



CZ.1.07/2.4.00/31.0023

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

STUDIJNÍ MATERIÁL

MOLEKULÁRNÍ ASPEKTY U REZISTENTNÍCH KMENŮ *S. AUREUS*

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INVESTICE DO ROZVOJE VZDĚLÁVÁNÍ

Název: Molecular aspects of *Staphylococcus aureus* resistant strains

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Staphylococcus aureus

- G⁺ bacteria of the genus *Staphylococcus* (Ø 1 µm)
- often cause of infections
- pathogenic - production of toxins
- in 1/3 of the population naturally presented on the skin and mucous membranes
- may be presented in salami, pork, potato salad and ice cream

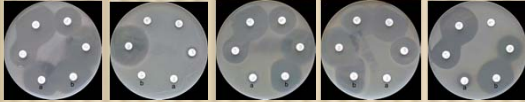
Treatment and prevention

- localized infections - surgically
- 90 % of staphylococci are resistant to penicillin → use of penicillin, which inhibits beta-lactamase
- macrolides, cephalosporins, aminoglycosides, tetracyclines etc.
- carriage – local antibiotic mupirocin
- prevention – vaccines to stimulate specific immunity



Resistance

- resistance (*from Latin*)
- biological resistance = resistance x environment effects
- resistance genes code genetic information, which can be changed by environmental factors



Aims of study

- comparison of biochemical markers in resistant (Ag, Cu, Cd, Zn and Pb) and non-resistant *Staphylococcus aureus*
- comparison of DNA changes in resistant (Ag, Cu, Cd, Zn and Pb) and non-resistant *Staphylococcus aureus*

Preparation of resistant strains of *S. aureus*

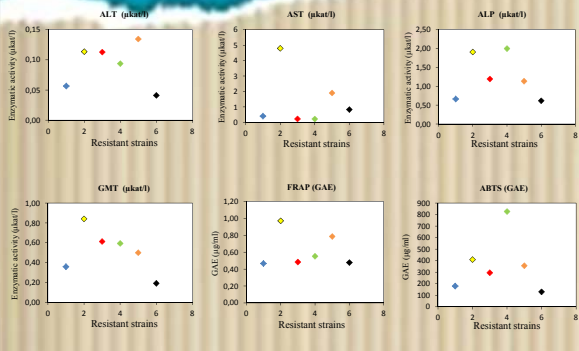
- *S. aureus* + 2 mM Ag, Cu, Cd, Zn or Pb
- lowest dose of metal = 50 μ M
- increase of 50 μ M of metal to the maximum possible dose for the regeneration of *S. aureus*
- possible to revitalize its resistant strain in medium without the addition of metal

Measurement

- spectrophotometry – BS 400
- electrochemistry (methalothionein, height of peaks)
- HPLC (GSH, GSSG)
- Multiskan EX (STAPHYtest 24)
- MALDI-TOF
- isolation of DNA (Magna Pure), PCR, gel electrophoresis

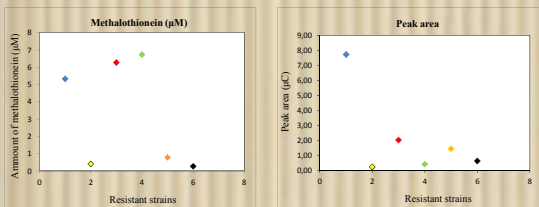
Spectrophotometry BS 400

◆ S.a. ◆ Ag ◆ Cu ◆ Pb ◆ Zn ◆ Cd

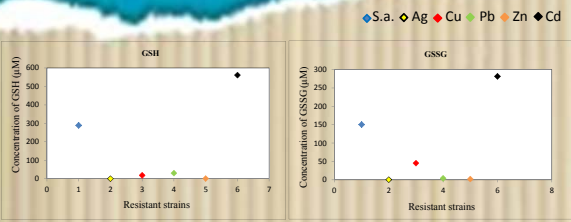


Electrochemistry

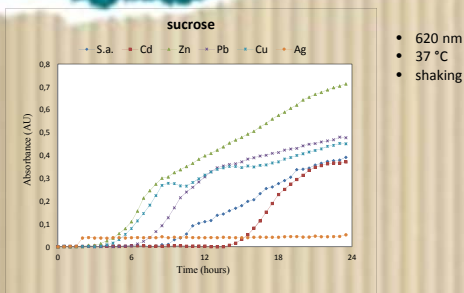
◆ S.a. ◆ Ag ◆ Cu ◆ Pb ◆ Zn ◆ Cd



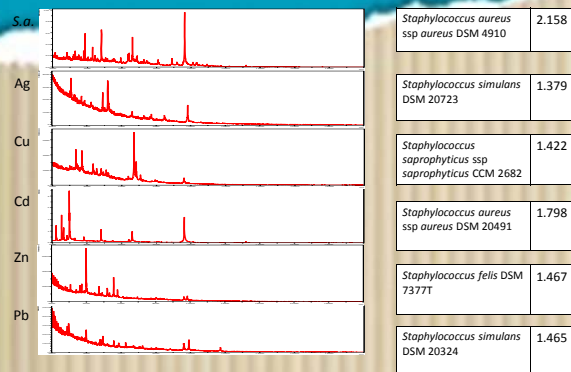
Glutathione



Multiskan EX (STAPHYtest24)



MALDI-TOF



Conclusion

- comparison of resistant and non-resistant strains of *S.aureus*
- used metals for resistance production: Ag, Cu, Cd, Zn a Pb
- substantial changes of biochemical properties, DNA structure



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Thank you for your attention