EDUCATION OF PUBLIC HEALTH PROFESSIONALS – MANAGEMENT, PREVENTION AND PROTECTION OF HEALTH AT WORK

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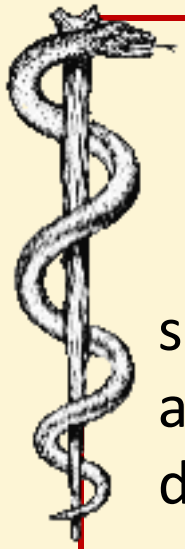
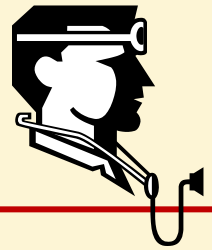
LADIES AND GENTLEMEN, DEAR GUESTS,

ALLOW ME TO GUIDE YOU THROUGH THE ACTIVITY OF OUR FACULTY OF PUBLIC HEALTH OF THE SLOVAK MEDICAL UNIVERSITY IN BRATISLAVA IN CONNECTION WITH THE EDUCATION OF PROFESSIONALS IN THE FIELD OF PUBLIC HEALTH - MANAGEMENT, PREVENTION AND PROTECTION OF HEALTH AT WORK.

Faculty of Public Health of Slovak Medical University in Bratislava educates students in bachelor's, master's and doctorate study program. It also educates physicians and public-health workers in several specialized study programs. The faculty has also a longtime focus on training health care workers in specialized study program Master of Public Health (MPH).

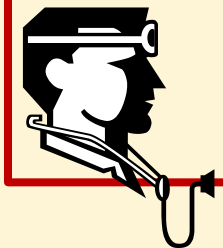


Specialized field of Master of Public Healts (MPH) educates specialists for management in public health, qualified to analyze the health of the population and identify the cause of disease in the population, formulate and coordinate priorities of government health policies and implement methods for prevention; to apply in practice acquired management knowledge and skills with a special focus on health management, medical equipment management and economic provision of health care and public health; to design and solve tasks and projects arising from the programs of health protection, health promotion and health education, in order to get the public for these objectives.

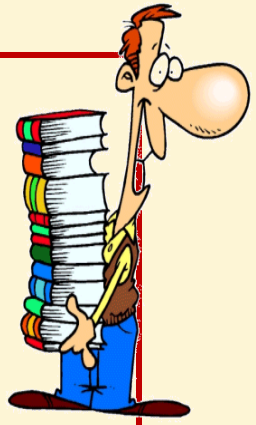


- One of the main focus of our faculty is education in the area of professional disease prevention, life without disability, reducing ineligibility to work, a positive influencing of the health determinants, and the education of public health managers - which includes prevention and protection of health at work.

- An important subject which we at the faculty teach, is "Health and safety at work." This subject is lectured by professors and associated professors from our university itself, by experts with practice or specialists from occupational medicine clinics.



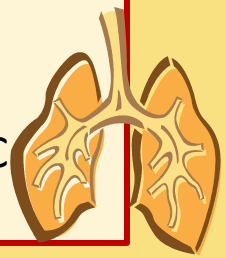
THE MAIN TOPICS OF THE MENTIONED SUBJECT ARE:



- Man and work environment; Protection and support of health at work ;
  Legislation in the field of health at work; Hygiene requirements for the construction and operation of workplaces;
- Principles of the working environment assessment; Physical factors in the work environment; Solid aerosols in the work environment; Industrial dusts; Professions exposed to nanoparticles; Health protection of workers against ionizing radiation; Workplaces with radiation; Administrative offices; Physiology of work; Ergonomics;

- Chemicals in the work environment; Measures to protect the health of workers at workplace with chemicals; Carcinogens and mutagens at work environment; Biological monitoring of occupational exposure to genotoxic chemicals; Biological factors in the work environment;
- Estimation, management and communication of professional risk; Hazardous works; Labour Health Service; Intervention programs in the workplace; Health protection requirements of selected groups of employees; Professional risks in selected industrial sectors; Psychology of work;
  The concept of Clinic of occupational diseases, definition and classification of occupational diseases; Compensation and reporting of occupational diseases;

General principles of differential diagnostics of professional and non-professional diseases; Supporting examinations in Clinic of occupational diseases; Medical preventative examinations; Intoxication - definitions, general mechanisms of poisoning, diagnostics, treatment, first aid; Occupational lung diseases; Reporting of occupational diseases; Epidemiology of occupational diseases and possible actual topics etc.



- In addition - we also teach students to apply for grants, enter and manage projects in these areas. Many students - mainly internal PhD students are directly involved in projects. They use the results from the projects during writing bachelor, master, rigorous, PhD., MPH and other works and theses.

OF COURSE, AS EDUCATIONISTS AND RESEARCHERS WE PUBLISH THE OBTAINED RESULTS OF OUR PROJECTS IN DOMESTIC AND FOREIGN SCIENTIFIC JOURNALS AND GIVE LECTURES AT NUMEROUS CONFERENCES AND PROFESSIONAL EVENTS.

In addition to education, Faculty of Public Health realizes also many research projects, which are focused on environmental health and cognition of causal links between environmental factors and human health.

- Many research projects concern the exposure to adverse environment and occupational factors (for example: asbestos, industrial dust, radiation, polychlorinated biphenyls, nanoparticles, etc.) in relation to the impact on employees' health and their subsequent preventive measures.

- In the previous projects, we examined the effects of asbestos dust on the health of workers exposed to asbestos in the long term and compared them with the state of health of employees exposed to asbestos substitutes - glass and basalt fiber dusts. Since the use of asbestos in the EU, USA. Australia, Japan and other industrialized countries is banned - but it is use for example in Russia, China and many developing countries and in the countries of third world - it is also necessary to monitor the health effects of industrial dusts, which are used as substitutes for asbestos. We investigated the employees professionally exposed to glass and basalt fibers.

WE FOUND OUT:

- *Significant changes in many respiratory parameters in persons exposed to asbestos - which signalizes its aggression on many parameters of defense and respiratory system.*

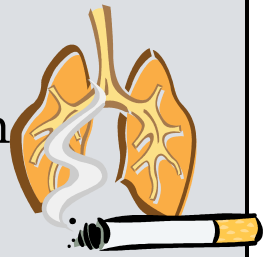
- *the values of examined parameters of the employees exposed to glass and basalt fibrous dust ranged from those found in the control group.*

- *Catching up the changes in mentioned parameters relative in time (before the radiological findings and clinical symptoms) - enable preventive and medical - hygienic measures for persons working in asbestos and other risks.*

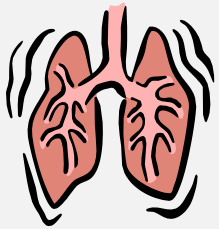
ALSO, WE SOLVED MANY INTERNATIONAL EXPERIMENTAL PROJECTS.

THE RESULTS OF OUR WORK SUGGEST:

- Serious inflammatory, cytotoxic and genotoxic changes in lungs after subchronic exposure (6 months) to amosite -AMO, refractory ceramic fibres-RCF or cigarette smoke-CS and amplification of AMO and RCF effect by CS.
- According to histological findings there were differences of lung tissue injury (fibrosis) between AMO (grade 8 according to Wagner) and RCF (grade 5) exposure and there was no fibrosis effect (grade 0) after cigarette smoke exposure.
- Histology of lungs indicated stronger impact of amosite in comparison with the examined substitutes.



TIME DEPENDENCE



Histological findings - grade according to Wagner	1-month exposure	3-month exposure	6-month exposure
Control	**0**	**0**	**0**
Asbestos – Amosite	**6**	**8**	**8**
Refractory ceramic fibres	**5**	**6**	**5**
Glass fibres	**5**	**5**	**-**

HISTOLOGY OF LUNGS (ACCORDING TO WAGNER SCALE – 6 MONTH EXPOSURE

Groups	Control	CS	AMO	AMO+CS	RCF	RCF+CS
Cellular changes	0	0	3	3	3	3
Fibrosis	0	0	8	8	5	5

ORDER OF FIBERS IN TERM OF RESPIRATORY TOXICITY (EXAMINED IN OUR LABORATORY)

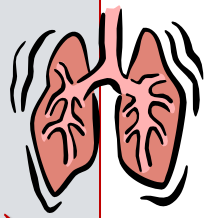
AMO > RW ≥ RCF > GF ≥ WF

*(**AMO** – asbestos Amosite; **RW** – Rock wool; **RCF** – Refractory ceramic fibres; **GF** – Glass fibres; **WF** – Wollastonite fibres)*

The objective of our other project was to provide data on the impact of different dimensions of fibres, fiber types, doses and duration of exposure on bronchoalveolar lavage parameters (BAL) studied. Both 24h and 3 months after intratracheal instillation of short and long asbestos (amosite) and wollastonite fibers (dose: 4mg/animal and 10mg/animal) •number of leukocytes/ml BAL, •number of alveolar macrophages/ml BAL, •percentage of granulocytes, • phagocytic activity and •viability of AM, •lactate dehydrogenase, •acid phosphatase, •tumor necrosis factor-α and •interferon-γ was investigated. Additionally, some parameters of antioxidant status and lung damage were investigated both 24h and 3 months after exposure to long amosite and wollastonite fibers.

THE RESULTS OF OUR STUDY INDICATE THAT:

- The increased toxic effects of industrial fiber dust depends on the length of exposure and dose escalation. We found the most significant changes in the BAL parameters and lung tissue, after exposure to asbestos fibers
- We confirmed the hypothesis by Stanton - that long thin fibers are more reactive than short thin ones.
- Lung disease development after exposure to long asbestos fibers could probably arise from two different mechanism **a)** lower dose (4mg/animal) results in increase of cytokine secretion with subsequent fibrosis development **b)** higher dose (10mg/animal) lead to the immunosuppression of defense mechanism factors of exposed host and thus contribute to the oncological disease.



THE ADVERSE EFFECT OF ASBESTOS HAS BEEN WELL RECOGNIZED IN BOTH OCCUPATIONAL AND GENERAL CIRCUMSTANCES. THESE FINDINGS RESULTED IN TRENDS TO SUBSTITUTE ASBESTOS BY FIBERS TECHNOLOGICALLY SIMILAR, YET WITH LOWER BIOLOGICAL CONSEQUENCES. HOWEVER, THE MECHANISM OF ASBESTOS AND OTHER FIBROUS DUST RELATED DISEASES HAS NOT BEEN FULLY EXPLAINED YET.

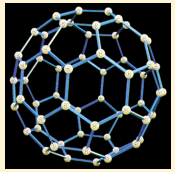
- *Results of our project were awarded with gold avard – „BAL and antioxidant state parameters in the process of the lung pathogenesis after exposure to long fibrous dusts“ and*
- *silver avard „Changes in some BAL-parameters - biomarkers in pathogenesis of lung diseases after exposure to fibrous dusts“ at the 9th International Conference on Occupational Respiratory Diseases, Kyoto, Japan where participated 800 research workers from 58 countries.*

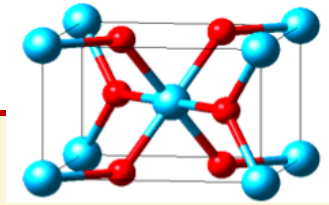
Although using the industrial fibrous dust in many sectors of industry is strategically important,

- its risk to health after prolonged exposure must be taken into account primarily.
- It is also necessary to examine the health effects before the start of its use in practice, which implies
- an important requirement for research – to monitor specifically the effects of industrial fibrous dust,
- especially the newly developed substitute fibers for asbestos - both in terms of experimental studies *in vitro, in vivo* and epidemiological studies.

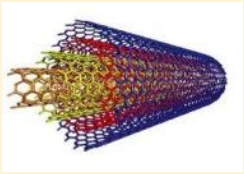
- Our other projects deal with nanoparticles and their effects on halth and professions that are exposed to nanoparticles.

- Nanoparticles (NP) are considered as substances (particles) that are less than 100 nm in size - in more than one dimension. They can be spherical, tubular, or irregularly shaped and can exist in fused, aggregated or agglomerated forms. They have extensive use: in electricity, electronics, optics, engineering, automobile, aerospace, military, construction, textile, chemical, food and consumer goods industry and in considerable measure they are also used in medicine (in diagnosis and therapy).





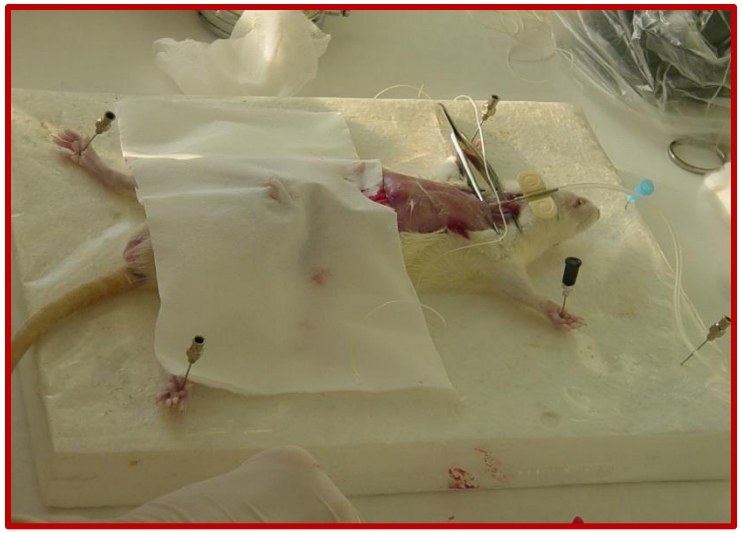
Many research groups are interested in the latest knowgledge s and findings about nanoparticles in terms of their characteristics, health effects, professional exposure to nanoparticles, the routes of entry into the body, legislation and preventive measures, analysis of risk as a result of occupational exposure to nanoparticles and classification of nanoparticles according to IARC (International Agency for Research on Cancer, Lyon).

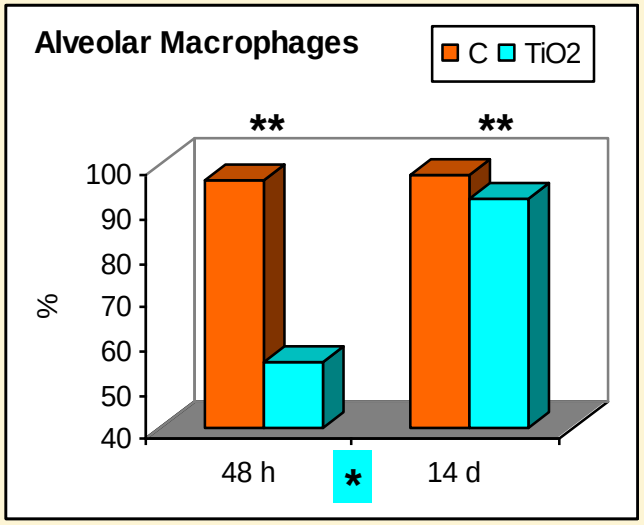


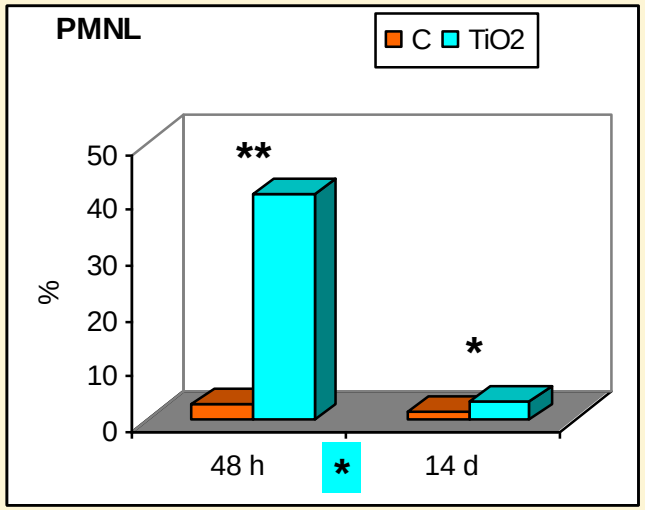
AT THE PRESENT WE ARE SOLVING THE IMPACT OF NANOPARTICLES ON THE RESPIRATORY TRACT, AND WHO EMPLOYEES ARE EXPOSED TO NANOPARTICLES - FOR EXAMPLE:

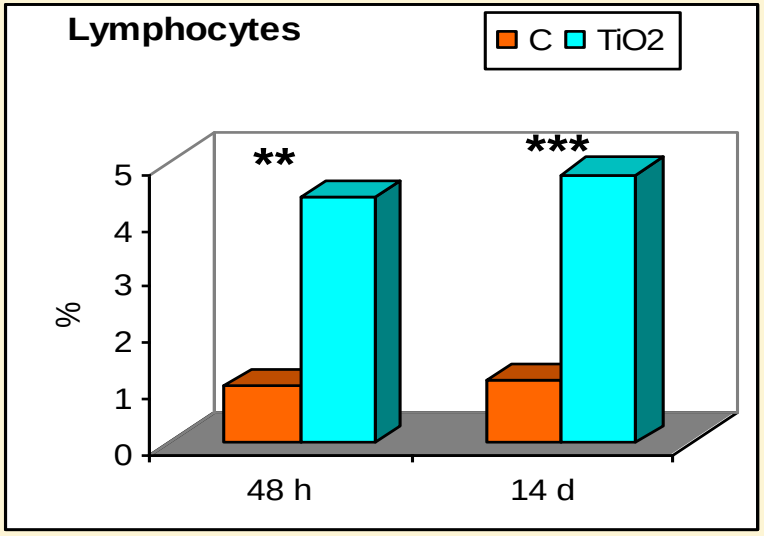
- Professions with exposure to CDNP (combustion-derived nanoparticles) - nanoparticles resulting from the combustion process
- Professional drivers and car repairers
- Welders
- Employees in Nanotechnology
- Painters - decorators
- Hairdressers
- Nanotechnology in Building
- Researchers
- Health-care workers
- Exposure to unknown nanoparticles

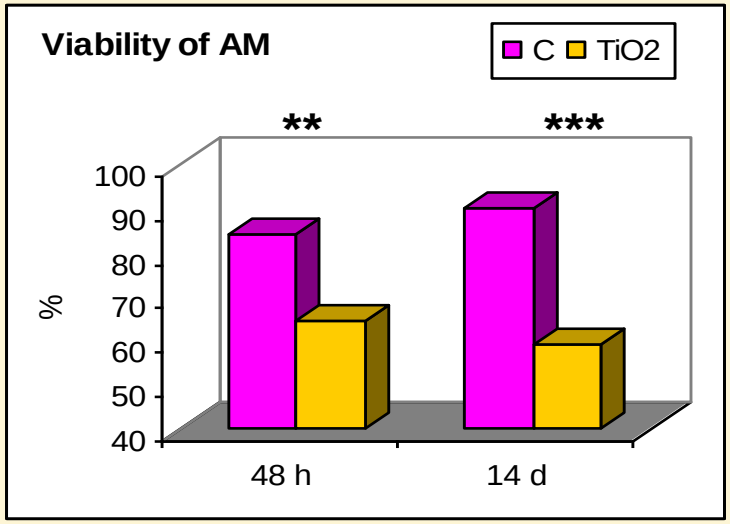
INTRATRACHEAL INSTILLATION AND PERFORMATION OF BAL

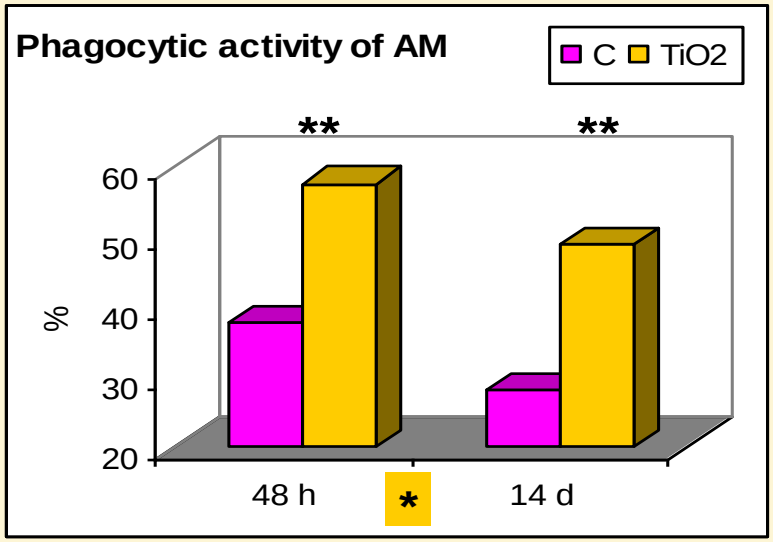


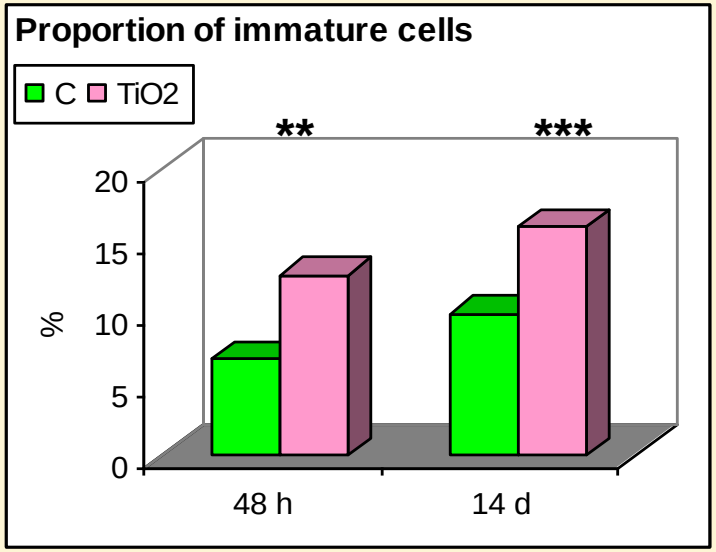

Alveolar Macrophages
C
TiO2
**
**
100
90
80
70
60
50
40
%
48 h
*
14 d

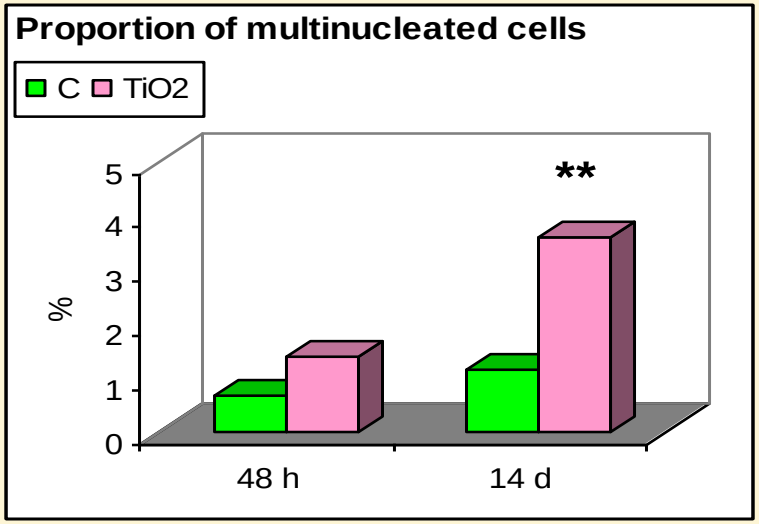

PMNL
C
TiO2
**
*
50
40
30
20
10
0
%
48 h
*
14 d

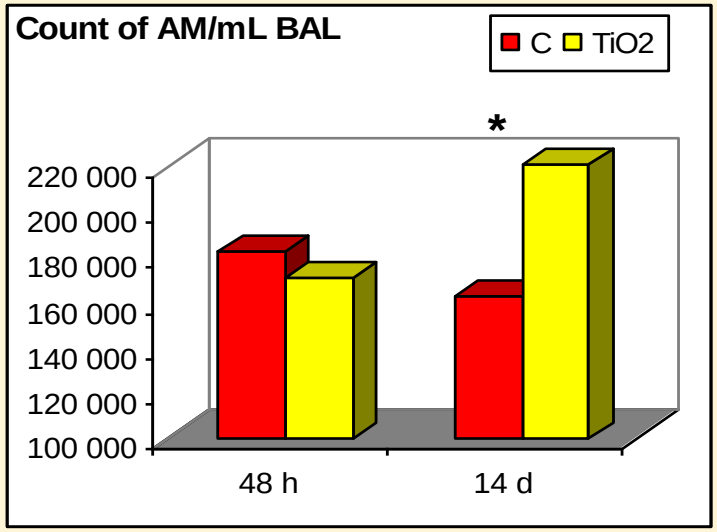

Lymphocytes
C
TiO2
**
***
5
4
3
2
1
0
%
48 h
14 d

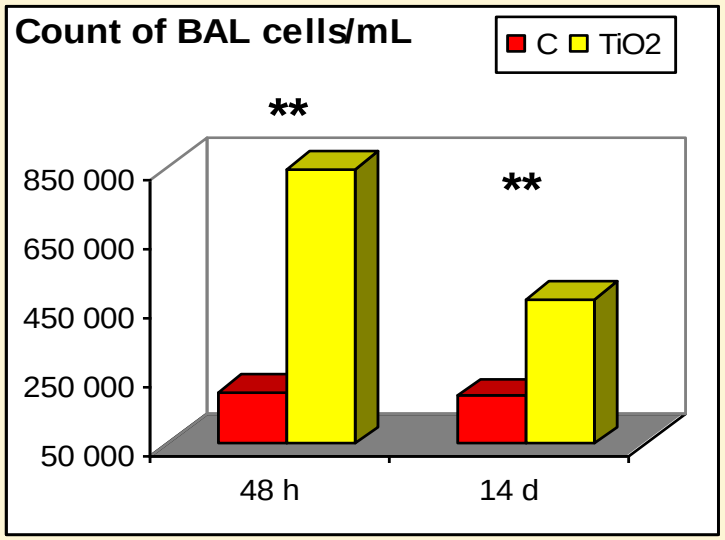

Viability of AM
C
TiO2
**
***
100
90
80
70
60
50
40
%
48 h
14 d

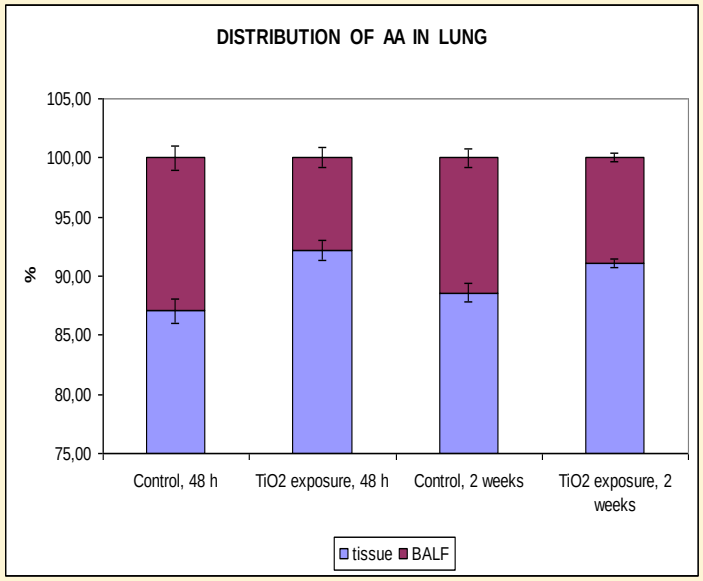

Phagocytic activity of AM
C
TiO2
**
**
60
50
40
30
20
%
48 h
*
14 d

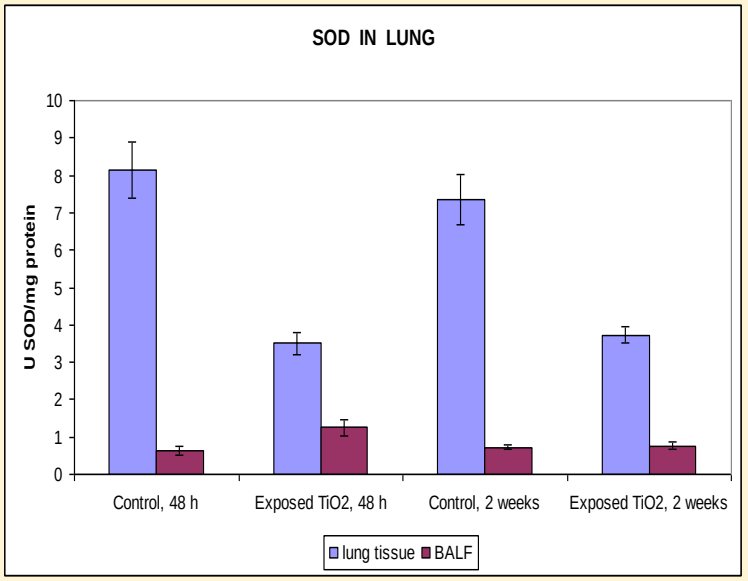

Proportion of immature cells
C
TiO2
**
***
20
15
10
5
0
%
48 h
14 d


Proportion of multinucleated cells
C
TiO2
**
5
4
3
2
1
0
%
48 h
14 d


Count of AM/mL BAL
C
TiO2
*
220 000
200 000
180 000
160 000
140 000
120 000
100 000
48 h
14 d


Count of BAL cells/mL
C
TiO2
**
**
850 000
650 000
450 000
250 000
50 000
48 h
14 d


DISTRIBUTION OF AA IN LUNG
105,00
100,00
95,00
90,00
85,00
80,00
75,00
%
Control, 48 h
TiO2 exposure, 48 h
Control, 2 weeks
TiO2 exposure, 2 weeks
tissue
BALF


SOD IN LUNG
10
9
8
7
6
5
4
3
2
1
0
U SOD/mg protein
Control, 48 h
Exposed TiO2, 48 h
Control, 2 weeks
Exposed TiO2, 2 weeks
lung tissue
BALF

In addition to

- *education - our results*
- *contribute to the necessary international scientific information and*
- *serve to the recommendation for practice and regulatory purposes of occupational health protection.*

THANK YOU VERY MUCH FOR YOUR ATTENTION !