

Hadi Ansarihadipour

Department of Biochemistry and Genetics, Faculty of Medicine, Arak University of Medical Sciences, Arak, Iran.
hadyansary@yahoo.com

Introduction

Background: Industrial metals induce various toxicities such as cytotoxicity, genotoxicity neurotoxicity, hepatotoxicity and hematotoxicity. This study focused on the oxidative effects of aluminium (Al), copper (Cu), iron (Fe) and lead (Pb) ions on blood proteins.

Material and Methods

Methods: Blood samples were collected from healthy volunteers. Age, weight and sex were determined as demographic parameters. Blood samples were incubated in isotonic phosphate buffer pH 7.4 and different doses of Al, Cu, Fe and Pb ions at 37 °C with shaking under aerobic condition. Carbonyl content of proteins (PCO) were calculated as oxidative marker. Protein content was estimated by measuring the optical density of samples at 280 nm, using bovine serum albumin as standard. Concentrations of oxy-Hb, metHb and hemichrome were calculated according to Hb absorbance at 560, 577 and 630 nm. The data was analyzed using Excel and SPSS software.

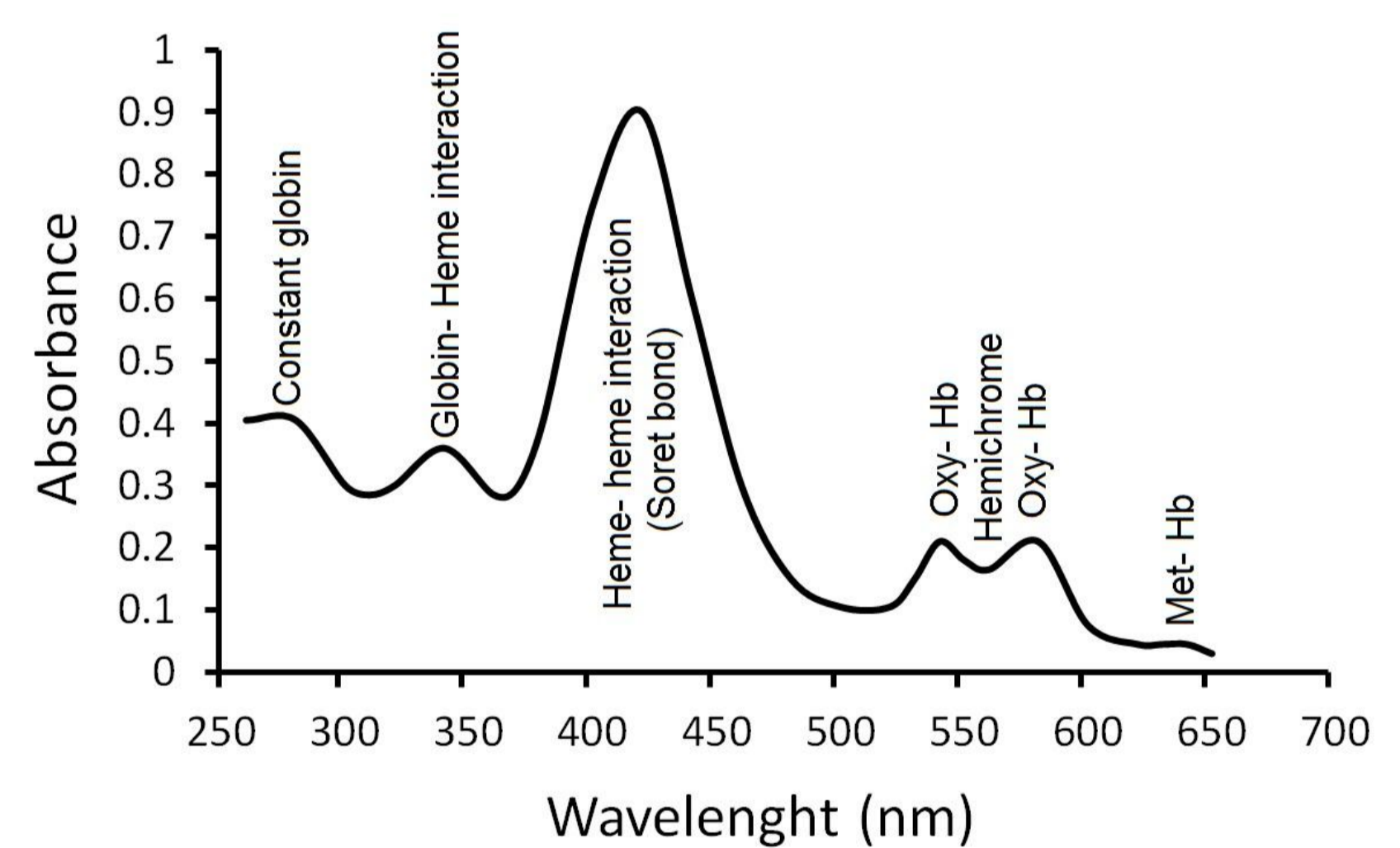
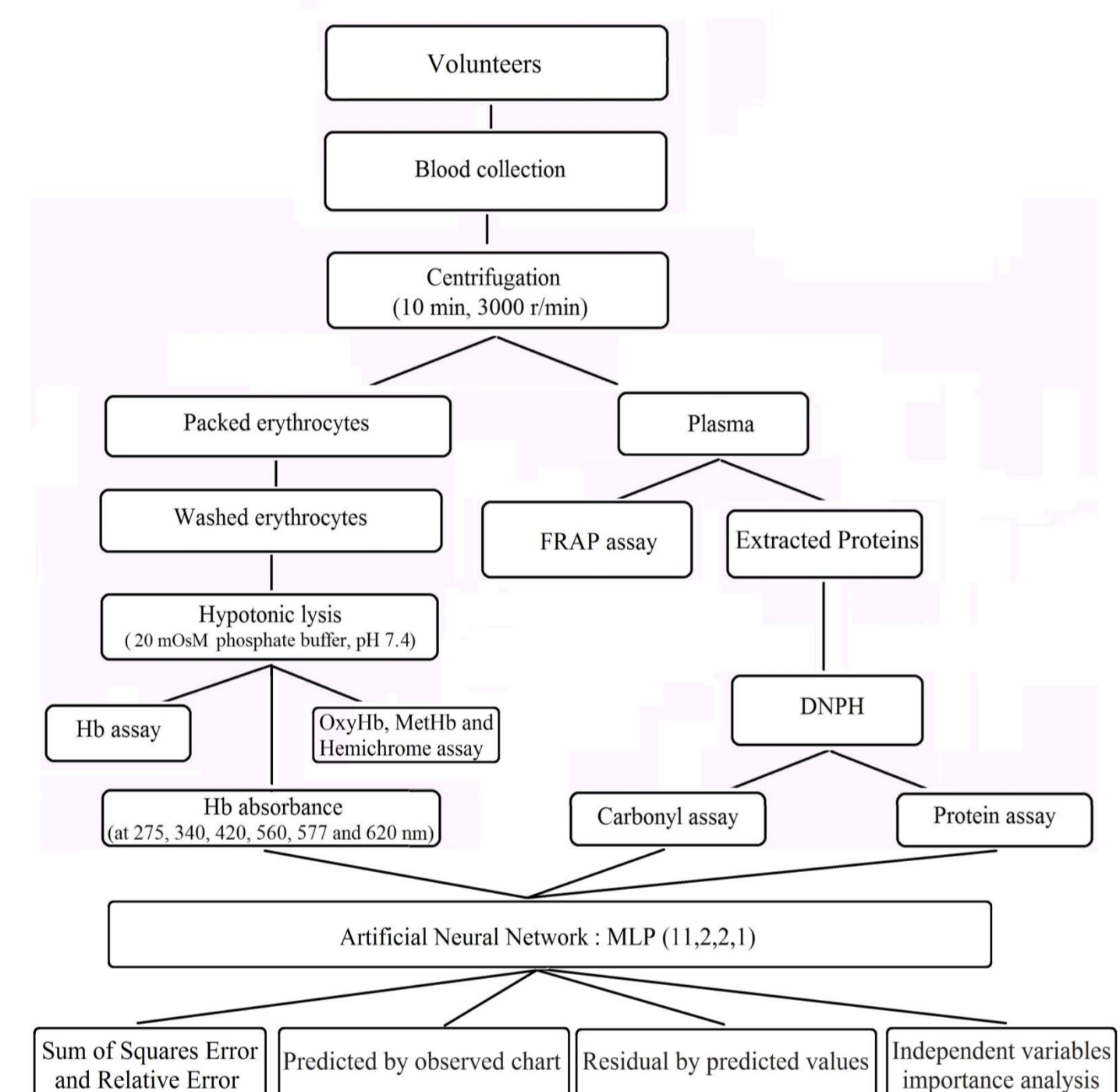
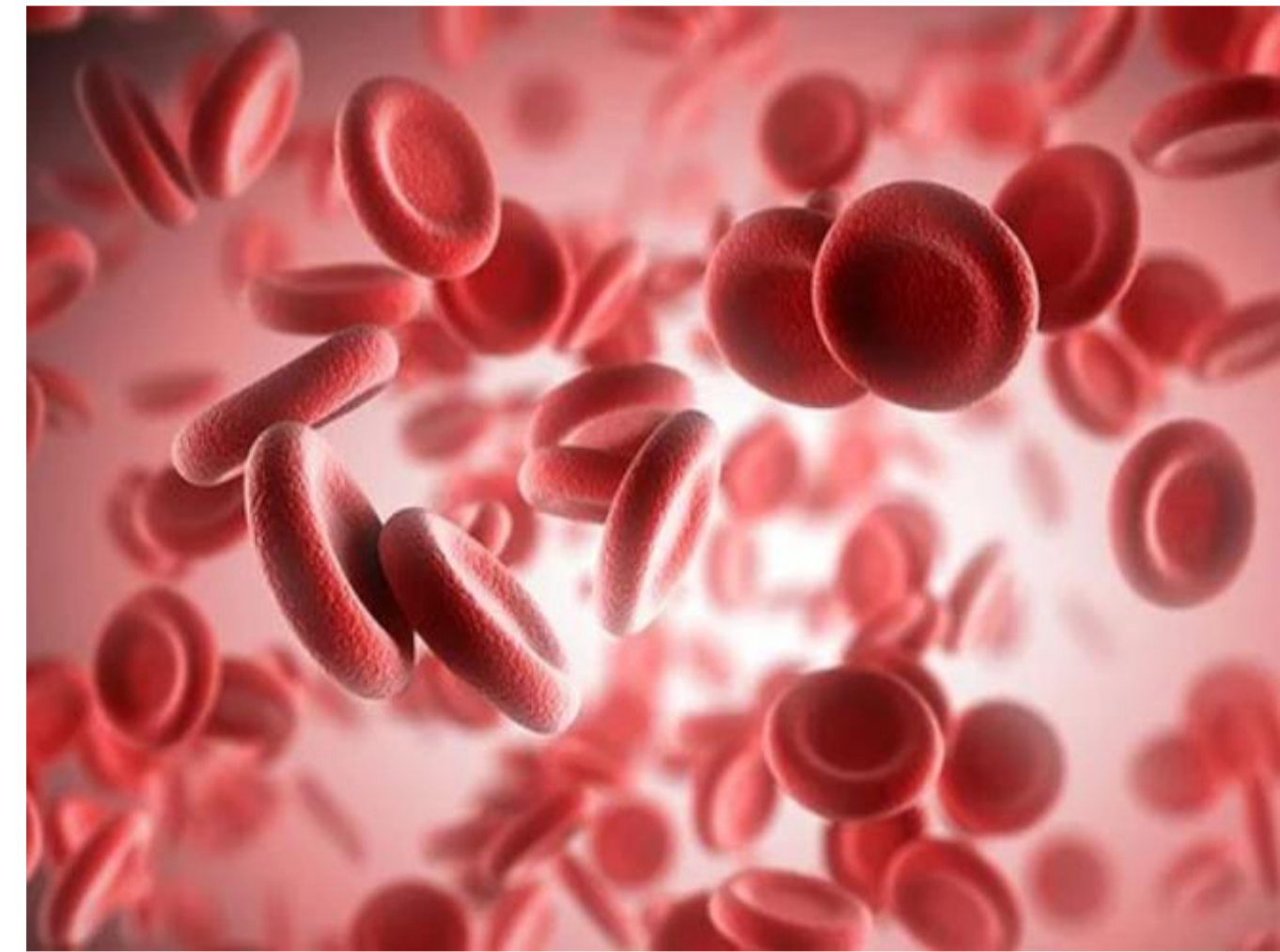
Results and Discussion

Results: Measurement of protein oxidation in Al, Cu, Fe and Pb treated samples, revealed a significant increase of 57.69 to 206.25% in carbonyl content of plasma proteins. Also a decrease in oxyHb and increase in metHb and hemichrome concentrations were observed after incubation with different doses of Al, Cu, Fe and Pb.

Conclusion

Conclusion: Our results demonstrated the conformational and structural modifications of hemoglobin and plasma proteins during exposure to industrial metals. Also we presented a reproducible and reliable algorithm of experiments to evaluate the oxidative effects of toxic metals on plasma proteins.

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1. **Choleglobin:** an increase at 700 nm.
2. **Met- Hb:** a shoulder at 630 nm.
3. **Ferryl Hb:** lack of a shoulder at 630 nm.
4. **Oxy- Hb:** an increase at 577 and 542 nm.
5. **Hemichrome:** a shallow trough at 560 nm.
6. **Hem-hem interaction bond (soret):** at 420 nm.
7. **Globin-hem interaction bond:** at 340 nm.
8. **Constant globin:** at 275 nm