Jimenez-Medina, Eva. Berruguilla, Enrique. Romero, Irene. Algarra, Ignacio. Collado, Antonia. Garrido, Federico. Garcia-Lora, Angel.

InstitutionServicio de Analisis Clinicos e Inmunologia, Hospital Universitario Virgen de las Nieves, Universidad de Granada, Av, de las Fuerzas Armadas 2, 18014 Granada, Spain. evajimenez@fundacionhvn.org

Title: The immunomodulator PSK induces in vitro cytotoxic activity in tumour cell lines via arrest of cell cycle and induction of apoptosis.

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BACKGROUND: Protein-bound polysaccharide (PSK) is derived from the CM-101 strain of the fungus Coriolus versicolor and has shown anticancer activity in vitro and in in vivo experimental models and human cancers. Several randomized clinical trials have demonstrated that PSK has great potential in adjuvant cancer therapy, with positive results in the adjuvant treatment of gastric, esophageal, colorectal, breast and lung cancers. These studies have suggested the efficacy of PSK as an immunomodulator of biological responses. The precise molecular mechanisms responsible for its biological activity have yet to be fully elucidated.

METHODS: The in vitro cytotoxic anti-tumour activity of PSK has been evaluated in various tumour cell lines derived from leukaemias, melanomas, fibrosarcomas and cervix, lung, pancreas and gastric cancers. Tumour cell proliferation in vitro was measured by BrdU incorporation and viable cell count. Effect of PSK on human peripheral blood lymphocyte (PBL) proliferation in vitro was also analyzed. Studies of cell cycle and apoptosis were performed in PSK-treated cells.

RESULTS: PSK showed in vitro inhibition of tumour cell proliferation as measured by BrdU incorporation and viable cell count. The inhibition ranged from 22 to 84%. Inhibition mechanisms were identified as cell cycle arrest, with cell accumulation in G0/G1 phase and increase in apoptosis and caspase-3 expression. These results indicate that PSK has a direct cytotoxic activity in vitro, inhibiting tumour cell proliferation. In contrast, PSK shows a synergistic effect with IL-2 that increases PBL proliferation.

CONCLUSION: These results indicate that PSK has cytotoxic activity in vitro on tumour cell lines. This new cytotoxic activity of PSK on tumour cells is independent of its previously described immunomodulatory activity on NK cells.

西班牙 Granada 大學附屬醫院免疫學系在2008發表的報告

是項試管實驗主力研究雲芝 PSK的抗癌細胞生長之功能。
所研究的癌細胞種類包括：血、皮膚、肌肉、子宮頸、肺、胰臟及腸胃。

研究方法是去觀察及記錄雲芝 PSK 對人體血液內淋巴細胞的生長影響及雲芝 PSK 對一般細胞的生長及白自然凋亡過程作深入了解。

研究結論認為雲芝 PSK 有消滅癌細胞的功能及活動。