



СЕКЦІЯ 10
ГІГІЕНА СЕРЕДОВИЩА І ВИВЧЕННЯ НОВИХ АНТИМІКРОБНИХ РЕЧОВИН
В ЕКСПЕРИМЕНТІ І КЛІНІЦІ

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SUBACUTE TOXICITY OF SPHERAL SILVER NANOPARTICLES IN RATS

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Silver nanoparticles (SNP) are nanoparticles of silver of between 1 nm and 100 nm in size. They are becoming increasingly prevalent in consumer products. Numerous shapes of nanoparticles are constructed depending on the application at hand. Commonly used silver nanoparticles are spherical, but diamond, octagonal, and thin sheets are also used.

Their extremely large surface area permits the coordination of a vast number of ligands. The properties of silver nanoparticles applicable to human treatments are under investigation in laboratory and animal studies, assessing potential efficacy, toxicity, and costs.

Although silver nanoparticles are widely used in a variety of commercial products, there has only recently been a major effort to study their effects on human health. There have been several studies that describe the *in vitro* toxicity of silver nanoparticles to a variety of different organs, including the lung, liver, skin, brain, and reproductive organs.

The aim of the work was to provide the hygienic assessment of harmful effects of spherical silver nanoparticles obtained by the method of photostimulated synthesis.

Three groups of animals (8 rats in each group) were daily intraperitoneally administered with a SNP solution (5 mg/kg, 1 mg/kg and 0.1 mg/kg concentration). Fourth group - biological control for 14 days. On 14th day, the animals were removed from the experiment by decapitation under mild ether anesthesia.

The following changes in the internal organs of rats were observed after the introduction of spherical nanosilver in a dose of 5 mg/kg: pronounced venous perfusion of the cortical and cerebrospinal fluid and the papilla of the kidney, the reversible swelling of the epithelium of the convoluted tubules with prevalence in the form of hydroperic swelling (72% $p < 0.05$), reversible swelling of hepatocytes (44%, $p < 0.05$), pronounced venous plethora of central and peripheral hepatic lobes, reversible swelling of nuclei of cardiomyocytes (28%, $p < 0.05$), pronounced venous plethora myocardial infarction, uneven venous plethora of walls of respiratory departments of lungs (68%, $p < 0.05$). Morphological changes in the studied organs of animals of other groups were not detected.

The intensity of pathomorphological changes under the effect of silver nanospheres increased in a line: heart, liver, lungs, kidneys.

So, silver nanospheres have a pronounced toxic effect at the dose 5 mg/kg. The target organs for the spherical SNP are kidneys, liver, heart, lungs, and brain.

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PREVALENCE OF METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS
AMONG PATIENTS WITH INFLAMMATORY PROCESSES IN CHERNIVTSI REGION

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Antimicrobial resistance stays a major global health concern, last years. It was called by World Health Organisation as one of the most urgent health threats of our time. Methicillin-resistant *Staphylococcus aureus* (MRSA) infection is still a major global healthcare problem. The clinical significance of MRSA is due to the fact that such strains are resistant to all β -lactam antibiotics: penicillins, cephalosporins, carbapenems. It is known from the literature about the geographical differences in the MRSA prevalence.

The aim of our study was to study the prevalence of MRSA among clinical strains of staphylococci, that were isolated in 2019 from patients with different pathology in the Chernivtsi



region. 306 clinical isolates of *S. aureus* from patients with inflammatory processes of different localizations were studied. The presence of methicillin-resistance in isolated strains was determined by a surrogate test with cefoxitin. In all strains, sensitivity to β -lactam antibiotics, aminoglycosides, fluoroquinolones, macrolides, clindromycin and trithromycin, clindromycin, and trithromycin, and clitromycin were also determined. Technique for antibiotic sensitivity determination was conducted according to the CLSI recommendations, 2017. Discs with antibiotics, manufactured by Oxoid, were used.

According to our data presented in the table 1, the prevalence of isolation of *S. aureus* from clinical material and the proportion of MRSA differ depending on the location of the inflammatory process. Almost half of all isolated and studied strains were isolates from the mucosa of the oropharynx, but the share of MRSA among them was not large - 3.36 %. While 15.0 % of nasal strains belonged to MRSA. The latter confirms the importance of controlling the spread of *S. aureus* nasal carriers. Our results correlate with the data of literature sources, which widely state variation in the prevalence of MRSA in European countries from < 1 % in the north to > 40 % in the west and south.

Table

The frequency of isolation *S. aureus* and the prevalence of MRSA among them

Localization of the inflammatory process	The frequency of isolation <i>S. aureus</i>		The prevalence of MRSA	
	amount	%	amount	%
Oropharynx	149	48.69	5	3.36
Feces	67	21.90	3	4.48
Vagina	31	10.13	2	6.45
Nose	20	6.54	3	15.00
Wounds, boils, pustules	20	6.54	0	0.00
External auditory canal	7	2.29	1	14.29
Urine	9	2.94	1	11.11
Other eco-niches	3	0.99	0	0.00
Total strains	306	100.00	15	4.9 \pm 2.19

When studying the sensitivity to antibiotics of isolated strains of MRSA, it was found that 9 of them, which is 60.0 % were resistant to 3-7 antibiotics of different groups. Therefore, MRSA may not only be resistant to β -lactam antibiotics. This proves the feasibility of using a surrogate test with cefoxitin to identify such strains and the correct choice of treatment tactics.

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APPROXIMATION OF KIDNEY INJURY IN ESSENTIAL HYPERTENSION PRESENCE DEPENDING ON THE CYP11B2 GEN POLYMORPHISM

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The combination of essential arterial hypertension (EAH) and diabetes is the leading independent cause of the kidney damage, accounting for 63% of all cases of chronic kidney disease (CKD).

The aim of the study was to evaluate correlations and develop the approximating models of the Chronic Kidney Disease (CKD) occurrence in essential arterial hypertension (EAH) patients depending on the Cytochrome 11b2 Aldosterone Synthase Gene (CYP11B2, rs1799998) allelic state. Screening of 100 patients with EAH, who underwent a complex of clinical-laboratory investigation with the following epidemiological, correlation, regression analysis, has been carried out. Mean age constituted 59.87 \pm 8.02 years. CHD was diagnosed taken into account the National Kidney Foundation recommendations (Kidney Disease: Improving Global Outcomes (KDIGO), 2012) according to glomerular filtration rate (GFR) decline, measured by CKD-EPI equations after Creatinine, or Cystatin-C blood level. All enrolled / screened patients signed the Informed Consent to participate in the research. Control group included 48 practically healthy persons of relevant age. Gene's nucleotide polymorphism CYP11B2 (-344C/T) was examined by polymerase chain reaction in 72 EAH patients and in the control group.