

EDUCATIONAL PROGRAMME ON RADIATION PROTECTION FOR VETERINARY MEDICINE SPECIALISTS

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ABSTRACT

The education of radiation protection for veterinary medicine specialists on the University of Belgrade is integrated both in regular graduate studies and in postgraduate studies. Within the graduate studies, students attend courses in physics and biophysics and in radiation hygiene. During postgraduate or specialistic veterinary medicine studies, veterinary medicine specialists expand their knowledge in radiation protection through a number of courses on radiation biophysics, radioecology, nuclear instrumentation and environmental protection.

INTRODUCTION

Radioactive contamination of the environment became a very serious problem during the age of nuclear energy exploitation. As the radiocontamination of the biosphere includes the contamination of the cattle breeding process and the live stock production and eventually the man exposure to radiation through food, the radiation hygiene in animal and food production was developed as a new educational and scientific discipline in veterinary medicine. Together with radiation protection it obtained an important role both from medical and technological point of view, in scientific as well as in practical sense, in the field of activity of a modern veterinary medicine specialist. The knowledge that such a specialist should obtain through these courses, together with basic knowledge in physics, is intended to enable him to undertake necessary measures of radioprotection and radio-decontamination if the radioactive contamination endangers the animal or food production process. The nuclear accident in Chernobyl and the situation that followed, confirmed that this matter is of invaluable importance for veterinary medicine specialists, especially those involved in the inspection of cattle and food production.

EDUCATIONAL PROGRAMME ON RADIATION PROTECTION IN THE GRADUATE STUDIES

During the first year of veterinary medicine studies, students obtain basic elements of radiation biophysics through courses of elementary physics and biophysics. The educational programme is carried out within a course of 2 theoretical lessons and 2 laboratory lessons per week during 15 weeks. The programme comprises:

- atom and nuclei structure, nuclei forces and bond energy;
- stable and unstable nuclei, radioactive disintegration and the law of radioactive decay;
- emission of alpha and beta particles and gamma and neutron rays and their interaction with matter;
- nuclear reaction, production and properties of radioisotopes, their application in medicine and biology;
- ionizing radiation: sources, detection and dosimetry, biological effects.

Laboratory lessons comprise detection of radioactive radiation and its absorption in matter with Geiger-Muller nuclear instrumentation, as well as calculation exercises on the matter.

Within the fifth year of veterinary medicine graduate studies, students attend a course on radiation hygiene including 15 lectures and 30 laboratory exercise hours. The programme comprises basic elements of radiation hygiene in animal production and food technology, including:

- basic principles of radioecology in animal production;
- distribution of natural and technologically produced radionuclides in different phases of cattle breeding process and food chains;
- internal radiocontamination of animals;
- radiopathology: radiation sickness in animals, methods of internal and external radiodecontamination;
- basic principles of radiation protection: units, standards, recommendations, permissible doses for occupational and nonoccupational exposures, accidental doses;
- radiohygienic control of food and fodder;
- nuclear accidents and protective measures in animal and food production;
- exposure and radiation risk for agricultural workers in accidental situations due to radiocontamination of the environment.

The laboratory exercises are especially emphasized within the framework of the course; students are acquainted with some of the methods for fast evaluation of radionuclide contents in food and fodder. The methods are developed for radiometric laboratories with GM counter detector. The exercises include detection of ionizing radiation and absorption of beta and gamma radiation in different materials, exposure

rates measurements in the field, mass activity determination of food and fodder including sampling, transport and storage procedures, fast evaluation of radionuclides contents in food and fodder in accidental situations, undertaking of protective measures and recommendations in food and fodder usage in accidental situations.

EDUCATIONAL PROGRAMME ON RADIATION PROTECTION IN POST-GRADUATE STUDIES

During postgraduate or specialistic veterinary medicine studies, veterinary medicine specialists expand their knowledge on radiation protection through a number of courses on biophysics, radioecology, nuclear instrumentation and environmental protection. The programmes discuss biophysical, radiobiological and biomedical aspects of the effects of ionizing radiation on cellular and molecular level, as well as some aspects of radiation diseases and post irradiation recovery.

The special course on environmental radiation protection considers:

- sources of ionizing radiation in the environment,
- translocation of radionuclides from the source of radiocontamination to man;
- radioecological parameters, concentrations, translocation and discrimination factors;
- models of radionuclides migration in the biosphere;
- instrumentation and methods for radionuclides detection and identification in the environment;
- aspects of dose and risk evaluation for animal and food production and eventually, population on the whole.

Some of the courses are specially organized for veterinarian inspectors. They provide important informations about legal regulatives in production of animal and food regarding radioactive contamination, especially in accidental situations. There are also training courses in methodology of fast evaluation of radioactive contamination of food and fodder in the field.

CONCLUSIONS

In the field of activity of a modern veterinary medicine specialist radiation protection plays an important role, both from medical and from technological point of view. The possibility of occurrence of large nuclear accidents demands that one obtains basic theoretical knowledge in radiation physics and biophysics, as well as to be acquainted with methods of detection of radionuclides in the environment, methods of radiodecontamination of animals and food and legal regulatives in this area. Radiation protection should be therefore considered an integral part of the educational

process in graduate and in postgraduate studies of veterinary medicine.

REFERENCES

1. Draganovic B., Djuric G., Petrovic B. and Zagorcic A., 1980, Radiation Biology, University Press, Beograd.
2. Djuric G. and Petrovic B., 1982, Nuclear Instrumentation and Methods in Radiometry, University Press, Beograd.
3. Djuric G., 1985, Laboratory Training Course in Radiation Hygiene, University Press, Beograd.
4. Djuric G., 1985, A Notebook for Laboratory Training Course in Radiation Hygiene, University Press, Beograd.
5. Petrovic B. and Djuric G., 1981, Elements of Radioecology in Animal Production, University Press, Beograd.
6. Petrovic B., Djuric G. and Draganovic B., 1984, Radiation Hygiene in Animal Production, University Press, Beograd.
7. Popovic D. and Stefancic V., 1984, Laboratory Training in Physics and Biophysics, University Press, Beograd.
8. Popovic D. and Stefancic V., 1988, Courses in Physics and Biophysics, University Press, Beograd.