

Selenium in cereals compared with other geochemical predictors of human selenium status in China.

J D Appleton¹, Li Jiayi², Zhang Qiling², C C Johnson¹, Ge Xiaoli², F M Fordyce¹ and Zhang Guangdi²

¹ British Geological Survey, Keyworth, Nottingham, NG12 5GG, UK. ² Institute of Rock and Mineral Analysis, Ministry of Geology and Mineral Resources, 26 Baiwanzhuang Street, Beijing 100037, China.

People living in the rural areas of China derive much of their Se intake from locally grown cereal crops. Multidisciplinary studies have been carried out to evaluate the relative merits of selenium (Se) in cereals, drinking water, and soil as predictors of human selenium status, oesophageal cancer incidence (Cixian County), Keshan disease (Zhangjiakou area, Hebei Province and Lichuan County, Enshi District) and selenium toxicity (Enshi District). In the Cixian area, all sample media are equally effective predictors of human selenium status that, contrary to expectations, increases from the low oesophageal cancer area to the high cancer area. In the Keshan disease study areas, Se in grain and Se in drinking water were generally the most reliable predictors of human selenium status. Total Se in soil is strongly controlled by adsorption onto organic matter, secondary Fe oxides and clay minerals and does not correlate with Se status or disease incidence. Water soluble Se in soil within the Keshan disease belt is generally so low that it can not be used to discriminate between villages with low and high disease incidence rates. Whereas the presence of carbonaceous rocks exerts the strongest control on human Se exposure in the Enshi Se toxicity area, Se uptake into cereal grains is strongly influenced by soil pH. Consequently, water soluble Se and grain Se are better predictors of human Se status and toxicity risk than total soil Se.