

ABSTRACT

We sought to elucidate the impact of diet, cyanide or cyanate exposure on mammalian cyanide detoxification capabilities (CDC). Male rats (~8weeks old) (N=52) on 75% sulfur amino acid (SAA)-deficient diet were treated with NaCN (2.5mg/kg bw) or NaOCN (50mg/kg bw) for 6weeks. *Macaca fascicularis* monkeys (~12years old) (N=12) were exclusively fed cassava for 5weeks. CDC was assessed in plasma, or spinal cord, or brain. In rats, NaCN induced seizures under SAA-restricted diet whereas NaOCN induced motor deficits. No deficits were observed in non-human primates. Under normal diet, the CDC were up to ~80× faster in the nervous system (14ms to produce one μmol of thiocyanate from the detoxification of cyanide) relative to plasma. Spinal cord CDC was impaired by NaCN, NaOCN, or SAA deficiency. In *M. fascicularis*, plasma CDC changed proportionally to total proteins ($r=0.43$; $p<0.001$). The plasma CDC was ~2× relative to that of rodents. The nervous system susceptibility to cyanide may result from a "multiple hit" by the toxicity of cyanide or its cyanate metabolite, the influences of dietary deficiencies, and the tissue variations in CDC. Chronic dietary reliance on cassava may cause metabolic derangement including poor CDC.