>Study Focus</th>
<th>Example</th>
<th>Level of Consultation</th>
<th>Level of Consent</th>
<th>Level of Support</th>
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<tbody>
<tr>
<td>Tangata: General Population</td>
<td>NZ Wide Gout Study, Growing up in NZ Study Neuro-endocrine Tumour Study (NETwork), LiLACS</td>
<td>Institutional &amp; Representative</td>
<td>Individual consent</td>
<td>Māori Institutional support Iwi &amp; agency endorsement Whānau support for individual consent</td>
</tr>
<tr>
<td>Whanau: Family Population</td>
<td>Familial Gastric Cancer, Adrenoleukodystrophy</td>
<td>Whānau and iwi</td>
<td>Whānau consent for project Individual consent to participate</td>
<td>Hapū and/or Iwi endorsement for project Whānau support for individual consent</td>
</tr>
<tr>
<td>Hapu/Iwi: Community Population</td>
<td>Rakaipaaka Health and Ancestry Study, Ngati Porou Genetics of Gout in Ngati Porou</td>
<td>Iwi &amp; Institutional</td>
<td>Hapū / Iwi consent for project Individual consent to participate</td>
<td>Iwi endorsement for project Maori institutional support Whānau support for individual consent</td>
</tr>
<tr>
<td>Pan-Iwi: Ethnic population</td>
<td>Hauora Manawa: Heart Health Community Heart Study, Te Wai o Rona Diabetes Prevention Strategy</td>
<td>Multiple iwi and hapū, Institutional &amp; Representative</td>
<td>Multiple iwi consents for project Individual consent to participate</td>
<td>Whānau support for individual consent</td>
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## APPROPRIATE ANALYTICAL METHODOLOGIES

<table>
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<tr>
<th>Study Focus</th>
<th>Examples</th>
<th>Designs</th>
<th>Statistical analyses</th>
<th>Interpretation(s)</th>
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<tr>
<td>Tangata: General Population With/without Moari cohort</td>
<td>NZ Wide Gout Study,</td>
<td>Case Control CG/GWAS with candidate gene SNPs, SNP chips*, whole exomes or whole genome resequence</td>
<td>Population admixture*, coancestry control, data imputation using appropriate reference populations, Single marker regressions (with Bayesian priors?) IBD mapping for rare variants</td>
<td>Average effects (usually small) on relative risk, i.e., having disease associated variants = increased risk (i.e., does not mean necessarily disease)</td>
</tr>
</tbody>
</table>
| Whanau: Family Population | Familial Gastric Cancer, Adrenoleukodystrophy, | IBD mapping and/or homozygosity mapping with whole exomes or whole genome resequence | Genome-wide IBD estimation, Data imputation(?), haplotype sharing of affecteds, homozygosity scanning | Context dependent:  
  - Few highly penetrant genes = high likelihood of disease  
  - Many small effect genes |
<p>| Hapu/Iwi: Community Population | Rakaipaaka Health and Ancestry Study, Ngati Porou Genetics of Gout in Ngati Porou | Case Control CG/GWAS with candidate gene SNPs, SNP chips*, whole exomes or whole genome resequence | Single marker regressions with control for admixture and coancestry (with Bayesian priors on candidate SNPs GENES?); data imputation with appropriate reference(s) | Average effects (usually small) on relative risk, i.e., having disease associated variants = increased risk (i.e., does not mean necessarily disease) |
| Pan-Iwi: Ethnic population | | Case Control CG/GWAS with candidate gene SNPs, SNP chips*, whole exomes or whole genome resequence* | Single marker regressions with control of admixture and coancestry (with Bayesian priors on candidate SNPs GENES?); data imputation with appropriate reference(s) | Average effects (usually small) on relative risk, i.e., having disease associated variants = increased risk (i.e., does not mean necessarily disease) |</p>
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<tbody>
<tr>
<td>Participant/community access to additional health resources</td>
<td>Feedback to participants to provide information about the contribution of</td>
<td>Improvements to health service delivery</td>
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<tr>
<td>• tests</td>
<td>• provide information about the contribution of genetic &amp; environmental</td>
<td>• access</td>
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<tr>
<td>• screening</td>
<td>• environmental factors (ie. consumption and exercise) to health incidence</td>
<td>• screening</td>
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<tr>
<td>• expertise</td>
<td>• increase levels of understanding about genetic conditions</td>
<td>• clinical decision making</td>
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<td>• genetic counselling</td>
<td>• information about whakapapa</td>
<td>• personalised medicines</td>
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<td>Capacity building</td>
<td>Community workshops and hui to provide information about the contribution</td>
<td>Improvements to health literacy in community</td>
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<tr>
<td>• internships</td>
<td>• of genetic &amp; environmental factors to health incidence</td>
<td>• Supports conscious decision-making around genetic conditions (genetic</td>
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<td>• scholarships</td>
<td>• increase levels of understanding about genetic conditions</td>
<td>literacy)</td>
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<tr>
<td>• research positions</td>
<td>• make informed consent processes more robust</td>
<td>• Activating healthy communities (health promotion)</td>
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<tr>
<td>• relationships/partnerships with research providers</td>
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<tr>
<td>Information for community</td>
<td>Develop project resources (print/website)</td>
<td>Support Information Sovereignty</td>
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<tr>
<td>• Baseline data for future iwi studies/interventions</td>
<td>• Genetic literacy</td>
<td>• Maori stewardship of data and information</td>
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<tr>
<td>• Shared intellectual property</td>
<td>• Health promotion</td>
<td>• Maori research capacity</td>
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**BENEFIT SHARING**
He tangata kei tua Relationship Model for Biobanks...

• Taonga needs to be the central aspect of the relationship – person/tissue/data

• They engage directly with the operational part of the biobank. Key issues at this level are the consent, tikanga/protocols they use, how they screen the purpose and methodology of the projects asking for samples,

• Operations are embedded within the governance structure of the biobank which needs to address kawa/principles, benefits and kaitiaki roles, and how they communicate with people/public.

• The biobank operates within the community and needs to maintain trust and relevance in the Maori, clinical and research communities by addressing issues of accountability, education and translation
NEXT STEPS FOR GUIDELINE DEVELOPMENT

Roll out – by September 2015
Complete biobanking framework
Publications – peer reviewed plus user-friendly guidelines
HRC processes
Workshops and Presentations (e.g. QMB)
Translation across to non human indigenous (BioHeritage NSC)
8. SUMMARY

• High burden of cancer reflect other health deficits in Māori communities ...
• Potential for benefit for Māori communities from genomics and biobanking
• Extensive data collection in Māori communities to develop key themes
• Culturally informed guidelines for medical genomics developed
  • Staged = reflects research process, assisted with key questions
  • Likely to require modifications in praxis (consultation-research-translation)
• Bibanking guidelines under development
  • Hierachically prioirtised, to reflect governance and operational requirements of biobanks
• Funder – HRC
• Research team – Maui Hudson, Moe Milne, Barry Smith, Valmaine Toki, Angela Beaton, Phillip Wilcox, Kim Southey, Waiora Port
• International advisory panel – Ngiare Brown, Maile Taualii, Rose James, Ron Whitener, Emma Wyeth, Jeff Reading, Malia Villegas
• Iwi communities – Ngāti Hine, Ngāti Whatua, Ngai Tahu, Ngāti Porou, Ngāti Rakaipaaka
• Key informants, wananga participants, and stakeholders
• Dr Karen Bartholemew Helen Wihongi and Tereki Stewart, Waitemata DHB
• Helen Morrin and Daphne Mason
• Peter Shepherd