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STUDY REGARDING THE BIOACID CAPACITY OF THE UV RADIATION WITH WAVE LENGTH OF 254,8 nm ON *STAPHILOCOCCUS AUREUS*

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Abstract

The study was performed on the bioacid effect of the UV radiation on some bacteria, beginning from the idea that more and more devices generating UV are used in the disinfection and sterilization of the areas, of air and water. Were made different studies, test and trials on different species of micro organisms, due to the increased interest for this technology.

In the study we used the lamp generating UV radiation produced by the company Biocomp, which generates a radiation with the length of wave of 254,8 mm, with the electrical power of 30 W.

Keywords:*StaphylococcusAureus, bacteria, UV lamp*

INTRODUCTION

*Staphylococcus aureus*are presented under the form of spherical cocci Gram-positive(0,5-1,5µm Ø), disposed isolated, in diplo, occasionally in short chains and characteristically in non regulated groups, immovable, not demanding alimentary, aerobe-facultatively anaerobe, catalase-positive and oxidase-negative, cultivate on medium with increased concentrations of NaCl (7,5-10%).

Medical importance –determines communitarian or nosocomial infections that are remarked by the frequency and diversity, some with very serious evolution (bacterimias with secondary localizations, septic shock, toxic staphylococcus shock). Was proven capable to develop resistance to all the antibiotics used in therapy.

Habitat: 20-70% nasal bearers (greater percentages at the employees from hospitals), transitory presence on the level of the tegument, contaminates the external environment by hands, squamas, secretions, excretions.

Resistance to medium factors: resistant to conditions of dessication, resistant to the action of lysosome and fat acids from the level of the tegument, sensitive to the action of some antiseptics and disinfectants: ethylic alcohol 700 (after 60 min), iodate alcohol, hexachlorophene etc. Destroyed in 30min at the temperature of 600C and after 15 minutesat 121 oC.

MATERIAL AND METHODS

Was accomplished the bioacid effect of *Staphylococcus aureus*.

The study was performed atThe Clinical Laboratory of the Pneumophthisiology from Oradea.

All the tests were performed from stems of reference, standardized, produced and distributed by the company Thermo scientific and Remel.

The main purpose was to underline the energetic density of surface, with the help of which will be reduced an important quantity of germs from a test. A significant reduction of the germs is represented by 99,99 % of the initial number, namely of witness. Gradually, for the importance of the experiment is also the reduction of the number of germs with 90 %, 99 % of the initial number of colonies.

The tests were performed by using the UV emission with wave length of 253,7 nm, with electrical power of 30 W.The bactericide lamp is fixed on a wall from the room of the compartment of bacteriology, belonging to the Clinical Laboratory of the Pneumophthisiology from Oradea, positioned above the work table, used to sterilize the surface of the table and of the air from the room.

Necessary materials for the preparing of the seeding plates:

Dehydrated medium agar Columbia from the company Oxoid.

Dehydrated medium Sabourauwith selectivity for fungi (*Candadaalbicans*) Oxoidcompany.

Distilled water for the preparing of the medium.

Jars of glass of 250 ml, sterilized.

Electrical scale calibrated for the weighing of the dehydrated medium.

Autoclave of sterilization for the prepared medium.

Calibrated pH-meter.

Defibrinated buck blood that is added over the agar medium only in the moment of returning to the temperature of 37-39 °C, to avoid the hemolysis of the red blood cells.

Petri plates of plastic with diameter of 90 mm.

Equipment used:

Reference stems :*Staphylococcus aureus*

RESULTS AND DISCUSSION

The study accomplished on *Staphylococcus aureus*had asfinal result the destruction in percentage of 99,99 % of the colonies, according to the table:

Fig.no.1.*Staphylococcus aureus*,blood agar(http://www.microbes_med.sc.edu85)

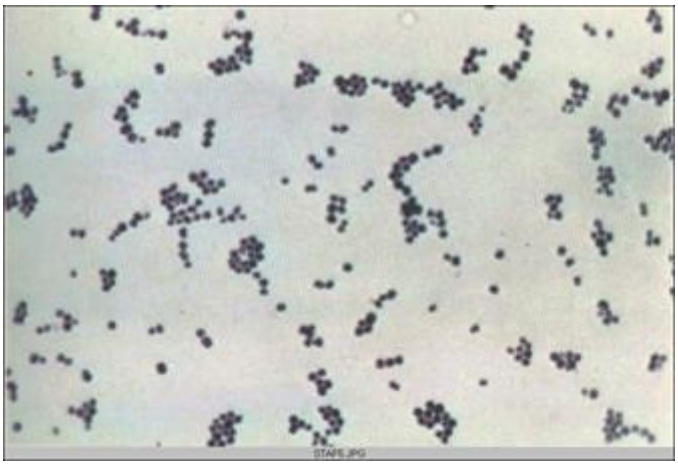

Fig.no.2. *Staphylococcus aureus*(www.esanatos.com)

Table no. 1

The results of the modifications of the number of germs, *S.aureus* by exposure to UVC, at different periods of time.

No.crt.	Period of exposure to radiation (min/sec)	Timeof exp.(sec)	No. of coloniesgrown	Percentage of destruction of colonies	Dose (ml/cm2)
1	Witness	0	1050UFC	0%	0
2	2 min and 25 sec	140	576UFC	47%	15
3	1 min and 17 sec	76	645UFC	42%7.5	7.6
4	1 min and 48 sec	106	599UFC	45%	11
5	2 min and 57 sec	176	400UFC	65%	17.8
6	3 min and 17 sec	197	219UFC	85%	19.7
7	3 min and 45 sec	225	90UFC	94%	24
8	4min and 28 sec	268	50UFC	97%	26,8
9	4min and 58 sec	298	19UFC	99,99%	29.8
10	5min and 27 sec	326	8UFC	99,99%	34

The energetic density on the surface by definition, is equal with the product from the energetic flux and the time when the exposure takes place, time measured in seconds. In the study, the energetic density on the surface was expressed in mJ/cm2**.** For the lamp used, that has the power of 30 W at a distance of 1 meter of test, the distributed power on 1cm 2 is of 0,1 mWUVC. This means that, if the constant distance was of 1 m was kept, in each direct point under the lamp, the density of energy is of 0,1 mJ/cm 2 at each second of exposure (named also the dose of UV exposure). Afterwards we structured in tables the results obtained and at the end we reported the obtained results with the specialty literature.

In order to verify the sterility at UV radiation, many researchers fathomed the studies on many species of micro organisms, among which also those studies by me. The limits of the lethal dose obtained by the experiment performed were compared with the data from the specialty literature.

In order to make comparisons were consulted the data offered from different publications, respectively the data given by the American Air and

Water for the estimation of reduction with 90 and 99 % of the number of germs for different species of micro organisms and viruses.

Staphylococcus aureus submittedto the period of time of 5 minutes and 20 seconds had significant results regarding the reducing of the number of colonies to 99,99%.

CONCLUSIONS

According to the specialty literature, the UV radiations from the UVC area have a bioacid potential, for this reasons they have direct applications in the sterilization and disinfecting of the work areas and the tools from the clinical medium.

The purpose of the present paper was to study the bioacid effect of the UV radiation with the length of wave of 273,5 nm, from the field of UVC on some bacteria and fungus that are met in the clinical medium.

From the experimental study performed we can reach to the conclusion that the fact that all the three types of bacteria, respectively: *Staphylococcus aureus, Streptococcus pyogenesand Pseudomonas aeruginosa*, and the fungus *Candida albicans*were strongly affected after the exposure to the UV radiations with wave length of 273,5 nm and power of 30 W.

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