

EXPOSOME

AND THE FUTURE OF RISK ASSESSMENTS

DEREK MILLER

DEREKMILLER@IHUG.CO.NZ

**“I cannot teach anybody anything
I can only make them think”**

Socrates

WHAT IS EXPOSOME?

- A concept that incorporates the complex exposures we face as humans
- Conception to death
- The first projects primarily focused on environmental exposures i.e. air pollution and water contaminants

-
- About two-thirds of the deaths in the world are caused by non-communicable diseases, especially cancer and cardiovascular disease
 - Only about 10% of this mortality attributed to genetic variation
 - 10- 90% thought to be linked to environmental exposures

-
- 100,000+ chemicals registered with EU alone,
 - Little known about toxicity of about 75% of these.
 - Several hundred new substances are marketed each year after some basic pre-market toxicity testing
 - NZ WES about 700 substances listed

-
- The message for exposure science should be clear — if the field is to have a more prominent role in discovering and preventing the causes of chronic diseases, it must broaden its coverage of exposures beyond those of regulatory interest.
 - *Journal of Exposure Science and Environmental Epidemiology* (2011) 21, 5–9; doi:10.1038/jes.2010.50; published online 17 November 2010

MEASUREMENT CHALLENGES

- Exposure – highly variable
- Impact - changes based on stage of life
- Impact - influenced by genetic and other personal factors
- Complexity of a life-times exposure
- Specific exposures can be difficult to monitor
- Indicators may be transient

CHALLENGES FOR NOW

- Appropriate training and competence levels
- Standardisation of reporting systems
- Reliable collection and storage of data
- Ability to adopt new monitoring techniques or equipment
- Making best use of available resources
- Convincing Workplaces that <WES can be a concern

THE WORKPLACE OF THE FUTURE

- Personal monitoring devices
 - Heart and respiration rates, body temperatures, radiation and UV exposures
 - Hydration trackers, e-skin, fatigue, lung function by phone
- Daily exposures
 - Silicone wristbands mimic how the body absorbs toxic compounds
 - Air pollution in the home, travelling and workplace
 - Blood chemistry through wristbands
 - Vibration exposures
- Exposure
 - Control banding

“You are okay”

Mythical beasts - Stephen Donaldson 1979

BENEFITS OF EXPOSOME

- Better understanding of underlying cause of disease
- Better understanding of personal risk factors
- Development of “legacy biomarkers”
- Development of new monitoring technologies for faster results and larger data collection
- Provide better estimate for ACC or MoH of future cases from a occupational exposure

-
- **Personalised risk assessments for everyone?**

Life is full of questions

Idiots are full of answers

Socrates