A CHANCE FOR FUTURE ARCHIVES: DISINFECTION BY TREATMENT WITH IONIZING RADIATION

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The Impact of Biological Agents Present in the Archives of Occupational Health and Safety

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International attention payed to health, environment protection and human rights has considerably increased during the past five decades. Different environmental factors above the tolerance limits could impair the normal development, human health and labour capacity.
EU Statistics

The European Statistics Agency Report shows that in 2001 there were occupational illnesses related to exposure to bacteria, fungi and other biological agents.

This Report published in 2003 shows that in 2001 there were approximately 5900 respiratory diseases and 4,600 skin diseases in the 12 countries (EU12) (by extrapolation it was estimated that the 15 countries (EU15) figures were 10,000 and 8,000 respiratory diseases and skin diseases). The factors for these diseases can be chemical, physical or biological.
The microbiological quality of work environment in the archives was very little studied so far. The purpose of our study was to assess the microbiological charge of air in the work environment and to correlate the obtained results with other environmental factors, in order to evaluate their impact on human health.
Classification of biological agents is based on the effects of these agents on healthy workers.

According to GD 1092/2006, Article 5, the microbiological agents are classified into 4 risk groups, depending on the risk of infection to be submitted:

- Group 1 – comprises biological agents that are not likely to cause human disease;

- Group 2 - biological agents that cause human disease and represent a danger to workers, their propagation in the community is unlikely, there is usually effective prophylaxis or effective treatment;
- **Group 3** - biological agents that can cause serious illness in humans and constitute a serious hazard to workers, they may present a risk of spreading to the community, but there is usually effective prophylaxis or effective treatment;

- **Group 4** - biological agents that can cause serious human disease and is a serious hazard to workers, they may present a high risk of spreading to the community and there is no usually effective prophylaxis or therapy.
It is necessary to carry out such studies on the microbiology of air in the working environment and to correlate the results with environmental factors, providing useful information regarding relationships between conditioning biotic and non-biotic components.
Aeromicroflora analysis

The aeromicroflora analysis was performed in a very big state archive, which contains very old documents and the flow of people and papers is extremely high.

For the biological evaluation of air pollution from the archives we performed a set of microbiological seasonal analyses (spring, summer, autumn and winter).
Material and methods

Each set of exposures consisted of 5 Petri plates with sterile culture media, specific for the following groups of microorganisms: nutrient agar for the total number of germs (NTG, Levine medium for Gram-negative germs (GR -), Chapmann medium for staphylococci (SF), Holmes medium for streptococci (SN) and Sabouraud medium for fungi.
Results and discussion:

The total number of aerobic microorganisms varied between 2135 and 16711 CFU /m³. For all groups of organisms examined, maximum values were recorded.

The results of the microbiological quantitative assay

<table>
<thead>
<tr>
<th>The period</th>
<th>NTG CFU /m³</th>
<th>Gram – CFU /m³</th>
<th>SF CFU /m³</th>
<th>ST CFU /m³</th>
<th>Fungi CFU /m³</th>
<th>Total CFU /m³</th>
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<td>August 2007</td>
<td>11317</td>
<td>209</td>
<td>104</td>
<td>1152</td>
<td>3929</td>
<td>16 711</td>
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<tr>
<td>October 2007</td>
<td>628</td>
<td>126</td>
<td>73</td>
<td>304</td>
<td>1834</td>
<td>2 965</td>
</tr>
<tr>
<td>February 2008</td>
<td>596</td>
<td>60</td>
<td>31</td>
<td>243</td>
<td>1205</td>
<td>2 135</td>
</tr>
<tr>
<td>April 2008</td>
<td>890</td>
<td>288</td>
<td>104</td>
<td>924</td>
<td>2384</td>
<td>4 590</td>
</tr>
</tbody>
</table>
The interpretation of results

In conclusion, the results of the microbiological assessment showed that the total number of microorganisms, the number of haemolytic mezofile and the microorganisms included in the hazard Group II exceeded the superior accepted limits.
The classes of identified fungi are also part of Group II of the danger, according to HG1092 Article 5 HG1092/2006.

We also observed the simultaneous presence of several species of pathogenic microorganisms.
Simultaneous presence of several categories of microbiological agents HG1092/2006 falling under the second class of danger, exceeded the limits recommended by the literature (2500NTG/m3) requires the development of prevention and protection measures.
Biological Agents Effect on Health Status of Personnel Records

Regardless of the forms found in air conditioning germs and pathogens can cause disease in organisms exposed primarily through inhalation of contaminated suspension (drops, droplet nuclei, dust) causing respiratory disease, laryngitis, dermatitis, allergic bronchitis, infections of the skin, nails, eyes, can also affect the mucous membranes, skin, appendages, internal organs, lungs, bronchi, sinuses, etc.
To support the workers exposed to biological agents, in this paper has developed the recipe for an ointment character prophylactic antifungal protection. This ointment is the basis of a patent filed with OSIM no. A/00226/19.05.2010 currently under publication.

The invention also attended at the International Fair Hannover Messe 2011
Protective ointment, according to the invention, the active ingredient is a macromolecule formed by polymerization of glycerol carboxymethylcellulose, this polymer acts as a network to which the mesh size can be higher or lower depending on the respective percentages of carboxymethyl glycerin added. The phenosept is added due to the action of bactericidal and fungicidal composition outstanding.
The protective skin ointment supports an uniform hydrolipidic film with acts as a mechano-chemical barrier to avoid the development of microorganisms to the skin and don’t make a greasy skin for reducing the work capacity of the worker.

The protective film of the ointment is resistant during the work programm and it is easy washable.
The product is an antimycotic prophylactic and protective skin ointment, which supports the natural protective function of the skin and offers lasting protection in cases of workers exposed at biological agents such as Fungi and Bacteria.

The ingredients have low toxicity for human and environment and the used concentration have a protective role.
Conclusions

1. The present study is representing one of the few scientific background necessary for the elaboration of specific prevention and protection plans of Romanian workers.

2. The aeromicroflora analysis was performed in a very big state archive, which contains very old documents, and the flow of people and papers is extremely high.

3. The biological evaluation of air pollution from the archives we performed a set of microbiological seasonal analyses (spring, summer, autumn and winter).

4. The results of the microbiological assessment showed that the total number of microorganisms, the number of haemolytic mezofile and the microorganisms included in the hazard Group II exceeded the superior accepted limits.

5. To support the workers exposed to biological agents a team of researchers has created an protective skin ointment.
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