

# 10<sup>th</sup> Congress of the European Society of Veterinary and Comparative Nutrition Cancer Prevention with Supplementation of Diets with Botanicals

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## INTRODUCTION

This work was conducted with a mushroom (*Coriolus versicolor*) which is in the market for human and animal use. Mushroom polysaccharides, particularly  $\beta$ -glucans, have anti-tumour and immunomodulating properties. These polysaccharides do not directly attack cancer cells, but instead exert their effects by activating immune responses in the host. Use of  $\beta$ -glucans as adjuvants for monoclonal antibody treatment has also been explored, because  $\beta$ -glucans bind to the complement receptor and enhance leukocyte killing of tumour cells through naturally occurring anti-tumour antibodies.  $\beta$ -glucans also appear to recruit tumoricidal granulocytes, dramatically enhancing tumour killing when combined with monoclonal antibody therapy. Mushroom  $\beta$ -glucans affect immune function by infiltrating, through specific receptors, tumours and activating dendritic cells, suppressing certain enzymes, or by influencing mitotic activity. Recent work in HPV cervical cancer in women have shown positive role of mushrooms.

The vicious circle of chronic toxic overload is described in which there is a series of detoxification steps leading to oxidative stress, causing free radical production which results in health conditions generally solved with non-steroid anti-inflammatory and antibiotics. These drugs induce increased permeability of the intestinal wall which is responsible for an overloaded liver causing detoxification problems.

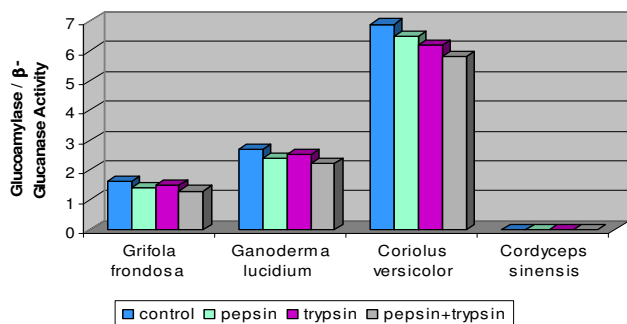
## RESULTS

Table I provides levels of SOD, cytochrome P-450, cytochrome P-450 reductase (NADPH dependent), laccase, peroxidase, protease,  $\beta$ -glucanase, protein-bound polysaccharides and secondary metabolites in 6 tablets (3 g) of *Coriolus versicolor* (biomass).

In Table I the impact of gastric acid was simulated when comparing the enzyme content in the absence of proteolytic enzymes, in pepsin and in trypsin. The purpose of this comparison was to determine the degradation of enzyme action in the intestinal tract of the human body.

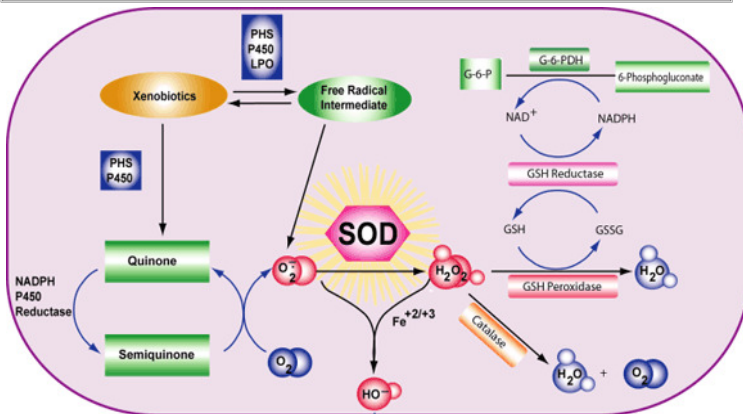
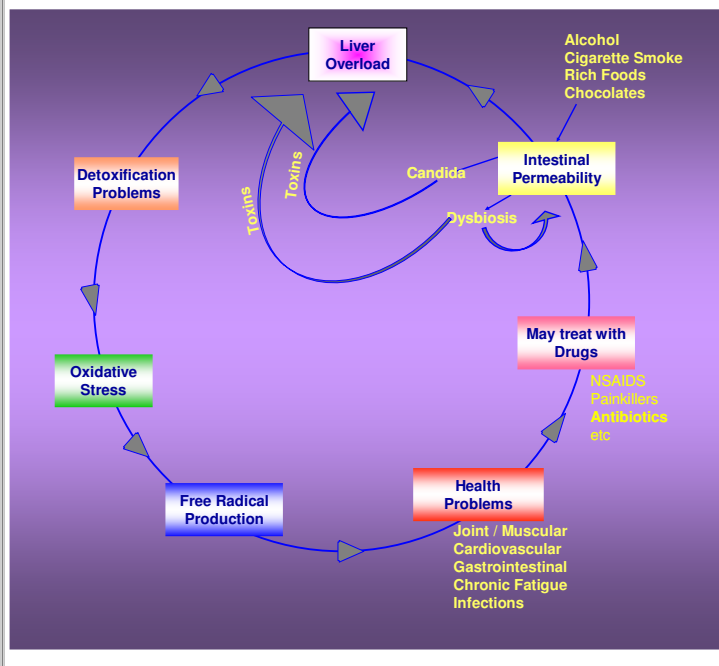
<i>Coriolus versicolor</i> <sup>a</sup>	Absence of Proteolytic Enzymes	In presence of Pepsin	In presence of Trypsin
1 Protein (content)	103.8 mg	94.2 mg	99.6 mg
2 Reducing sugars	88.8 mg	87 mg	84.6 mg
3 Protein - bound polysaccharide	549 mg	483 mg	492.6 mg
4 Peroxidase activity	403.2 mU	362.4 mU	387 mU
5 Laccase activity	3129 mU	3069.6 mU	3210.6 mU
6 Glucoamylase/Beta - glucanase activity	41.4 U	30.0 U	37.2 U
7 Protease activity	35.4 U	30.0 U	31.2 U
8 Glucose 2 - Oxidase activity	297 mU	163.2 mU	270.0 mU
9 Cytochrome P - 450	3.06 nmoles	2.94 nmoles	3.12 nmoles
10 Cytochrome P - 450 reductase	71.4 mU	57.12 mU	66.6 mU
11 SOD activity	462.6 U	367.2 U	411 U
12 Secondary metabolites (Thrombin inhibitors)	59 %	54.2 %	52 %

Glucoamylase /  $\beta$ -glucanase Activity



*Coriolus versicolor* supplied by Mycology Research Laboratories Ltd (MRL) - <http://www.mycologyresearch.com>

## The Vicious Circle of Chronic Toxic Overload



## Prevention in Dogs/Cats

Weight	<i>Coriolus versicolor</i> (g/ Dia)
< 10 Kg	1.0
10 a 30 Kg	2.0
> 30 Kg	4.0

Oxidative Damage  
DNA  
Proteins  
Lipids

## CONCLUSIONS

Mushrooms contain several important enzymes, protein-bound polysaccharides, and secondary metabolites which play an important role in carcinogenesis, through specific receptors, namely: Increase in the activity of T and NK Cells, in enzyme profiles, proteases, cytochrome P450 reductase, laccase,  $\beta$ -glucanase, peroxidase and SOD.

Further research is required to study the effect of mushroom immunonutrition on the levels of other key proteins, enzymes and metabolites *in vivo* which are involved in cancer of virus origin.