Title of Project: Assessment of iron requirements in major Asian ethnicities by stable isotope techniques

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Short Description

Iron is an essential nutrient. Physiological losses have to be constantly replaced to remain in iron balance. A negative iron balance results in iron deficiency and iron deficiency anemia which affects work performance, resistance to infection and increases morbidity and mortality of mother and child around birth. A positive iron balance results in iron accumulation in the body. Iron overload has been associated with cardiac disease, liver damage and arthritis and is suspected to play a significant role in the development of chronic disease in the elderly.

Current recommendations for dietary iron intake are based on a single study in 1968 which yielded data on iron turnover in a small cohort of Caucasians and Indian males. These data have been translated to dietary iron requirements that are uniformly valid for all adults, irrespective of ethnicity. Because of a lack of data, recommendations for children, infants and women of childbearing age are based on the same set of data with some degree of moderation.

The aim of this project is the re-assessment of iron turnover in adults, in general, and the first ever direct determination of physiological iron requirements in Asians. Iron turnover will be determined by oral administration of a stable isotope tracer (\(^{57}\text{Fe}\)) and by monitoring the appearance and fate of the tracer in erythrocytes will over 18-24 months. Erythrocte bound tracer will be quantified via high precision isotope ratio measurements using thermal ionization mass spectrometry. Tracer fate from the body will be assessed by computational mutli-compartment modeling techniques. Studies will be conducted in Chinese, Malay, Indian and Caucasian males in Singapore for identification of ethnic differences in iron requirements. Depending on study progress, assessments will be expanded to other population groups (women of childbearing age, elderly subjects or physically highly active subjects which are known to suffer from increased iron losses). The project is expected to yield new reference data for the assessment of human iron requirements and recommended dietary iron intake.