

# ABSTRACT

## HABILITATION THESIS

### **Experimental investigation concerning the use of biochemical and proteomic methods in veterinary pathology**

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The habilitation thesis includes the most relevant personal achievements in scientific research (in the field of veterinary medicine, since 2003, after PhD graduation), being described the significant results presented in 8 publications in ISI journals, 11 full papers / abstracts ISI Proceedings and 14 papers published in journals indexed BDI. The presented scientific work comprises the specific topics of veterinary medical biochemistry, focusing on issues linked to the monitoring of oxidative stress markers in various veterinary pathology, and the proteomics techniques in the investigation of milk proteins profile in various animal species.

The thesis is divided into three parts, Part 1 containing data related to my professional and academic formation. The second part presents the main lines of research that formed the basis of this thesis. Chapter 1 of this part, called *The study of oxidative stress parameters and the influence of administration natural antioxidants in various pathologies*, comprises three sub-sections, which present experimental investigations where have been follow the changes that occur in the activity of the antioxidant enzymes and the level of oxidative degradation molecules in various pathological conditions (cancer, hyperthyroidism, infectious diseases) and how we can influence these variations by administering selenium and carotenoids.

Chapter 1.1. comprises two chapters, presenting original studies on the influence of astaxanthin administration on the process of mammary cancerogenesis induced by methyl nitrosurea (MNU) in rats, respectively the investigations, with a character of novelty, concerning the antioxidant / anti-tumor activity of oxygenated carotenoids with normal and retro-type structure (canthaxanthin and rhodoxanthin) in mice injected subcutaneously with dimethylbenzanthracene (DMBA). In both studies, the administration of carotenoids had a positive effect on oxidative stress markers at the cellular antioxidant enzyme activity, in particular in the case of the groups treated with carcinogen.

Chapter 1.2. is divided into three sub-sections. The main purpose was to investigate how the thyroid hormone hypersecretion induces oxidative stress in thyroid, liver, myocardium and blood. In parallel, it was investigated how the rat's dietary supplementation with selenium or lycopene may reduce the effects of oxidative stress in target tissues.

Chapter 1.3. present the data obtained in the evaluation of oxidant / antioxidant balance in horses infected with equine infectious anemia virus (EIAV) and assessing the impact of animal age and time post infection, on both enzymatic and non-enzymatic antioxidants. This study has highlighted a new link between oxidative stress markers and EIAV infection in horses.

At the end of the chapter, in Section 1.4, is presented a scientific achievement that I consider it of interest, the book - *Oxidative stress and natural antioxidants*, elaborated in collaboration with Andrea Bunea and Adela Pinteau.

Chapter 2 - *Milk biochemistry* - presents a new thematic research, carried out since 2005, on the analysis of milk protein using proteomics techniques (mono and two-dimensional electrophoresis, chromatography techniques, mass spectrometry). This chapter presents the results achieved in the postdoctoral research project, conducted in France, concerning a comparative determination of proteins profile in milk of mice, of different lines, using the techniques of proteomics and in mouse milk from different species.

Chapter 2.3 presents the results obtained in the research project PNII-Idei and comprises 4 chapters: evaluation of oxidative stress markers, the activity of antioxidant enzymes (in more detail glutathione peroxidase), and antioxidant status in correlation with somatic cells count and type of pathogens in mastitis milk. It was also evaluated the profile of fatty acids and cholesterol in normal milk compared to mastitis milk. The last part includes data related to the assessment of hydrolytic changes occurring in the proteins, in milk from cows diagnosed with subclinical mastitis.

At the end of the chapter, in Section 2.4, is presented another important achievement, the book - *The physiology and pathology of the cow mammary gland*, elaborated as coordinator.

The study of chemical compounds present in milk was also extended to goat milk. In Chapter 2.5. is presented a study, which had as objective the evaluate the effect of oil from hemp seed (USC) on lipid metabolism, hepatic function, the concentrations and the profile of fatty acids, cholesterol and vitamin A in goat's milk.

The scientific research and publishing activity, after PhD graduation, can be quantified as follows: 2 books, 5 didactic text books and 5 practical works. I realized, as main author or co-authored 12 papers in ISI journals; 29 articles / abstracts ISI Proceedings papers and 53 BDI papers. A total of 6 ISI papers were awarded UEFISCDI. The researches were materialized in three research projects (1 project PNII Idei and 2 CNCSIS AT projects). Furthermore, in 2014 we were awarded with the "Ioan Adameșteanu" prize of the Academy of Agricultural and Forestry Sciences "Gheorghe Ionescu-Sisești" for the book "Oxidative stress and natural antioxidants". In the academic year 2005-2006, I was invited and I presented, as invited professor, eight courses of Veterinary Clinical Biochemistry in the Faculty of Veterinary Medicine "Maison d'Alfort", Paris, France.

The third part of the thesis presents the plans for the scientific, professional and academic development. The development plan of my scientific career has, as its first objective, to increase the scientific quality and the visibility, to improve the national and international recognition of my own research. My research work will concentrate on the involvement of oxidative stress in the development of various pathologies, studies for which there is an appropriate laboratory infrastructure. I also wish to pursue work on the biochemistry of milk, especially the aspects of various mammary gland diseases that can induce changes on biochemical parameters of milk from various species.