Mycology Research Laboratories
Global Leader in Mushroom Nutrition

The Therapeutic Potential of Coriolus & Hericium Mushroom Nutrition in Neurodegenerative Conditions

Wilfried Legein

wlegein@skynet.be

International Congress on Naturopatic Medicine

London, UK 2017

Mycology Research Laboratories
Global Leader in Mushroom Nutrition

The Potential of Mushroom Nutrition in Neurodegenerative Conditions

* NEURODEGENERATIVE CONDITIONS WORLDWIDE
* RESEARCH ON MEDICINAL MUSHROOMS
* NEUROPROTECTIVE POSSIBILITIES

* CAUSATIVE FACTORS IN NEURODEGENERATIVE CONDITIONS
* RISK FACTORS
* SYMPTOMS AND SIGNS
* COMPLICATIONS

* MUSHROOM NUTRITION TREATMENTS

Mycology Research Laboratories
Global Leader in Mushroom Nutrition

The Potential of Mushroom Nutrition in Neurodegenerative Conditions

- In 2015, one estimate is that 46.8 million persons have dementia worldwide; this number is expected to grow to 131.5 million by 2050.[2]

- (1). World Alzheimer Report 2015, The Global Impact of Dementia: An Analysis of Prevalence, Incidence, Cost and Trends. Alzheimer Disease International, London. Chapter 2, p22. August 2015

- Five (5) per cent of people from age sixty-five (65) to seventy-four (74) have Alzheimer´s, but more than fifty (50) per cent of those over eighty-five (85) have it, even if they have no obvious risk factors.[3]

- (2). World Alzheimer Report 2015, The Global Impact of Dementia: An Analysis of Prevalence, Incidence, Cost and Trends. Alzheimer Disease International, London. Chapter 2, p22. August 2015

Mycology Research Laboratories
Global Leader in Mushroom Nutrition

The Potential of Mushroom Nutrition in Neurodegenerative Conditions

- The estimated cost of dementia is estimated to be $816 billion and expected to grow to 1 trillion by 2018.[4]
- (3) World Alzheimer Report 2015, The Global Impact of Dementia: An Analysis of Prevalence, Incidence, Cost and Trends. Alzheimer Disease International, London. Chapter 5, p53. August 2015

- Furthermore, a UK study estimates that the health and social costs for dementia almost match the combined cost of cancer, heart disease and stroke.[5]
- In sum, the economic cost of Alzheimer´s (AD) is staggering and threatens the healthcare budgets of many countries.

- (3) World Alzheimer Report 2015, The Global Impact of Dementia: An Analysis of Prevalence, Incidence, Cost and Trends. Alzheimer Disease International, London. Chapter 7, p78. August 2015

Mycology Research Laboratories
Global Leader in Mushroom Nutrition

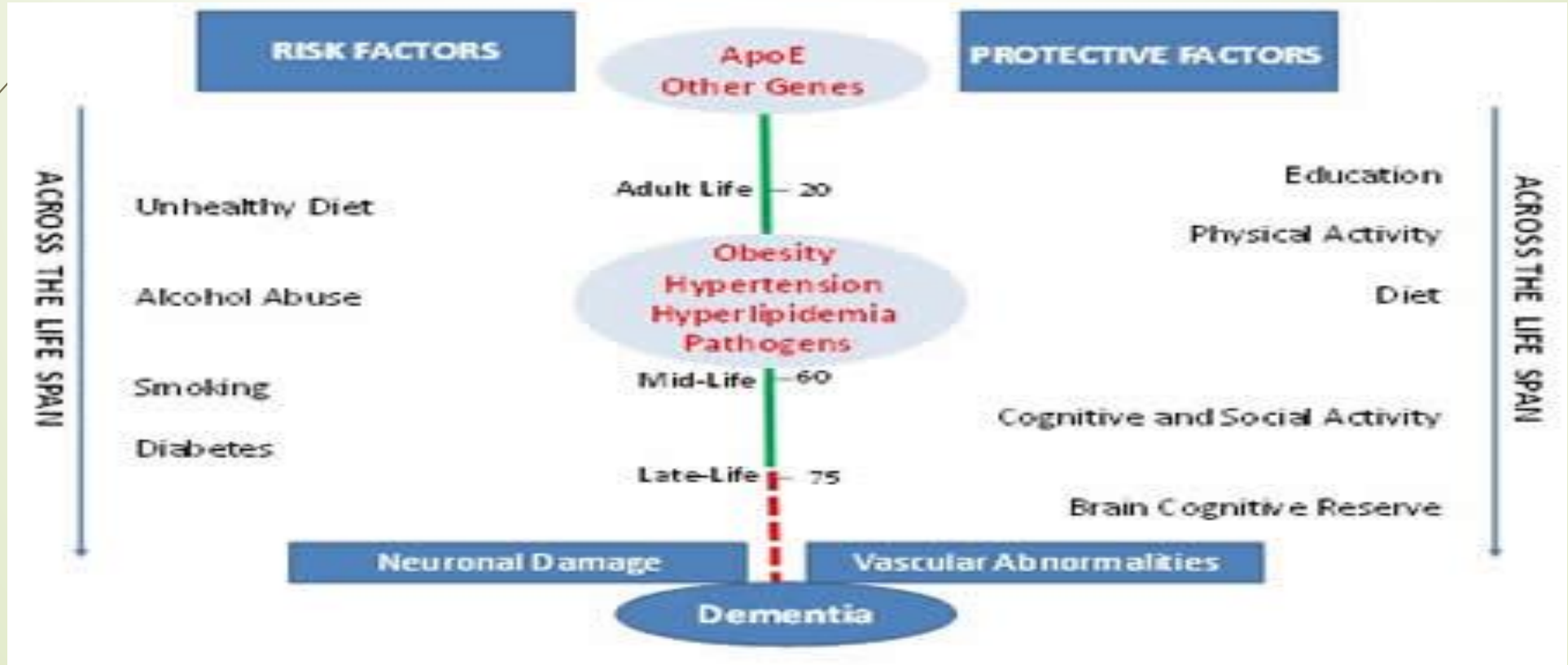
The Potential of Mushroom Nutrition in Neurodegenerative Conditions

- In 2014, one of the objectives of the Global Action Against Dementia was to identify a cure or disease-modifying therapy for dementia by 2015.

- **The objective of this paper is to propose a disease-modifying therapy for neurodegenerative diseases based on the use of mushroom nutrition.**

The Potential of Mushroom Nutrition in Neurodegenerative Conditions

- Alzheimer´s disease (AD) and other neurodegenerative conditions like ALS are multifactorial disorders (**Figure 1**). Mixed pathology dementias account for half or more of all dementia cases, with the presence of beta-amyloid and vascular disease constituting the most frequent combination of pathologies. Atherosclerosis, arteriosclerosis, micro-infarcts, silent stroke, and diffuse white matter disease are all associated with increased risk of the brain cells.



The Potential of Mushroom Nutrition in Neurodegenerative Conditions

A NEW ROLE FOR MEDICINAL MADE BIOMASS MUSHROOMS

BACKGROUND

A possible link between Herpes Simplex Virus (HSV-1) and Alzheimer's was demonstrated in studies at California University (2000) in the USA and Manchester University in the UK (2008)

At **Catania University, Italy,** it was found that *Coriolus versicolor* biomass may stimulate Lipoxin LXA4 in microglia *(these perform active vigilance of the cerebral tissue and of the spinal medullae, thus the immune resistant cells of the Central Nervous System)*, therefore, indirectly, reduce the symptoms of Alzheimer's disease on **its initial stages.**

The Potential of Mushroom Nutrition in Neurodegenerative Conditions

SCIENTIFIC STUDIES ON MUSHROOM NUTRITION

Objectives of studies at Catania University, Italy

To focus on molecules capable of activating the system of **Vitagenes**, as a new model of therapeutic impact, in order to minimize the detrimental consequences associated with free radicals that induce neurodegenerative cellular damage.

Lipoxin A4 (LXA4) from mushrooms is one endogenous **eicosanoid** fatty acids. These are signaling molecules exerting complex control over many bodily systems; mainly in growth during and after physical activity, inflammation or immunity after the intake of toxic compounds and pathogens, and as messengers in the central nervous system.

Mycology Research Laboratories
Global Leader in Mushroom Nutrition

The Potential of Mushroom Nutrition in Neurodegenerative Conditions

SCIENTIFIC STUDIES ON MUSHROOM NUTRITION

Redox modulation of cellular stress response and lipoxin A4 expression by *Coriolus versicolor* in rat brain: Relevance to Alzheimer's disease pathogenesis,

Trovato et al., Neurotoxicology 2015

Redox modulation of cellular stress response and lipoxin A4 expression by *Hericium erinaceus* in rat brain: Relevance to Alzheimer's disease pathogenesis,

Trovato et al., Immunity & Aging 2016

Supplementation with Hericium erinaceus and Coriolus versicolor to Inhibit Progression of Alzheimer's Disease,

Calabrese & Ontario, Clinical Journal of Mycology Vol V, Januar 2016

Mycology Research Laboratories
Global Leader in Mushroom Nutrition

The Potential of Mushroom Nutrition in Neurodegenerative Conditions

SCIENTIFIC STUDIES ON MUSHROOM NUTRITION

Dr. LaFerla and his researchers demonstrated that aspirin-triggered

Lipoxin A4 (LXA4), twice a day,

- reduced NF kB (Nuclear Factor Kappa B) activation (most important factor causing inflammation in the body)
- reduced pro-inflammatory cytokines and chemokines
- reduced increased levels of anti-inflammatory IL-10 and transforming the grow factor ß (4)

(4) Medeiros R, Kitazawa M, Passos GF, Baglietto-Vargas D, Cheng D, Cribbs OH, LaFerla FM. Aspirin-triggered lipoxin A4 stimulates alternative activation of microglia and reduces Alzheimer disease-like pathology in mice. Am J Pathol. 182(5);1740-9. May 2013

SCIENTIFIC STUDIES ON MUSHROOM NUTRITION

- In effect, the researchers contend that activating LXA4 signalling may represent a novel therapeutic approach for AD.

- Since 2014, a group of researchers (led by Professor Vittorio Calabrese) from the Universities of Catania and Messina, made their goal to determine if *Coriolus versicolor* biomass and *Hericium erinaceus* biomass could stimulate Lipoxin A4 (LXA4) activation in both peripheral blood and in the CNS of rats treated with an equivalent human dose of 3g per day given, orally.

SCIENTIFIC STUDIES ON MUSHROOM NUTRITION

Given the potential gastrointestinal discomfort associated with aspirin intake, is there another manner to increase LXA4 in the brain

as well as provide both anti-viral protection and anti-oxidant protection?

In the past fifteen years, the clinical development of mushroom nutrition has determined that

- ***Coriolus versicolor*** **(biomass) has viral protective properties,**
- **while *Hericium erinaceus* (biomass) is extremely high in Superoxide Dismutase (SOD) content.**

The Potential of Mushroom Nutrition in Neurodegenerative Conditions

SCIENTIFIC STUDIES ON MUSHROOM NUTRITION

- Additionally, *Coriolus versicolor* biomass is used to increase the regression rate of LSIL lesions in HPV patients and to significantly reduce the HPV viral load in LSIL HPV patients.[4,5,6]

- (4). Silva Couto J, Pereira da Silva D. Evaluation of the Efficacy of Coriolus versicolor Supplementation in HPV Lesions (LSIL) . Poster presented at the 20th European Congress of Obstetrics and Gynecology, Lisbon, Portugal. March 4-8th 2008.
- (5).Bogdanova J. Coriolus versicolor-innovation in prevention of oncogynecological diseases, especially HPV. PMID 19449722 Akush Ginekol (Sofia Bulgaria 2008 47 Suppl 3:51-3.
- (6). Borisov S. Coriolus-MRL-a new adddition to the arsenal for complex treatment of oncogynecological diseases. PMID 20380095 Akush Ginekol (Sofia, Bulgari) 2009;48 Suppl 2:31.

- *Additional, Hericium erinaceus* biomass has an extremely high Superoxide Dismutase (SOD) content , which in the presence of *in vitro* proteolytic enzymes (per 500 mg tablet) has a SOD content of 19.430 10^3 U.[7]

- (7) Cornelius C, Cavallaro M, Cambria MT, Toscano MA, Calabrese V. Com¬parative Enzyme Analysis of Polyporus umbellatus, Agaricus blazei, Pleurotus ostreatus and Hericium erinaceus . Clinical Journal of Mycology Vol II. Pp4-7. 2009.

The Potential of Mushroom Nutrition in Neurodegenerative Conditions

SCIENTIFIC STUDIES ON MUSHROOM NUTRITION

- Since 2014, a group of researchers (led by Professor Vittorio Calabrese) from the Universities of Catania and Messina, made their goal to determine if *Coriolus versicolor* biomass and *Hericium erinaceus* biomass could stimulate Lipoxin A4 (LXA4) activation in both peripheral blood and in the CNS of rats treated with an equivalent human dose of 3g per day given, orally.

- In one study, a group of rats were supplemented with *Coriolus versicolor* biomass and another group (Control) that was not supplemented over 30 days (N=10).
- In another study, one group of rats were supplemented with *Hericium erinaceus* biomass and another group (Control) that was not supplemented over 90 days (N=10).

The Potential of Mushroom Nutrition in Neurodegenerative Conditions

SCIENTIFIC STUDIES ON MUSHROOM NUTRITION

- At the end of experimental periods for the *Coriolus* (30 days) and *Hericium* (90 days) studies, animals were sacrificed and the activity of LXA4 was determined in serum, lymphocytes and in different brain regions (cortex, *striatum, substantia nigra*, hippocampus and cerebellum) and compared with LXA4 of untreated animals, as control.

- The researchers also focused on the impact of each mushroom on redox-dependent genes, called vitagenes, including heat shock proteins (Hsps), sirtuins, thioredoxin (TrX) and lipoxin A4 (LXA4).
- The differences in the up-regulation of the following vitagenes were measured:
- **a. Lipoxin A4 (LXA4)**
- **b. Heme Oxygenase-1 (HO-1);**
- **c. Heat Shock Protein 70 (HSP 70).**
- **d. Thioredoxin TrX**

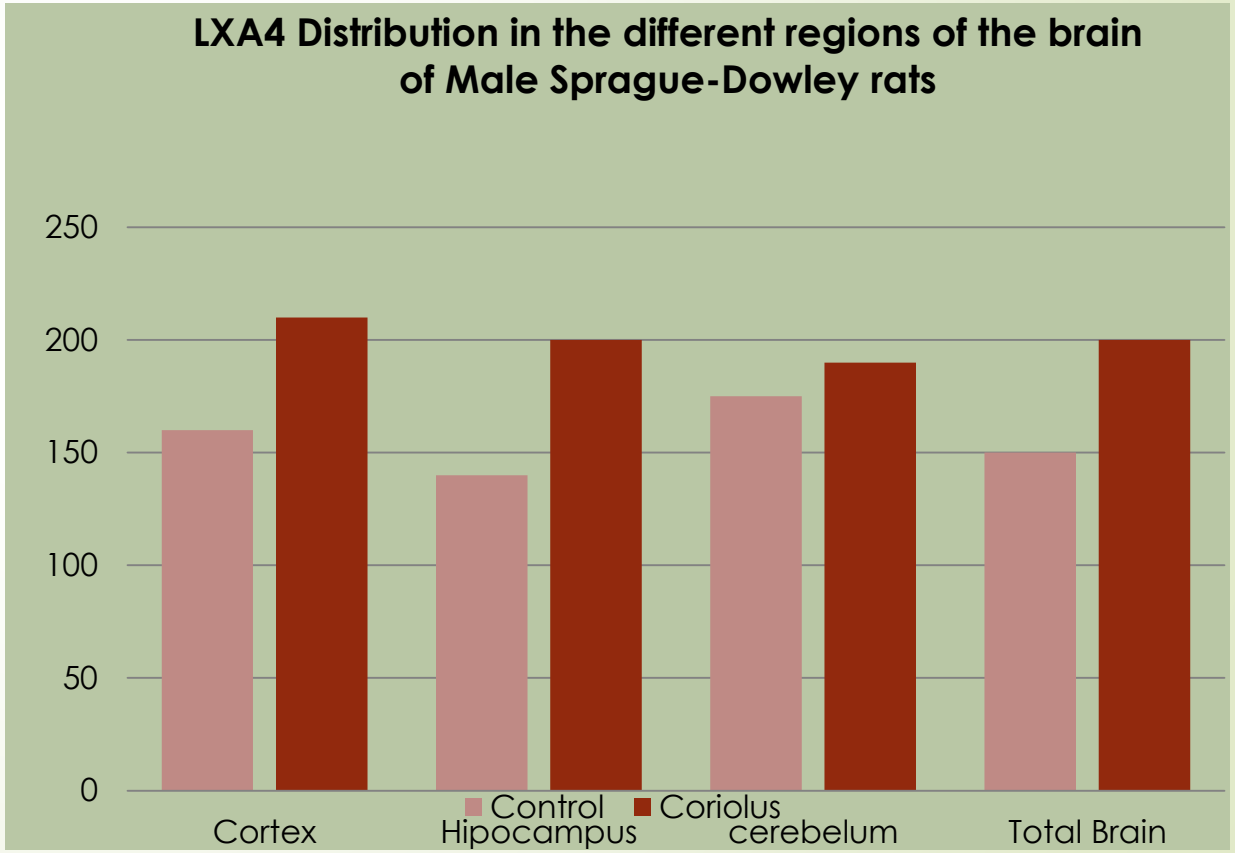
Mycology Research Laboratories
Global Leader in Mushroom Nutrition

The Potential of Mushroom Nutrition in Neurodegenerative Conditions

A summary of the results from the Coriolus study are:

LXA4 Distribution in the different regions of the brain of Male Sprague-Dowley rats (8)

After 30 days	Control	Coriolus
Cortex	160	210
Hipocampus	140	200
cerebelum	175	190
Total Brain	150	200



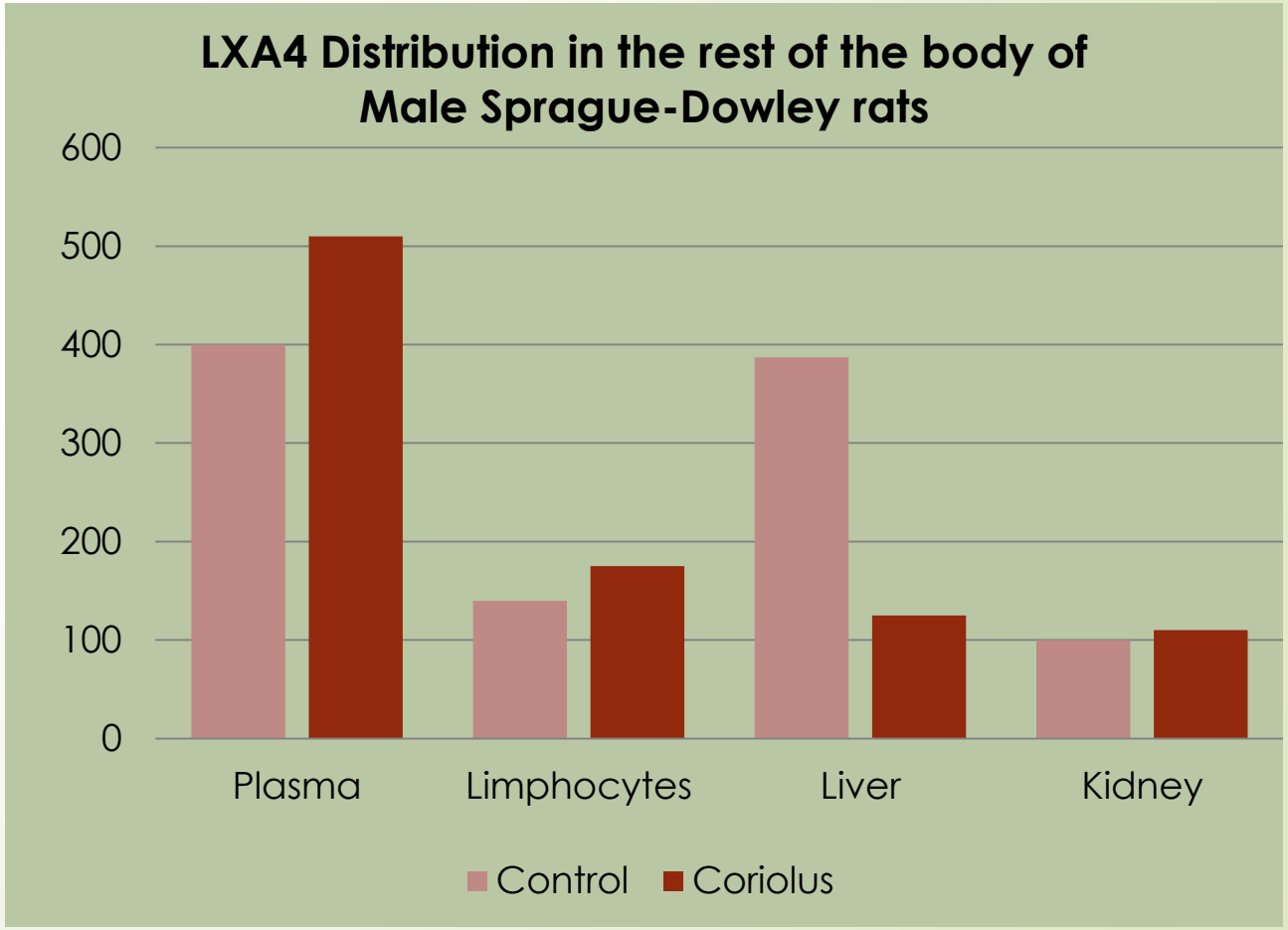
8. Trovato A, Siracusa R, Di Paola R, Scuto M,Fronte V, Koverech C, Luca M, Serra A, Toscano M.A., Petralia A, Cuzzocrea S, Calabrese V. Redox modulation of cellular stress response and lipoxin A4 expression by Coriolus versicolor in rat brain: Relevance to Alzheimer´s disease pathogenesis. Neurotoxicology. 53:350-8. doi: 10.1016/j.neuro.2015.09.012. 2016.

The Potential of Mushroom Nutrition in Neurodegenerative Conditions

A summary of the results from the Coriolus study are:

LXA4 Distribution in the rest of the body of Male Sprague-Dowley rats (8)

After 30 days	Control	Coriolus
Plasma	400	510
Limphocytes	140	175
Liver	387	125
Kidney	100	110



The Potential of Mushroom Nutrition in Neurodegenerative Conditions

A summary of the results from the Coriolus study are:

In addition, there was a significant increase in

- **heme oxygenase-1,**
- **Hsp 70 and**
- **thioredoxin**
- **in the total brain of *Coriolus*-fed rats when compared to a control group.[8]**

8. Trovato A, Siracusa R, Di Paola R, Scuto M,Fronte V, Koverech C, Luca M, Serra A, Toscano M.A., Petralia A, Cuzzocrea S, Calabrese V. Redox modulation of cellular stress response and lipoxin A4 expression by Coriolus versicolor in rat brain: Relevance to Alzheimer´s disease pathogenesis. Neurotoxicology. 53:350-8. doi: 10.1016/j.neuro.2015.09.012. 2016.

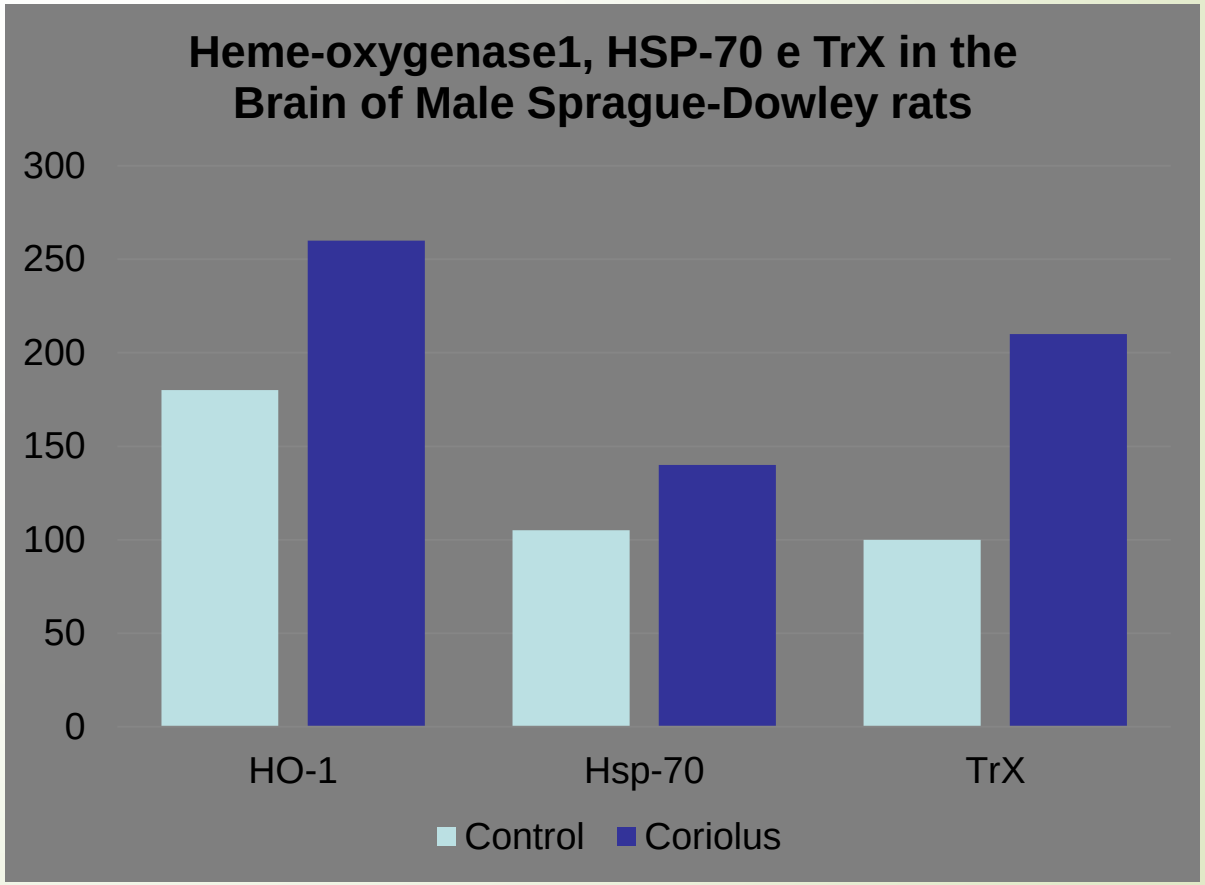
Mycology Research Laboratories
Global Leader in Mushroom Nutrition

The Potential of Mushroom Nutrition in Neurodegenerative Conditions

A summary of the results from the Coriolus study are:

Heme-oxygenase1, HSP-70 e TrX in the Brain of Male Sprague-Dowley rats (8)

After 30 days	Control	Coriolus
HO-1	180	260
Hsp-70	105	140
TrX	100	210



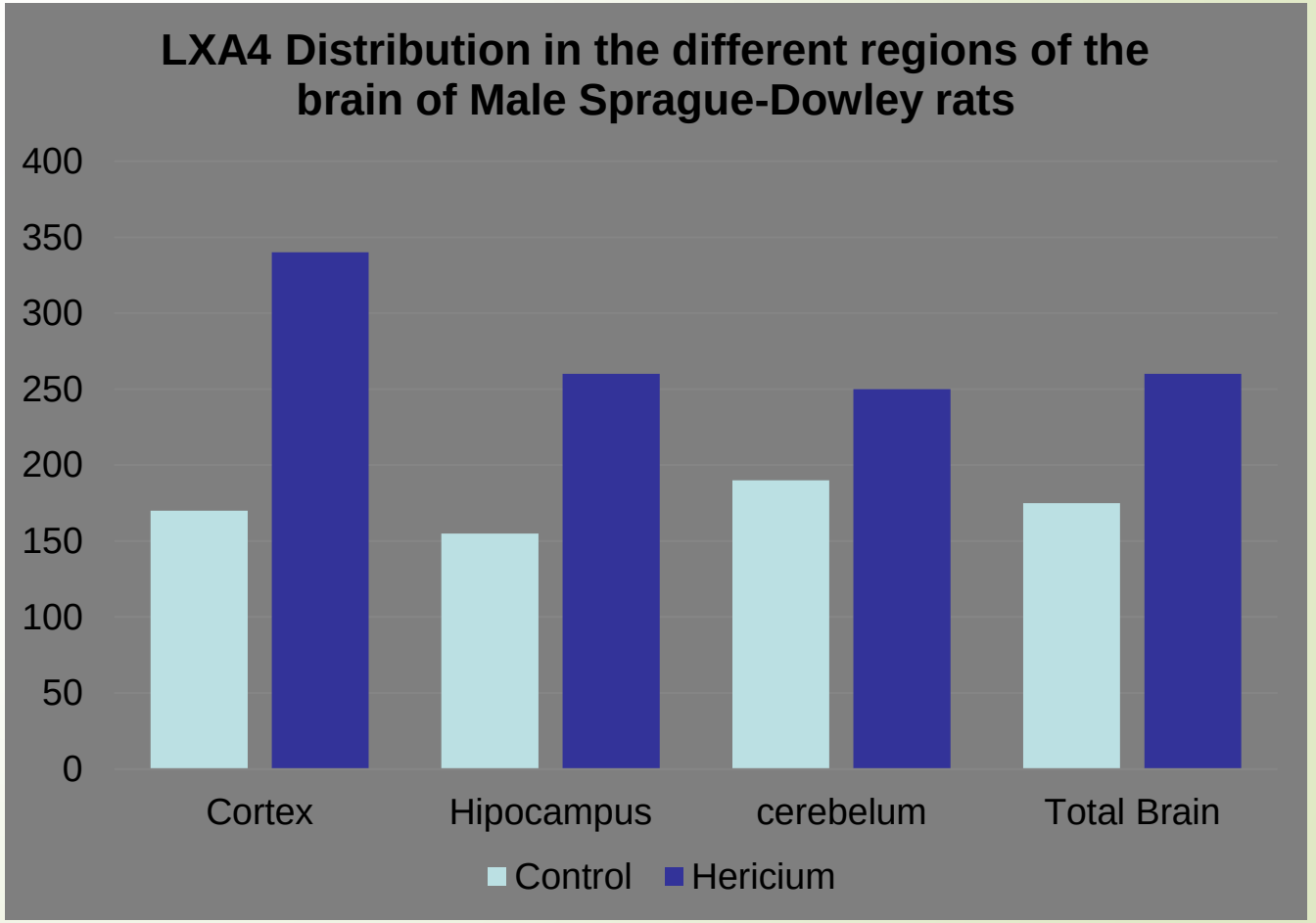
Mycology Research Laboratories
Global Leader in Mushroom Nutrition

The Potential of Mushroom Nutrition in Neurodegenerative Conditions

A summary of the results from the Hericium study are:

LXA4 Distribution in the different regions of the brain of Male Sprague-Dowley rats (9)

After 90 days	Control	Hericium
Cortex	170	340
Hipocampus	155	260
cerebelum	190	250
Total Brain	175	260

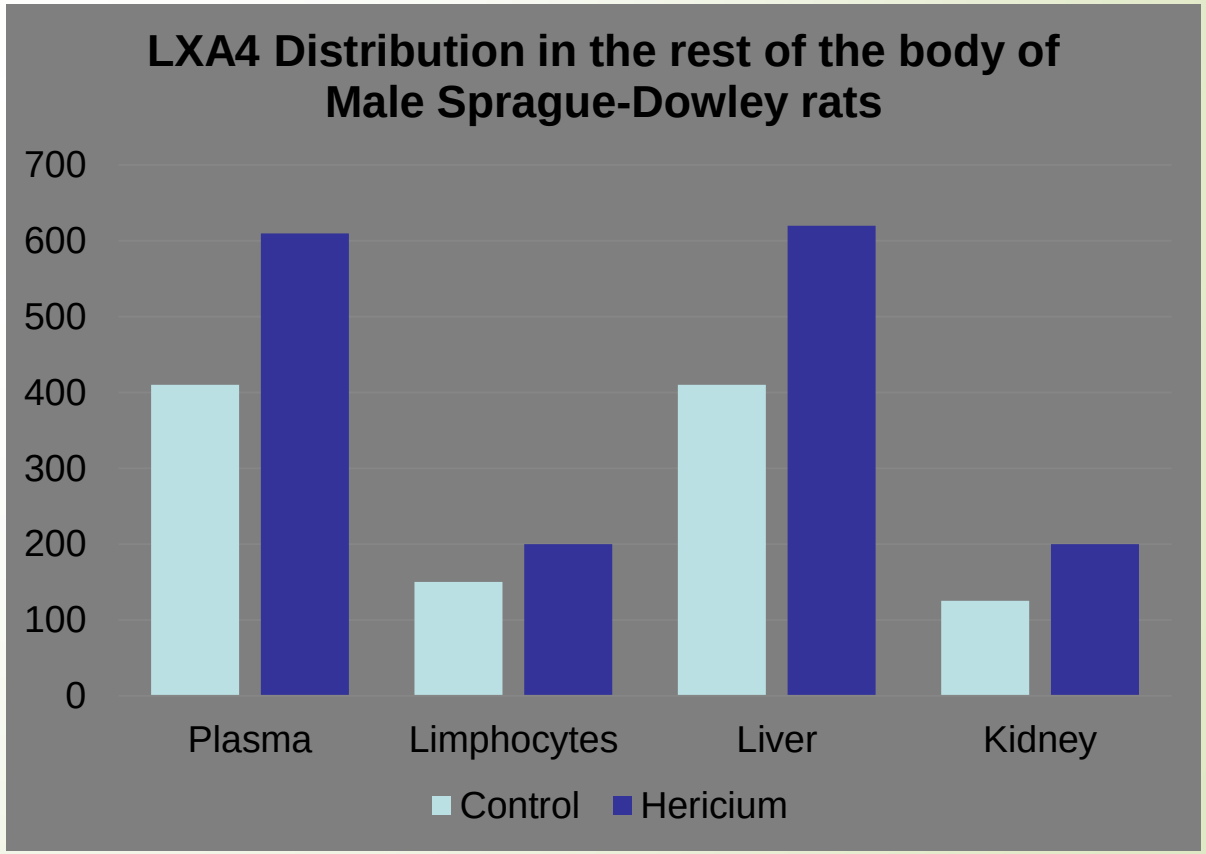


The Potential of Mushroom Nutrition in Neurodegenerative Conditions

A summary of the results from the Hericium study are:

LXA4 Distribution in the rest of the body of Male Sprague-Dowley rats (9)

After 90 days	Control	Hericium
Plasma	410	610
Limphocytes	150	200
Liver	410	620
Kidney	125	200



The Potential of Mushroom Nutrition in Neurodegenerative Conditions

A summary of the results from the Hericium study are:

In addition, there was a significant increase in

- **heme oxygenase-1,**
- **Hsp 70 and**
- **thioredoxin**
- **in the total brain of *Hericium*-fed rats when compared to a control group.[9]**

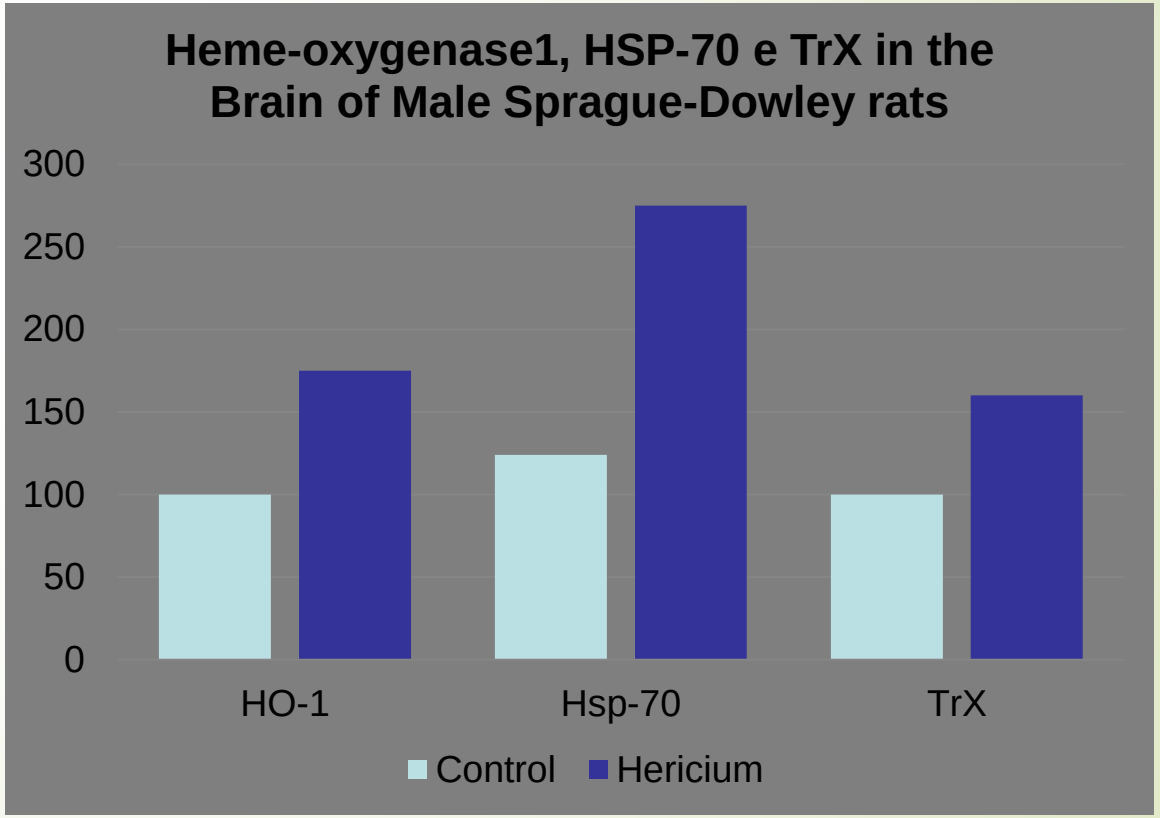
9) Trovato A, Siracusa R, Di Paola R, Scuto M, Ontario ML, Bua O, Di Mauro P, Toscano MA, Petralia CC, Maiolino L, Serra A, Cuzzocrea S, Calabrese V. Redox modulation of cellular stress response and lipoxin A4 expression by Hericium Erinaceus in rat brain: relevance to Alzheimer's disease pathogenesis. Immun Ageing. 13:23. doi: 10.1186/s12979-016-0078-8. Jul 9 2016.

The Potential of Mushroom Nutrition in Neurodegenerative Conditions

A summary of the results from the Hericium study are:

Heme-oxygenase1, HSP-70 e TrX in the Brain of Male Sprague-Dowley rats (9)

After 90 days	Control	Hericium
HO-1	100	175
Hsp-70	124	275
TrX	100	160



(9) Trovato A, Siracusa R, Di Paola R, Scuto M, Ontario ML, Bua O, Di Mauro P, Toscano MA, Petralia CC, Maiolino L, Serra A, Cuzzocrea S, Calabrese V. Redox modulation of cellular stress response and lipoxin A4 expression by Hericium Erinaceus in rat brain: relevance to Alzheimer's disease pathogenesis. Immun Ageing. 13:23. doi: 10.1186/s12979-016-0078-8. Jul 9 2016.

Conclusions

Mycology Research Laboratories
Global Leader in Mushroom Nutrition

- In separate studies, ***Coriolus versicolor*** and ***Hericium erinaceus*** biomass supplementation demonstrated a significant up-regulation of LXA4 in the brain in rats when compared to a control group.

- In the *Coriolus versicolor biomass* study the increase was measured at the end of 30 days,
- while in the *Hericium erinaceus biomass* study, the final results were retrieved at the end of 90 days.

Conclusions

Mycology Research Laboratories
Global Leader in Mushroom Nutrition

- These findings indicate the powerful therapeutic potential of mushroom nutrition supplementation in the control of neuro-inflammatory alterations and neurodegenerative conditions like AD, ALS etc.

- Further studies in human models should be conducted in early stage Alzheimer's disease patients with potential impact on the course and the progression of the disease ie. Mild Cognitive Impairment.

RECOMMENDATIONS

Mycology Research Laboratories
Global Leader in Mushroom Nutrition

- Subject to further clinical research, the recomended application of mushroom nutrition should be to those patients identified as:
- a) having a family history of AD, ALS ...
- b) having been diagnosed with Mild Cognitive Impairment (MCI) and
- c) having high viral levels of **HSV-1,HSV-2 or CMV**.

- Recommended supplementation should be:
- Coriolus -3g/day (six tablets (500 mg).
- Hericium -3g/day (six tablets (500 mg).
  1,5g (3 tablets) before breakfast and 1,5g (3 tablets) before lunch.

- Cost of supplementation would be £ 80.00 plus VAT (20%) per month or £ 100.00 per month including VAT.
- Or £ 3,33 per day.

Mushroom Nutrition in Neurodegenerative Conditions

Coriolus versicolor



THANK YOU

Hericium erinaceus



This clinical work was funded by Mycology Research Laboratories Ltd

Mycology Research Laboratories

wlegein@skynet.be

International Congress on Naturopatic Medicine London, UK 2017

Medicinal Biomass Mushrooms Information: **www.mycologyresearch.com**