

## **Nutritional Genomics, DNA Damage Diagnostics and Prevention** (CSIRO Human Nutrition)

**Supervisors:** Dr Nathan O'Callaghan, Prof Michael Fenech



Legend for photo(s): Dr Nathan O'Callaghan (L); Nutritional Genomics, DNA Damage Diagnostics and Prevention Group (R).

**Location of laboratory:** CSIRO Human Nutrition – Kintore Ave, Adelaide.

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### **Current research interests**

The Nutritional Genomics, DNA Damage Diagnostics and Prevention Group, led by Prof Fenech, has a research focus in investigating nutritional requirements for genome health maintenance and determining how genetic background influences nutritional requirement for preventing DNA damage. Damage to DNA is a critical underlying cause of developmental and degenerative disease. We aim to develop new approaches for modifying disease risk by determining which nutrients and foods are important for optimising genome health. Prof Fenech is renowned for developing the cytokinesis block micronucleus (CBMN) assay, which is a quick and reliable technique for detecting abnormalities in chromosomes. The CBMN assay is now a standard technique used by major pharmaceutical companies and the US Food and Drug Administration (FDA,) for determining the safety of pharmaceuticals, food ingredients and radiation-emitting devices, and has been used successfully to identify dietary deficiencies and excesses associated with DNA damage in humans. The laboratory's research is now also focusing on dietary on stability and maintenance of critical regions of chromosomes, such as telomeres. The central research aim of the laboratory is to determine which micronutrients are required for genome health maintenance in an individual (i.e. personalised nutrition) by developing minimally invasive diagnostics to measure dietary effects on DNA damage in easily accessible target tissues. URL: <http://www.csiro.au/people/Michael.Fenech.html>

### **Key references:**

- 1 Title: [An increased micronucleus frequency in peripheral blood lymphocytes predicts the risk of cancer in humans](#) Author(s): Bonassi S, Znaor A, Ceppi M, et al. **CARCINOGENESIS** Volume: **28** Issue: **3** Pages: **625-631** Published: **MAR 2007**
- 2 Title: [Methylenetetrahydrofolate reductase C677T polymorphism, folic acid and riboflavin are important determinants of genome stability in cultured human lymphocytes](#) Author(s): Kimura M, Umegaki K, Higuchi M, et al. **JOURNAL OF NUTRITION** Volume: **134** Issue: **1** Pages: **48-56** Published: **JAN 2004**
- 3 Title: [Cytokinesis-block micronucleus cytome assay](#) Author(s): Fenech M **NATURE PROTOCOLS** Volume: **2** Issue: **5** Pages: **1084-1104** Published: **2007**
- 4 Title: [The Genome Health Clinic and Genome Health Nutrigenomics concepts: diagnosis and nutritional treatment of genome and epigenome damage on an individual basis](#) Author(s): Fenech M **MUTAGENESIS** Volume: **20** Issue: **4** Pages: **255-269** Published: **JUL 2005**
- 5 Title: [A quantitative real-time PCR method for absolute telomere length](#) Author(s): O'Callaghan NJ, Dhillon VS, Thomas P and Fenech M. **BIOTECHNIQUES** Volume: **44** Issue: **6** Pages: **807-809** Published: **MAY 2008**