PSP and PSK

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PSP and PSK are the 2 products of Yun Zhi ratified by Chinese Ministry of Public Health and Japanese Ministry of Public Health respectively.

PSK was first manufactured by Kureha Chemical Industry Co. Ltd. The PS in PSK represents polysaccharide and K represents the first alphabet of the name of this Company. It was originally written as PS-K and was later changed to PSK. o; The commercial name of the product is Krestin.

PSP was prepared by Professor Qing-yao Yang. It is like PSK and is also a kind of compound polysaccharide. On the molecules of the polysaccharide, the small molecular protein (polypeptide) is connected. So it is called Yun Zhi Duo Tang Tai or Yun Zhi Tang Tai. The Tang Tai English names were originally glycopeptide, proteoglucan, glycosaminoglucan, etc. But the polysaccharide is all composed of N-acetyl-amino-hexose. But the polysaccharides of PSP and PSK are not composed of N-acetylamino-hexose. So it is not suitable to use the name. So the word "polysaccharopeptide" or "polysaccharide-peptide" is used and is abbreviated as PSP or Ps-p.

According to the different degrees of extraction, there are a series of PSP products. PSP directly extracted from the mycelia of Yun Zhi is called Yun Zhi Polysaccharide-peptide (Trade mark Qing Kang) and PSP polysacchardie-peptide (Landford). The former is sold on the market of Mainland China and the latter is according to the export specifications and is sold overseas. These 2 products are mainly used for tumorous patients.

The essence of the product is obtained by further isolation of the crude product. It is called Essence of Mushroom (Yun Zhi) (The sole distributor is Winsor Health Products Ltd., Hong Kong) used for healthy purposes.

Japan is quite specialized in the research of Yun Zhi. Besides PSK, Hirose, S. *et al*, (1970), Naruse S. and Takeda S. (in 1970) and Sugiura M. (in 1980) isolated two anticancerous components of the mycelia of Yun Zhi respectively. The former is called

ASTO and latter D--II. In addition, Ito H. *et al* (in 1974) extracted from the fermented mash of Yun Zhi an anti-tumor component which does not contain protein and it is called Coriolan. Its chemical components are glucans (by Hayashida S. *et al*, in 1992). But the above-mentioned three components still remain in the process of pharmacological research and was not used in clinical application.

Though PSP and PSK are all a kind of protein bound polysaccharide and are all extracted from the deep layer cultivated mycelia, yet they use the different strains, fermented medium and different extracted methods. Thus there is a certain difference between PSP and PSK. It is known that in the polysaccharide of PSP there is fucose, while there is no fucose in PSP, which contains arabinose and rhamnose; while there are no such ingredients in PSK. On the other hand, according to the pharmacological and clinical research, PSP has the definite effect of alleviating pain and increasing appetite, while there is no such report on PSK.

Comparison of Two Characterisitics of PSP and PSK

Items compared	Similarities	Dissimilarities
Fungi	Yun Zhi *Coriolus versicolor* (Fr.) Quel	PSP: Cov-1 strain PSK: CM-101 strain
Drug produced		PSP: capsule PSK: loose package
Powder color	brown	PSP: brown PSK: dark brown
Raw materials	deep-layer cultivated mycelia (2N)	
Fermentation technology	with glucose as the main carbon source (25°C, 3 days)	PSP: nitrogenous source: soya bean cake powder PSK: nitrogenous source: peptone and yeast cake
Extract and isolate	obtained by immersion in hot water	PSP: isolate by alcoholic precipitation PSK: isolate by salting out with $(NH_4)_2SO_4$
Medicinal ingredients	protein bound polysaccharide; average molecular wt. 1 x 10^5 Da the polysaccharide is formed from many monosaccahrides containing	PSP: polysaccharides contain arabinose and rhmanose, but no fucose PSK: polysaccharides do not

	alpha-1,4 and beta-1,3 glucoside linkage. Peptide mainly consists of aspartic and glutamic acids	contain arabinose and rhamnose, but contain fucose
Pharmacological function	inhibit the synthesis of nucleic acid of Ehrlich ascitic cells, and inhibit the accretion of cancer cells of Sarcoma-180, P388 leucocytes, etc.	PSP: inhibiting rate on P388 is 90-96% (1mg/kg) PSK: inhibiting rate on P388 is 61-90% (1mg/kg)
	recover the delayed supersensitive reaction inhibited by chemotherapeutic drugs such as cyclophosphamide and raise the lowered no. of WBC.	The inhibiting rate of PSP on Sarcoma-180 of Kunming mice is 43%; PSK, 28%.
	obviously raise the activity of NK cells and macrophages, raise the contents of immunoglobulin, complement C_3, antibody HC_{50} and IL-2 and promote the increase of T-lymphocytes	PSP can increase the alpha and gamma interferons produced by WBC by 2 to 4 times
Toxic test	LD_{50}>20g/kd; Ames test and the tests of abnormal chromosomes, nucleotide, reproduction, and abnormality are all negative. Use 50 times clinical dosage for monkey, consecutively for 6 months, no toxic reaction.	PSP can produce the toxic reaction by making the aggregation of the chromosomes of the lung cancer cells, but there is no toxic function on the hamster cells of normal mice.
Clinical effect	lessen the toxic and side reactions of chemo- and radiotherapy, raise the immune function, promote curative effect, prolong life and raise the quality of life	PSP can not only increase appetite, but also relieve pain.