



DEPARTMENT OF HEALTH & HUMAN SERVICES  
FOOD AND DRUG ADMINISTRATION

Public Health Service

Memorandum

Date . FEB 17 1999

From Senior Regulatory Scientist, Regulatory Branch, Division of Programs & Enforcement Policy (DPEP), Office of Special Nutritional, HFS-456

Subject 75-day Premarket Notification for New Dietary Ingredient

To Dockets Management Branch, HFA-305

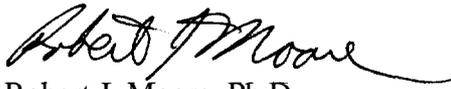
New Dietary Ingredients: LDW Liver Nurishing [sic] Capsule™  
(*Imperata cylindrical*)  
(*Ganoderma lucidum*)

Firm: P&Y American Dietary Supplements, Inc.

Date Received by FDA: February 12, 1999

90-day Date: May 10, 1999

In accordance with the requirements of section 413(a)(2) of the Federal Food, Drug, and Cosmetic Act, the attached 75-day premarket notification for the aforementioned new dietary ingredient should be placed on public display in docket number 95S-0316 after May 10, 1999.

  
Robert J. Moore, Ph.D.

95S-0316

RPT 42



**FEB 17 1999**

Mr. Simon Ko  
President & CEO  
P & Y American Dietary Supplements, Inc.  
288 N. Ridge Road  
P.O.Box 327  
Marathon, Wisconsin 54448

Dear Mr. Ko:

This is in response to your letter to the Food and Drug Administration (FDA) dated February 5, 1999, making a submission for a new dietary ingredient pursuant to 21 U.S.C. 350b(a)(2) (section 413 of the Federal Food, Drug, and Cosmetic Act (the Act)) and 21 CFR 190.6. Your letter notified FDA of your intent to market a product (named LDW Liver Nurishing [sic] Capsule™) containing the new dietary ingredients extract of root of lemon grass (*Imperata cylindrica*) and extract of plant of Chinese black mushroom (*Ganoderma lucidum*).

Under 21 U.S.C. 350b(a), the manufacturer or distributor of a dietary supplement that contains a new dietary ingredient that has not been present in the food supply as an article used for food in a form in which the food has not been chemically altered must submit to FDA, at least 75 days before the dietary ingredient is introduced or delivered for introduction into interstate commerce, information that is the basis on which the manufacturer or distributor has concluded that a dietary supplement containing such new dietary ingredient will reasonably be expected to be safe. FDA reviews this information to determine whether it provides an adequate basis for such a conclusion. Under section 350b(a)(2), there must be a history of use or other evidence of safety establishing that the new dietary ingredient, when used under the conditions recommended or suggested in the labeling of the dietary supplement, will reasonably be expected to be safe. If this requirement is not met, the dietary supplement is deemed to be adulterated under 21 U.S.C. 342(f)(1)(B) because there is inadequate information to provide reasonable assurance that the new dietary ingredient does not present a significant or unreasonable risk of illness or injury.

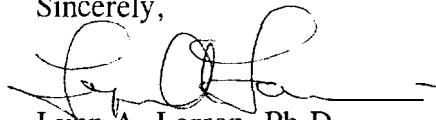
Your submission contained information that you believe establishes that the new dietary ingredients extract of root of *Imperata cylindrical* and extract of whole plant of *Ganoderma lucidum*, when used under the conditions recommended or suggested in the labeling of the dietary supplements, will reasonably be expected to be safe. The information in your submission does not meet the requirements of 21 CFR 190.6 (copy enclosed) because it does not include reprints or photostatic copies of

Page 2- Mr. Simon Ko

references to published information offered in support of the notification (see 21 CFR 190.6(b)(4)). Moreover, FDA is unable to determine whether the scientific studies you cite provide an adequate basis for a conclusion that the dietary supplement will reasonably be expected to be safe because the summaries you have provided are incomplete and do not include adequate information about the methods used or the actual results of the studies. You may submit an amended notification that cures the defects described above. If you market your product without submitting an amended notification that meets the requirements of 21 CFR 190.6, or less than 75 days after submitting such a notification, your product is considered adulterated under 21 U.S.C. 342(f)(1)(B) as a dietary supplement that contains a new dietary ingredient for which there is inadequate information to provide reasonable assurance that such ingredient does not present a significant or unreasonable risk of illness or injury. Introduction of such a product into interstate commerce is prohibited under 21 U.S.C. 331(a) and (v).

Please contact us if you have any questions concerning this matter.

Sincerely,

A handwritten signature in black ink, appearing to read 'Lynn A. Larsen', with a horizontal line extending to the right.

Lynn A. Larsen, Ph.D.

Director

Division of Programs and Enforcement Policy

Office of Special Nutritional

Center for Food Safety

and Applied Nutrition

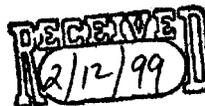
Enclosure

# P&Y American Dietary Supplements, Inc.

63685

Robert J. Moore, Ph.D.  
Director, Division of Programs and Enforcement Policy  
Office of Special Nutritional (HFS-455), CFSAN  
U.S. Food and Drug Administration  
200 "C" Street, S. W.  
Washington, D.C. 20204

288 N. Ridge Rd, P.O. Box 327  
Marathon, WI 54448  
Tel: 715-443-3338 Fax: 715-443-2818



February 5, 1999

Dear Dr. Moore,

Pursuant to the requirement of section 413(a)(2) of the Federal Food, Drug and Cosmetic Act for Dietary Supplement, P&Y Dietary Supplements Inc., wish to notify the Food and Drug Administration that it will market a brand named dietary supplement product, the LDW Liver **Nurishing Capsule™** on the U.S. Market 75 days after this notice. The product contains two new dietary ingredients, extract of root of Lemon grass (*Imperata cylindrical*) and extract of plant of Chinese black mushroom (*Ganoderma lucidum*). Other **excipients** include Royal Bee Jelly, Bee Pollen, and Spearmint Extract (*Metha spicta*). Accordingly, two copies of this notification are submitted for your reference.

The capsule will be sold in a 200 mg gelatin capsule contains 50 mg each of the extracts. The recommended dose is up to 6 capsules three times a day.

The new ingredient extracts (*Imperata cylindrical* and *Ganoderma lucidum*) were prepared from aqueous extraction of two popular nutritional foods that have a long history of use in Asia. The use as herbal medicine for *Imperata cylindrical* and *Ganoderma lucidum* were recorded in Ben **Cao Gang Mu** (or The Great Herbal) published since 16<sup>th</sup> century in China and Japan. They are both non-toxic, used in large quantity in oriental cooking. The pharmacological effects have been widely studied in recent years, Some selected references and abstracts for those studies (7 for *Imperata cylindrical*, and 15 for *Ganoderma lucidum*) are enclosed in this submission.

Based on the information submitted, we have concluded that the dietary supplement product containing the above mentioned ingredients will reasonably be expected to be safe under the recommended conditions of use.

Please contact me if you have any further questions concerning this matter. Thanks.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Simon Ko".

Simon Ko  
President & CEO

Enclosures

Ref 1

TITLE:

Studies on the individual and combined diuretic effects of four Vietnamese traditional herbal remedies (Zea mays, Imperata cylindrica, Plantago major and Orthosiphon stamineus).

AUTHORS:

Doan DD; Nguyen NH; Doan HK; Nguyen TL; Phan TS; Van Dau N; Grabe M; Johansson R; Lindgren G; Stjernstrom NE

AUTHOR AFFILIATION:

Vietnam-Sweden Hospital of Uong Bi, Vietnam.

SOURCE :

J Ethnopharmacol 1992 Jun;36(3) :225-31

CITATION IDS:

PMID: 1434681 UI: 93061108

ABSTRACT:

Herbal remedies are widely used in Vietnam alongside modern drugs. We assessed the diuretic effect of four traditional Vietnamese herbal remedies from Zea mays, Imperata cylindrical, Plantago major and Orthosiphon stamineus, all claimed to produce an increase of diuresis. No influence was recorded for the 12- and 24-h urine output or on the sodium excretion for any of the drugs when tested under standardized conditions in a placebo controlled double-blind crossover model. The present study indicates the need for critical review of the present recommendations regarding therapy with plant materials in countries relying on empiric traditions.

MAIN MESH HEADINGS:

Diuretics/\*pharmacology  
Plant Extracts/\*pharmacology  
\*Plants, Medicinal

ADDITIONAL MESH HEADINGS:

Adult  
Corn  
Double-Blind Method  
Drug Combinations  
Human  
Plantago  
Potassium/urine  
Sodium/urine  
Support, Non-U.S. Gov't  
Urine  
Vietnam

PUBLICATION TYPES:

CLINICAL TRIAL  
CONTROLLED CLINICAL TRIAL  
JOURNAL ARTICLE

CAS REGISTRY NUMBERS:

0 (Diuretics)  
0 (Drug Combinations)  
0 (Plant Extracts)  
7440-09-7 (Potassium)  
7440-23-5 (Sodium)

LANGUAGES:

Eng

Ref 2

TITLE:

Imperanene, a novel phenolic compound with platelet aggregation inhibitory activity from Imperata cylindrical.

AUTHORS:

Matsunaga K; Shibuya M; Ohizumi Y

AUTHOR AFFILIATION:

Department of Pharmaceutical Molecular Biology, University, Sendai, Japan.

SOURCE :

J Nat Prod 1995 Jan;58(1) :138-9

CITATION IDS:

PMID: 7760071 UI: 95280025

ABSTRACT :

Imperanene, a novel phenolic compound [1] has been isolated from Imperata cylindrical. Its structure was elucidated by spectroscopic evidence. Imperanene showed platelet aggregation inhibitory activity.

MAIN MESH HEADINGS:

Grasses/\*chemistry  
Phenols/\*pharmacology  
Platelet Aggregation Inhibitors/\*pharmacology

ADDITIONAL MESH HEADINGS:

Animal  
In Vitro  
Male  
Phenols/isolation & purification  
Platelet Aggregation Inhibitors/isolation & purification  
Rabbits

PUBLICATION TYPES:

JOURNAL ARTICLE

CAS REGISTRY NUMBERS:

0 (imperanene)  
0 (Phenols)  
0 (Platelet Aggregation Inhibitors)

LANGUAGES:

Eng

Ref 3

TITLE:

Cylindol A, a novel- biphenyl ether with 5-lipoxygenase inhibitory activity, and a related compound from *Imperata cylindrica*.

AUTHORS:

Matsunaga K; Ikeda M; Shibuya M; Ohizumi Y

AUTHOR AFFILIATION:

Department of Pharmaceutical Molecular Biology, Tohoku University, Sendai, Japan.

SOURCE :

J Nat Prod 1994 Sep;57 (9):1290-3

CITATION IDS:

PMID: 7798964 UI: 95096888

ABSTRACT :

Cylindol A [1] and B [2], two novel substances, have been isolated from *Imperata cylindrical*, and their structures have been elucidated on the basis of their spectral data coupled with chemical evidence and total synthesis. Cylindol A [1] showed 5-lipoxygenase inhibitory activity.

MAIN MESH HEADINGS:

Drugs,  
Chinese Herbal/\*chemistry  
Lipoxygenase  
Inhibitors/\*isolation & purification  
Parabens/\*isolation & purification  
Phenyl Ethers/\*isolation & purification

ADDITIONAL MESH HEADINGS:

Animal  
Drugs, Chinese  
Herbal/pharmacology  
Lipoxygenase  
Inhibitors/pharmacology  
Parabens/pharmacology  
Phenyl Ethers/pharmacology  
Rats  
Tumor Cells, Cultured

PUBLICATION TYPES:

JOURNAL ARTICLE

f

CAS REGISTRY NUMBERS:

- O (cylindrol A)
- O (Drugs, Chinese Herbal)
- O (Lipoxygenase Inhibitors)
- O (Parabens)
- O (Phenyl Ethers)
- 159225-90-8 (cylindol B)

LANGUAGES:

Eng

Ref 4

TITLE:

Cylindrene, a novel sesquiterpenoid from Imperata cylindrical with inhibitory activity on contractions of vascular smooth muscle.

AUTHORS:

Matsunaga K; Shibuyam; Ohizumi y

AUTHOR AFFILIATION:

Department of Pharmaceutical Molecular Biology, Tohoku University, Sendai, Japan.

SOURCE :

J Nat Prod 1994 Aug;57(8):1183-4

CITATION IDS:

PMID: 7964801 UI: 95054101

MAIN MESH HEADINGS:

Muscle, Smooth, Vascular/\*drug effects  
Plants, Medicinal/\*chemistry  
Sesquiterpenes/\*isolation & purification

ADDITIONAL MESH HEADINGS:

Animal  
Aorta/drug effects  
In Vitro  
Muscle Contraction/drug effects  
Nuclear Magnetic Resonance  
Plant Roots/chemistry  
Rabbits  
Sesquiterpenes/chemistry  
Sesquiterpenes/pharmacology

PUBLICATION TYPES:

JOURNAL ARTICLE

CAS REGISTRY NUMBERS:

0 (Sesquiterpenes)  
158204-49-0 (cylindrene)

LANGUAGES:

Eng

Ref 5

TITLE:

Inhibitory effect of the water extract of spikes of *Miscanthus sinensis* on IgE formation in mice.

AUTHORS:

Xu HX; Kadota S; Hattori M; Takahashi T; Kojima Y; Namba T

AUTHOR AFFILIATION:

Research Institute for Wakan-Yaku (Traditional Sino-Japanese Medicines), Toyama Medical and Pharmaceutical University, Japan.

SOURCE :

Planta Med 1993 Dec;59(6) :529-32  
.....

CITATION IDS:

PMID: 8302952 UI: 94134849

ABSTRACT :

The effects of four different plant extracts of the spikes of *Miscanthus sinensis*, *Phragmites communis*, and *Imperata cylindrica* var. *major*, and of the spikelets of *Coix lachrym-jobi* on IgE antibody formation were investigated in mice. The IgE antibody titer was tested by the passive cutaneous anaphylaxis (PCA) method in rats. Of these, the water extract of *M. sinensis* showed an appreciable inhibitory effect on IgE formation. Furthermore, an undialyzable fraction of extract with a relative molecular mass of more than 50,000d, designated as MSIS, showed the most potent inhibitory activity on IgE formation. MSIS was also a potent inhibitor of IgE formation when given intraperitoneally or intranasally to mice the day before injection of dinitrophenyl (DNP)-ovalbumin (OVA) antigen in both the primary and secondary immune responses. Moreover, MSIS clearly suppressed on-going IgE antibody formation in both primary and secondary immune responses .

MAIN MESH HEADINGS:

Grasses/\*chemistry  
IgE/\*biosynthesis  
Plant Extracts/\*pharmacology

ADDITIONAL MESH HEADINGS:

Animal  
Antibody Formation/drug effects  
Female  
Mice  
Mice, Inbred BALB C

PUBLICATION TYPES:

JOURNAL ARTICLE

CAS REGISTRY NUMBERS:

0 (Plant Extracts)  
37341-29-0 (IgE)

LANGUAGES:

Eng

Ref 6

TITLE:

Graminone B, a novel lignan with vasodilative activity from Imperata cylindrica.

AUTHORS:

Matsunaga K; Shibuya M; Ohizumi y

AUTHOR AFFILIATION:

Department of Pharmaceutical Molecular Biology,  
Pharmaceutical Institute, Tohoku University, Aoba, Sendai,  
Japan.

SOURCE :

J Nat Prod 1994 Dec;57(12):1734-6

CITATION IDS:

PMID: 7714541 UI: 95230305

ABSTRACT :

Two novel lignans, graminones A [1] and B [2] have been isolated from *Imperata cylindrical* and their structures have been elucidated on the basis of their spectral data. Graminone B [2] showed inhibitory activity on the contraction of the rabbit aorta.

MAIN MESH HEADINGS:

Drugs, Chinese Herbal/\*chemistry  
Furans/\*isolation & purification  
Guaiacol/\*analogs & derivatives  
Vasodilator Agents/\*isolation & purification

ADDITIONAL MESH HEADINGS:

Animal Drugs,  
Chinese Herbal/pharmacology  
Furans/pharmacology  
Guaiacol/isolation & purification  
Guaiacol/pharmacology  
In Vitro  
Muscle Contraction/drug effects  
Muscle, Smooth, Vascular/drug effects  
Nuclear Magnetic Resonance  
Rabbits  
Vasodilator Agents/pharmacology

PUBLICATION TYPES:  
JOURNAL ARTICLE

CAS REGISTRY NUMBERS:  
O (graminone B)  
O (Drugs, Chinese Herbal)  
O (Furans)  
O (Vasodilator Agents)  
90-05-1 (Guaiacol)

LANGUAGES:  
Eng

Ref 7

TITLE:

Characterization of cogon grass (Imperata cylindrical) pollen extract and preliminary analysis of grass group 1, 4 and 5 homologies using monoclonal antibodies to phleum pratense [In Process Citation]

AUTHORS:

Kumar L; Sridhara S; Singh B; Gangal S

AUTHOR AFFILIATION:

Centre for Biochemical Technology, Delhi, India.

SOURCE :

Int Arch Allergy Immunol 1998 Nov;117 (3):174-9

CITATION IDS:

PMID: 9831804 UI: 99051195

ABSTRACT :

BACKGROUND:

Previous studies have established the role of Imperata cylindrical (It) pollen in type I allergic disorders. However, no systematic information is available on the allergen composition of Ic pollen extract.

OBJECTIVES:

To characterize the IgE-binding proteins of Ic pollen extract and to detect the presence of grass group 1, 4 and 5 allergen homologies, if any. METHODS: Pollen extract of Ic was analyzed by in vivo and in vitro procedures such as intradermal tests (ID), enzyme-linked immunosorbent assay (ELISA), ELISA-inhibition, thin-layer isoelectric focusing (TLIEF), sodium dodecylsulfate polyacrylamide gel electrophoresis (SDS-PAGE) and immunoblotting. Dot blot assay was carried out to check the presence of well-known group 1, 4, and 5 allergen homologies in Ic pollen extract. RESULTS: Out of 303 respiratory allergies patients skin-tested, 27 showed sensitivity to Ic pollen extract. Specific IgE levels were elevated in all 15 serum samples tested. The extract prepared for this study was found to be highly potent since it required only 400 ng of homologous proteins for 50% inhibition of binding in ELISA inhibition assays. TLIEF of Ic pollen extract showed 44 silver-stained bands (pI 3.5-7.0) while SDS- PAGE resolved it into 24 Coomassie-Brilliant-Blue-

stained bands (MW 100- 10 kD) . Immunoblotting with individual patient sera recognized 7 major IgE-binding bands (MW 85, 62, 57, 43, 40, 28 and 10 kD) in Ic pollen extract. A panel of monoclonal antibodies, specific to group 1, 4 and 5 allergens from Phleum pratense pollen extract identified group 5 and group 4 homologies in Ic pollen extract. CONCLUSION: Ic pollen extract was characterized for the protein profile by TLIEF and SDS-PAGE. IgE reactivity was determined by ELISA and immunoblot. Monoclonal antibodies to group 5 and group 4 allergens reacted weakly showing that this pollen contains group 5 and group 4 homologous allergens.

LANGUAGES:

Eng

Ref

TITLE:

Anti-HIV-1 and anti-HIV-1-protease substances from Ganoderma lucidum [In Process Citation]

AUTHORS:

el-Mekkawy S; Meselhy MR; Nakamura N; Tezuka y; Hattori M; Kakiuchi N; Shimotohno K; Kawahata T; Otake T.

AUTHOR AFFILIATION:

Research Institute for Traditional Sino-Japanese Medicines, Toyama Medical and Pharmaceutical University, Japan.

SOURCE :

Photochemistry 1998 Nov;49(6) :1651-7

CITATION IDS:

PMID: 9862140 UI: 99079133

ABSTRACT:

A new highly oxygenated triterpene named ganoderic acid alpha has been isolated from a methanol extract of the fruiting bodies of *Ganoderma lucidum* together with twelve known compounds. The structures of the isolated compounds were determined by spectroscopic means including 2D- NMR. Ganoderiol F and ganodermanontriol were found to be active as anti- HIV-1 agents with an inhibitory concentration of 7.8 micrograms ml<sup>-1</sup> for both, and ganoderic acid B, ganoderiol B, ganoderic acid Cl, 3 beta- 5 alpha-dihydroxy-6 beta-methoxyergosta-7, 22-diene, ganoderic acid alpha, ganoderic acid H and ganoderiol A were moderately active inhibitors against HIV-1 PR with a 50% inhibitory concentration of 0.17-0.23 mM.

LANGUAGES:

Eng

Ref 9

TITLE:

Radical scavenger and antihepatotoxic activity of Ganoderma formosanum, Ganoderma lucidum and Ganoderma neo-japonicum.

AUTHORS:

Lin JM; Lin CC; Chen MF; Ujiie T; Takada A

AUTHOR AFFILIATION:

Graduate Institute of Natural Products, Kaohsiung Medical College, Taiwan, R.O.C.

SOURCE :

J Ethnopharmacol 1995 Jun 23;47 (1):33-41

CITATION IDS:

PMID: 7564419 UI: 96020922

ABSTRACT :

The free radical scavenging and antihepatotoxic activity from Ganoderma lucidum, Ganoderma formosanum and Ganoderma neo-japonicum were studied. Treatment with the water extract of Ganoderma lucidum, Ganoderma formosanum and Ganoderma neo-japonicum caused a marked decrease in the CC14-induced toxicity in rat liver, made evident by their effect on the levels of glutamic oxaloacetic transaminase (GOT) and lactic dehydrogenase (LDH) in the serum. The scavenging potency of the water extracts of the crude drugs was evaluated in terms of their ability to reduce the peaks of spin adducts using electron spin resonance (ESR) spin-trapping techniques. The results indicated that Ganoderma formosanum showed the greatest antihepatotoxic activity and the greatest free radical scavenging activity.

MAIN MESH HEADINGS:

Basil/\*chemistry  
Carbon Tetrachloride/\*toxicity  
Free Radical Scavengers/\*pharmacology  
Liver/\*drug effects

ADDITIONAL MESH HEADINGS:

Alanine Transaminase/blood  
Animal  
Ascorbic Acid/pharmacology  
Aspartate Transaminase/blood  
Drugs, Chinese Herbal/pharmacology  
Electron Spin Resonance Spectroscopy  
Hydroxyl Radical/toxicity  
Lactate Dehydrogenase/blood  
Liver/cytology  
Liver/enzymology  
Male  
Rats  
Superoxides/toxicity  
Water/chemistry

PUBLICATION TYPES:

JOURNAL ARTICLE

CAS REGISTRY NUMBERS:

EC 1.1.1.27 (Lactate Dehydrogenase)  
EC 2.6.1.1 (Aspartate Transaminase)  
EC 2.6.1.2 (Alanine Transaminase)  
0 (Drugs, Chinese Herbal)  
0 (Free Radical Scavengers)  
11062-77-4 (Superoxides)  
3352-57-6 (Hydroxyl Radical)  
50-81-7 (Ascorbic Acid)  
56-23-5 (Carbon Tetrachloride)  
7732-18-5 (Water)

Ref 10

TITLE:

Effects of Ganoderma lucidum and krestin on subset T-cell in spleen of gamma-irradiated mice.

AUTHORS:

Chen WC; Hau DM; Wang CC; Lin IH; Lee SS

AUTHOR AFFILIATION:

Institute of Radiation Biology, National Tsing Hua University, Hsinchu, Taiwan.

SOURCE :

Am J Chin Med 1995; 23 (3-4) :289-98

CITATION IDS:

PMID: 8571925 UI: 96126239

ABSTRACT :

Effects of Ganoderma lucidum (G1) and Krestin (PSK) extracts on spleen, thymus and splenocytes gamma-irradiated mice were investigated in this study. ICR strain male mice were divided into five groups. Group A was the normal control. Group B, the experimental control, was treated with G1. Group C, the radiation treatment control, was treated with whole body exposure to 4 Gy gamma-irradiation (RT) . Group D was treated with RT and G1. Group E was treated with RT and PSK. The dosage of G1 was 40 mg/day/kg body weight and PSK was 500 mg/day/kg body weight. Our results indicated that the relative thymus weight in groups D and E were higher than group C on day 28 after gamma-irradiation. Group D was the highest in all the experimental groups. CD4 and CD8 splenocytes in group D were higher than group C on days 7 and 28. G1 was better than PSK in repairing the damage of subset T-cells in the spleen of gamma- irradiated mice.

MAIN MESH HEADINGS:

Interferon Inducers/\*pharmacology  
Proteoglycans/\*pharmacology  
Spleen/\*drug effects  
T-Lymphocytes/\*drug effects

ADDITIONAL MESH

HEADINGS:

Animal  
Basidiomycota/chemistry  
Flow Cytometry  
Male  
Medicine, Herbal  
Mice  
Mice, Inbred ICR  
Spleen/radiation effects  
Time Factors

PUBLICATION TYPES:

JOURNAL ARTICLE

CAS REGISTRY NUMBERS:

0 (Interferon Inducers)  
0 (Proteoglycans)  
66455-27-4 (PS-K)

LANGUAGES:

Eng

Ref 11

TITLE:

Effects of Ganoderma lucidum and krestin on cellular immunocompetence in gamma-ray-irradiated mice.

AUTHORS:

Chen WC; Hau DM; Lee SS

AUTHOR AFFILIATION:

Institute of Radiation Biology, National Tsing Hua University, Hsinchu, Taiwan.

SOURCE :

Am J Chin Med 1995;23(1):71-80

CITATION IDS:

PMID : 7598094 UI: 95321302

ABSTRACT:

The effects of *Ganoderma lucidum* (Gl) and Krestin (PSK) extracts on cellular immunocompetence, leukocyte counts and differential count in gamma-irradiated mice were investigated in this study. ICR strain male mice were used and randomly divided into five groups. Group A is normal control. Group B, the experimental control, was treated with Gl. Group C, the radiation treatment control, was treated with whole body exposure to 4 Gy gamma-irradiation (RT) . Group D was treated with RT and Gl. Group E was treated with RT and PSK. The dosage of Gl was 400 mg/day/kg body weight and PSK was 500 mg/day/kg body weight. After irradiation, six mice from each group were sacrificed on day 7 and the other six on day 28. Cellular immunocompetence was measured by means of 3H-thymidine incorporation with splenic cells stimulated through mitogens such as PHA, Con A and LPS. The results revealed that relative splenic weight in Groups D and E were higher than group C on day 28 after gamma-irradiation, Group D was the highest in all the experimental groups. Leukocyte counts were decreased significantly in Groups D and E on day 7, the former was a little higher than the latter. Gl administration showed an increase in the leukocyte count in Group D on day 28. The blastogenic response of splenocytes to PHA and Con A in groups D and E were higher than in Group C on days 7 and 28. We suggested that Gl and PSK were effective in enhancing the recovery of cellular immunocompetence from gamma-ray irradiation.

MAIN MESH HEADINGS:

Biological Response Modifiers/\*pharmacology  
Immunocompetence/\*drug effects  
\*Medicine, Chinese Traditional  
Proteoglycans/\*pharmacology

ADDITIONAL MESH

HEADINGS :

Animal  
Basidiomycota/chemistry  
Body Weight/drug effects  
cell Count  
Leukocytes/drug effects  
Lymphocytes/drug effects  
M<sup>a</sup>le  
Mice  
Monocytes/drug effects  
Radiation  
spleen/drug effects

PUBLICATION TYPES :

JOURNAL ARTICLE

CAS REGISTRY NUMBERS:

0 (Biological Response Modifiers)  
0 (Proteoglycans)  
66455-27-4 (PS-K)

LANGUAGES :

Eng

Ref 12

TITLE:

Some characteristics and partial purification of the  
Ganoderma lucidum cellulase system.

AUTHORS:

Jakucs E; Racz I; LasztityD

AUTHOR AFFILIATION:

Department of Plant Anatomy, Eotvos Lorand University,  
Budapest.

SOURCE :

Acts Microbiol Immunol Hung 1994;41 (1):23-31

CITATION IDS:

PMID: 7921848 UI: 95006104

ABSTRACT:

The extracellular cellulase system of the white-rotting basidiomycete *Ganoderma lucidum* was characterised while growing in cellulose- containing shaken liquid culture. The protein content of the culture filtrate reached its maximum after 36 days and cellulase activity at about 60 days. Different cellulase activities (endoglucanase, cellobiohydrolase and beta-glucosidase) were determined in a range of pH extending from 6 to 2. All of the three enzyme activities have at least three peaks between pH 6 and 2, although optimum points of the different enzymes are slightly different, showing that the enzyme complex consists of a number of enzymes and isozymes. Partial purification of the enzyme complex was carried out by DEAE-cellulose column chromatography. Using 0-3 M linear urea gradient, protein was eluted in one sharp peak corresponding mainly to beta-glucosidase activity. Comparing crude extracellular protein with that of purified by the column using PAGE indicated that this method was suitable for the separation and partial purification of one type of *Ganoderma* cellulases.

MAIN MESH HEADINGS:

Basidiomycota/\*enzymology  
Cellulase/\*isolation & purification

LANGUAGES:

Eng

## Ref (3)

TITLE:

Evaluation of the anti-inflammatory and liver-protective effects of anoectochilus formosanus, ganoderma lucidum and gynostemma pentaphyllum in rats. ——— — — —

AUTHORS:

Lin JM; Lin CC; Chiu HF; Yang JJ; Lee SG

AUTHOR AFFILIATION:

School of Pharmacy, Kaohsiung Medical College, Taiwan.

SOURCE :

Am J Chin Med 1993;21 (1):59-69

CITATION IDS:

PMID: 8328423 UI: 93318804

ABSTRACT :

The pharmacological effects of Anoectochilus formosanus, Ganoderma lucidum and Gynostemma pentaphyllum were studied against carrageenan- induced paw edema and CCl (4)-induced hepatotoxicity in rats. The water extracts of G. pentaphyllum and G. lucidum were found to possess significant anti-inflammatory activity against carrageenan induced edema. The administration of Gynostemma pentaphyllum displayed an activity even more potent than indomethacin. In contrast, Anoectochilus formosanus showed a delayed onset of anti-inflammatory activity starting from 4 hrs post carrageenan administration. However, A. formosanus significantly decreased the acute increase in serum GOT and GPT level caused by CCl(4) . Histological changes such as necrosis, fatty change, ballooning degeneration, inflammatory infiltration of lymphocytes and Kupffer cells around the central vein were simultaneous improved by the treatment of A. formosanus.

MAIN MESH HEADINGS:

Alkaloids/\*therapeutic use  
Drugs, Chinese Herbal/\*therapeutic use  
Edema/\*drug therapy  
Liver Diseases/\*drug therapy  
Pyrroles/\*therapeutic use

ADDITIONAL MESH HEADINGS:

Alanine Transaminase/blood  
Alkaloids/administration & dosage  
Alkaloids/pharmacology  
Animal  
Aspartate Transaminase/blood  
Biopsy  
Carbon Tetrachloride  
Carrageenan  
Disease Models, Animal  
Drug Screening  
Drugs, Chinese Herbal/administration & dosage  
Drugs, Chinese Herbal/pharmacology  
Edema/chemically induced  
Edema/pathology  
Liver Diseases/blood  
Liver Diseases/chemically induced  
Liver Diseases/pathology  
Male  
Pyrroles/administration & dosage  
Pyrroles/pharmacology  
Rats  
Rats, Wistar

PUBLICATION TYPES:

JOURNAL ARTICLE

CAS REGISTRY NUMBERS:

EC 2.6.1.1 (Aspartate Transaminase)  
EC 2.6.1.2 (Alanine Transaminase)  
O (Alkaloids)  
O (Drugs, Chinese Herbal)  
O (Pyrroles)  
133086-80-3 (ganoine)  
56-23-5 (Carbon Tetrachloride)  
9000-07-1 (Carrageenan)

LANGUAGES:

Eng

Ref 14

TITLE:

[Chemical studies on immunologically active polysaccharides of Ganoderma lucidum(Leyss. ex Fr.) Karst]

AUTHORS:

He Y; Li R; Chen Q; Lin Z; Xia D; Ma L

AUTHOR AFFILIATION:

School of Pharmacy, Beijing Medical University.

SOURCE :

Chung Kuo Chung Yao Tsa Chih 1992 Apr;17 (4) :226-8, 256

CITATION IDS:

PMID: 1418551 UI: 93039591

ABSTRACT :

BN3B, the polysaccharide component of the fruit of Ganoderma lucidum, has been shown to have immune activity. From BN3B four homogeneous polysaccharides were separated and purified. Chemical studies on the main components BN3B1 and BN3B3 indicated that BN3B1 contained only glucose and should be a glucan containing beta- (1----6) and (1----3)glycoside bonds and that BN3B3 was an arabinogalactan containing beta- (1----6) and (1----3)glycoside bonds.

MAIN MESH HEADINGS:

Glucans/\*isolation & purification  
Polyporaceae/\*chemistry  
Polysaccharides/\*chemistry

ADDITIONAL MESH

HEADINGS:

Adjuvants, Immunologic  
English Abstract  
Galactans/chemistry  
Galactans/isolation & purification  
Glucans/chemistry  
Polysaccharides/pharmacology

PUBLICATION TYPES:

JOURNAL ARTICLE

LANGUAGES:

Chi

Ref 15

TITLE:

Effect of Ganoderma lucidum on postherpetic neuralgia [In  
Process Citation]

AUTHORS:

Hijikata Y; Yamada S

AUTHOR AFFILIATION:

Tokyo Hijikata Clinic, Osaka, Japan.

SOURCE :

Am J Chin Med 1998; 26(3-4) :375-81

CITATION IDS:

PMID: 9862025 UI: 99079018

ABSTRACT :

Administration of hot water soluble extracts of Ganoderma lucidum (GI) (36 to 72 g dry weight/day) decreased pain dramatically in two patients with postherpetic neuralgia recalcitrant to standard therapy and two other patients with severe pain due to herpes zoster infection.

LANGUAGES:

Eng

Ref 16

TITLE:

Cardiovascular effects of mycelium extract of Ganoderma lucidum: inhibition of sympathetic outflow as a mechanism of its hypotensive action.

AUTHORS:

Lee SY; Rhee HM

AUTHOR AFFILIATION:

Department of Pharmacology, Oral Roberts University School of Medicine, Tulsa, OK 74137.

SOURCE :

Chem Pharm Bull (Tokyo) 1990 May;38 (5):1359-64

CITATION IDS:

PMID: 2393962 UI: 90367209

ABSTRACT :

In an effort to understand the mechanism of cardiovascular actions of *Ganoderma lucidum* which was cultivated in Korea, the mycelium was isolated for a large-scale culture. Water extract of the mycelia was evaluated for its cardiovascular activity in anesthetized rabbits and rats. The left femoral artery and vein were cannulated for the measurement of arterial pressure and subsequent delivery of drugs. The left kidney was exposed retroperitoneally and a branch of the renal nerve was used to integrate renal efferent or afferent nerve activities. The extract decreased systolic and diastolic blood pressure, which was accompanied by an inhibition of renal efferent sympathetic nerve activity. The extract did not decrease heart rate in these animals, although there was clear hypotension in the extract dose dependent manner. This suggests that the hypotension induced by the treatment of the extract was secondary to the primary effect of the extract in the central nerve system, which suppressed the sympathetic outflow. Therefore we concluded that the mechanism of hypotensive action of *Ganoderma lucidum* was due to its central inhibition of sympathetic nerve activity.

MAIN MESH HEADINGS:

Antihypertensive Agents/\*pharmacology  
Basidiomycota/\*metabolism  
Hemodynamics/\*drug effects  
Sympathetic Nervous System/\*drug effects

ADDITIONAL MESH HEADINGS:

Animal  
Male  
Rabbits

PUBLICATION TYPES:

JOURNAL ARTICLE

CAS REGISTRY NUMBERS:

0 (Antihypertensive Agents)

LANGUAGES:

Eng

Ref 17

TITLE:

Experimental and clinical studies on inhibitory effect of Ganoderma lucidum on platelet aggregation.

AUTHORS:

Tao J; Feng KY

AUTHOR AFFILIATION:

Department of Internal Medicine, Tongji Hospital, Tongji Medical University, Wuhan.

SOURCE :

J Tongji Med Univ 1990;10(4):240-3

CITATION IDS:

PMID: 2098581 UI: 91278149

ABSTRACT :

In this study we observed the inhibitory effect of Chinese herbal medicine Ganoderma lucidum (GL) on platelet aggregation in 15 healthy volunteers and 33 patients with atherosclerotic diseases. The results showed that the first and the second phase of aggregation of platelets of the healthy volunteers were obviously inhibited (P less than 0.01) when watery soluble extract of GL of different concentrations was added to the platelets in vitro, i. e., the reaction speed of platelet aggregation was slowed down. The inhibitory effect was related to dosage. Platelet aggregation induced by ADP in final concentration of 2  $\mu\text{mol/L}$  and 3  $\mu\text{mol/L}$  was obviously inhibited, after the patients had taken GL 1g 3 times a day for 2 weeks, the maximum platelet aggregation inhibition rates were then 31.49% (P less than 0.01) and 17.7% (P less than 0.01) respectively. Length and weights (wet and dry) of the extracorporeal thrombi were reduced from 30.05 +/- 4.38 mm, 103.9 +/- 9.33 mg and 44.89 +/- 4.79 mg to 20.4 +/- 2.33 mm (P less than 0.05), 85.27 +/- 8.77 mg (P less than 0.01) and 35.1 +/- 4.5 mg (P less than 0.01) respectively after oral administration of GL. The results of our experiments suggested that the Chinese herbal medicine GL may be an effective inhibitory agent of platelet aggregation. However, its mechanism and active principle remain to be further investigated.

MAIN MESH HEADINGS:

Atherosclerosis/\*drug therapy  
Drugs, Chinese Herbal/\*pharmacology  
Platelet Aggregation/\*drug effects  
Platelet Aggregation Inhibitors/\*pharmacology

ADDITIONAL MESH HEADINGS:

Aged  
Atherosclerosis/blood  
Blood Coagulation/drug effects  
Drugs, Chinese Herbal/therapeutic use  
Female  
Human  
Male  
Middle Age  
Tablets

PUBLICATION TYPES:

JOURNAL ARTICLE

CAS REGISTRY NUMBERS:

0 (Drugs, Chinese Herbal)  
0 (Platelet Aggregation Inhibitors)  
0 (Tablets)

LANGUAGES:

Eng

Ref 18

TITLE:

Mechanisms of hypoglycemic activity of ganoderan B: a glycan of Ganoderma lucidum fruit bodies.

AUTHORS:

Hikino H; Ishiyama M; Suzuki Y; Konno C

SOURCE :

Planta Med 1989 Oct;55(5) :423-8

CITATION IDS:

PMID: 2682700 UI: 90047198

ABSTRACT :

Ganoderan B increased the plasma insulin level in normal and glucose- loaded mice but elicited no effect on insulin binding to isolated adipocytes. Administration of ganoderan B elicited significant increases of the activities of hepatic glucokinase, phosphofructokinase and glucose-6-phosphate dehydrogenase, decreased the hepatic glucose-6- phosphate and glycogen synthetase activities and did not affect the activities of hexokinase and glycogen phosphorylase. Ganoderan B reduced the glycogen content in the liver but had no influence on total cholesterol and triglyceride levels in the plasma and liver.

MAIN MESH HEADINGS:

Insulin/\*blood  
Polysaccharides/\*pharmacology

ADDITIONAL MESH

HEADINGS:

Animal  
Cholesterol/metabolism  
Glucose/metabolism  
Liver/enzymology  
Male  
Mice  
Triglycerides/metabolism

PUBLICATION TYPES:

JOURNAL ARTICLE

LANGUAGES:

Eng

Ref 19

TITLE:

Anti-allergic constituents in the culture medium of Ganoderma lucidum. (II). The inhibitory effect of cyclooctasulfur on histamine release.

AUTHORS:

Tasaka K; Mio M; Izushi K; Akagi M; Makino T

AUTHOR AFFILIATION:

Department of Pharmacology, Faculty of Pharmaceutical Sciences, Okayama University, Japan.

SOURCE :

Agents Actions 1988 Apr;23 (3-4) :157-60

CITATION IDS:

PMID: 2455976 UI: 88279189

ABSTRACT :

For centuries, Ganoderma lucidum has been used in Oriental medicine for the treatment of chronic bronchitis. Sequential fractions of the culture medium of this plant revealed that one of the active constituents was cyclooctasulfur. The latter effectively inhibited histamine release from rat peritoneal mast cells and impeded  $^{45}\text{Ca}$  uptake into these cells without affecting the cyclic AMP content. SDS- PAGE analysis indicated that cyclooctasulfur induced some changes in protein bands obtained from the membrane fraction of mast cells, suggesting that this compound interacts with membrane proteins so as to inhibit  $^{45}\text{Ca}$  uptake, and that this may be the main cause of histamine release inhibition.

MAIN MESH HEADINGS:

Basidiomycota/\*analysis  
Histamine Release/\*drug effects  
Polyporaceae/\*analysis  
Sulfur/\*pharmacology

PUBLICATION TYPES:

JOURNAL ARTICLE

LANGUAGES:

Eng

Ref 20

TITLE:

[Effect of six edible plants on the development of AFB1-induced gamma-glutamyltranspeptidase-positive hepatocyte foci in rats]

AUTHORS:

Chen ZY; Yan RQ; Qin GZ; Qin LL

AUTHOR AFFILIATION:

Guangxi Cancer Institute, Nanning.

SOURCE :

Chung Hua Chung Liu Tsa Chih 1987 Mar;9 (2) :109-11

CITATION IDS:

PMID: 2443327 UI: 88003983

ABSTRACT :

Six edible plants, green tea (GT), black tea (BT), *Lentinus edodes* (berk) Sing (LE), *Hericium erinaceus* (Bull. ex Fr.) Pers. (HE), Mixture of *Ganoderma Lucidum* (~~Ley ss~~ ex Fr.) Karst et *Ganoderma Japanium* (Fr.) Lloyd (MGLJ) and mung bean (MB), were tested for the effect on the development of AFB1-induced gamma-glutamyltranspeptidase positive hepatocyte foci (gamma-GT foci) using an in vivo short-term test model in rats. The rats received intraperitoneally 12 doses of initiator AFB1, 400 micrograms/kg per dose for 2 successive weeks. Two weeks after the initiation, the rats were submitted to a modified "Solt- Farber promotion program", i.e., a two weeks' feeding of a diet containing 0.015% acetylaminofluorene plus a two-third partial hepatectomy (PH) on day 7. The rats were sacrificed 10 days after PH and the livers were processed to gamma-glutamyltranspeptidase staining. The tested substances were powdered and mixed with the basal diet at the concentration level of 30% for MB and 5% for the others. The rats were fed with the diet-containing tested substances from 10 days before the AFB1 initiation to 3 days after the AFB1 conclusion. Consequently, the liver of the rats which had consumed GT showed significantly less and smaller gamma-GT foci, and those which had consumed BT, HE and LE showed somewhat less and significantly smaller foci than the control groups. It is indicated that the four diets have an inhibiting effect on AFB1-induced gamma-GT foci in different degrees. MB and MGLJ show no significant influence on the foci.

MAIN MESH HEADINGS:

Aflatoxins/\*pharmacology  
Liver Neoplasms, Experimental/\*chemically induced  
\*Plants, Edible  
\*Tea

ADDITIONAL MESH

HEADINGS:

gamma-Glutamyltransferase  
Animal  
English Abstract  
Liver/pathology  
Liver Neoplasms, Experimental/prevention & control  
Male  
Precancerous Conditions/chemically induced  
Precancerous Conditions/prevention & control  
Rats  
Rats, Inbred Strains  
Staining

PUBLICATION TYPES:

JOURNAL ARTICLE

CAS REGISTRY NUMBERS:

EC 2.3.2.2 (gamma-Glutamyltransferase)  
O (Aflatoxins)  
1162-65-8 (Aflatoxin B1)

LANGUAGES:

Chi

Ref 21

TITLE:

Dietary effect of *Ganoderma lucidum* mushroom on blood pressure and lipid levels in spontaneously hypertensive rats (SHR) .

AUTHORS:

Kabir Y; Kimura S; Tamura T

AUTHOR AFFILIATION:

Department of Food Chemistry, Faculty of Agriculture, Tohoku University, Sendai, Japan.

SOURCE :

J Nutr Sci Vitaminol (Tokyo) 1988 Aug;34 (4):433-8

CITATION IDS:

PMID: 3236086 UI: 89177594

MAIN MESH HEADINGS:

\*Basidiomycota  
Blood Pressure/\*drug effects  
Hypertension/'physiopathology  
Lipids/\*metabolism  
\*Polyporaceae

ADDITIONAL MESH HEADINGS:

Animal  
Hypertension/metabolism  
Male  
Plant Extracts/pharmacology  
Rats  
Rats, Inbred SHR

PUBLICATION TYPES:

JOURNAL ARTICLE

CAS REGISTRY NUMBERS:

0 (Plant Extracts)

LANGUAGES:

Eng

Ref 22

TITLE:

Hypoglycemic actions of some heteroglycans of Ganoderma lucidum fruit bodies.

AUTHORS:

Hikino H; Mizuno T

SOURCE :

Planta Med 1989 Aug;55(4) :385

CITATION IDS:

PMID: 2813573 UI: 90047191

MAIN MESH HEADINGS:

Hypoglycemic Agents/\*isolation & purification  
Plants, Medicinal/\*analysis  
Polysaccharides/\*pharmacology

ADDITIONAL MESH HEADINGS:

Animal  
Antineoplastic Agents, Photogenic/isolation & purification  
Antineoplastic Agents, Photogenic/pharmacology  
Japan  
Male  
Mice  
Mice, Inbred Strains  
Polysaccharides/isolation & purification

PUBLICATION TYPES:

JOURNAL ARTICLE

CAS REGISTRY NUMBERS:

O (Antineoplastic Agents, Photogenic)  
O (Hypoglycemic Agents)  
O (Polysaccharides)

LANGUAGES:

Eng