



CZ.1.07/2.4.00/31.0023

Tento projekt je spolufinancován z Evropského sociálního fondu a státního rozpočtu České republiky.

STUDIJNÍ MATERIÁL

HLADINY METALOTHIONEINU U PACIENTŮ SE ZHOUBNÝMI NÁDORY

Ing. Kateřina Tmejová, Ph.D.



INVESTICE DO ROZVOJE VZDĚLÁVÁNÍ

Název: METALLOTHIONEIN Levels in PATIENTS WITH MALIGNANT TUMOUR

Školitel: Kateřina Tmejová

Datum: 5.2.2013

Reg. č. projektu: CZ.1.07/2.4.00/31.0023

Název projektu: Partnerská síť centra excelentního bionanotechnologického výzkumu



Metallothionein

Properties

- isolated in 1957 by Margosh and Vale from horse kidney
- low molecular protein (6-10 kDa)
- cystein rich protein
- no aromatic aminoacides

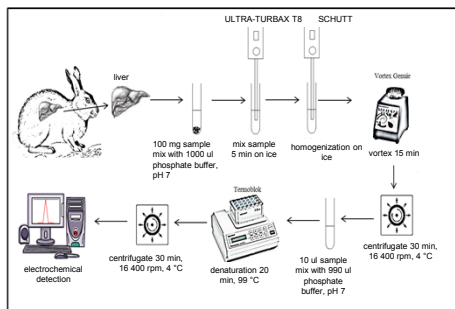


Functions

- protection to heavy metals
 - antioxidant
 - bounding of heavy metals (Cd, Hg, Pb) after intoxication of organism and by this way heavy metals are „destroyed“
 - conservation of oxidative-reduction conditions
 - metal ions transportation
 - expression regulation
- possible prognostic marker at cancer diseases

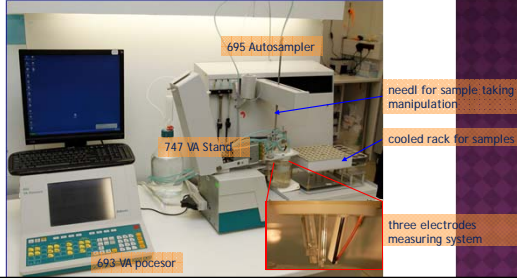
Sample preparation for metallothionein measurement

- blood
- animal sample (liver, kidney, muscle,...)



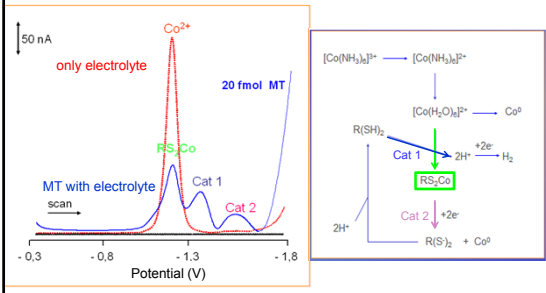
Electrochemical determination of metallothionein

- 747 VA Stand with 693 VA processor and 695 Autosampler
- three electrodes measuring system
- electrolyte: Brdička solution: 1mM $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$ and 1mM ammonium buffer (NH_3 (aq) + NH_4Cl)



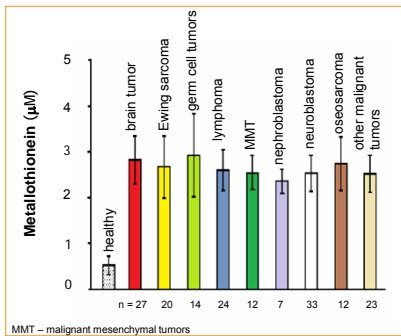
Electrochemical determination of metallothionein

- elektrolyte: Brdička solution
- in solution: catalytic reaction due to interaction of $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$ with $-\text{SH}$ group from protein



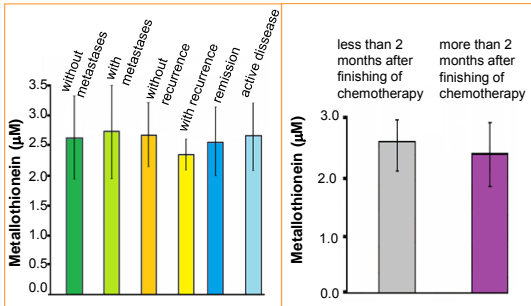
Metallothionein at children with cancer diseases

- 172 patients
- 71 girls and 101 boys
- age: 0,1 – 19,5



MMT – malignant mesenchymal tumors
Kruscova et al.: Serum metallothioneins in childhood tumors - possible prognostic marker, in press

Metallothionein at children with cancer diseases



Kruseeva et al. Serum metallothioneins in childhood tumors - possible prognostic marker. in press

Summary

- MT levels were determined at 172 children patients with different malignant tumors.
- Significant difference between MT level and tumor type was not found.
- The highest MT level was found in germ cell tumor (2.94 ± 0.9) µM and brain tumor (2.82 ± 0.5) µM.
- Healthy adults have MT level 5x lower than patients with germ cell tumors.
- Important decrease of metallothionein was found after more than 2 months after finishing of chemotherapy.
- Metallothionein shows as a promising cancer marker.

Acknowledgement

Laboratory of Metallomics nad Nanotechnologies



prof. Ing. René Kizek, Ph.D.
doc. RNDr. Vojtěch Adam, Ph.D.

Supported by: NANOBIMETALNET
CZ.1.07/2.4.00/31.0023

THANK YOU FOR YOUR ATTENTION.
