

## New insights into the etiology of human disease by probing the bioinorganic chemistry of the bloodstream



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### ABSTRACT

Despite extensive research, the etiology and the biomolecular origin of many grievous human diseases, including Alzheimer's Disease, multiple sclerosis and Parkinson's disease, remains poorly understood and is regarded by many as one of biology's biggest challenges in the 21<sup>st</sup> century. In view of the fact that the human genome project has so far been rather insufficient in providing much needed insight into the origin of human disease, we are left with 'environmental factors' as potential root causes. Anthropogenic activities have, in fact, progressively increased the mobilization of toxic metals and metalloid compounds from the earth's crust into the global environment. The concomitant increased dietary exposure of certain human populations to these persistent pollutants and their subsequent absorption into the systemic blood circulation are therefore of increasing concern. Although the average concentrations of several toxic metals and metalloids in human blood are now firmly established, their interpretation with regard to their health relevance is exceedingly difficult. Our lack of understanding the etiology of human disease combined with the detection of several inorganic environmental pollutants in human blood suggests that a better understanding of the bioinorganic chemistry of toxic metals and metalloid compounds in the bloodstream may contribute to establish functional connections between the exposure of humans to certain metals and specific diseases. To this end, we have elucidated the erythrocyte-mediated bioinorganic basis for the antagonistic interaction between the environmentally abundant inorganic pollutants arsenite and mercuric mercury with the essential ultra trace element selenium in the bloodstream. After a brief discussion of the health relevance of these findings, a promising proteomic approach is introduced which is eminently suited to provide exciting new insights into other disease-relevant bioinorganic chemistry processes in the mammalian bloodstream.

### Education

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