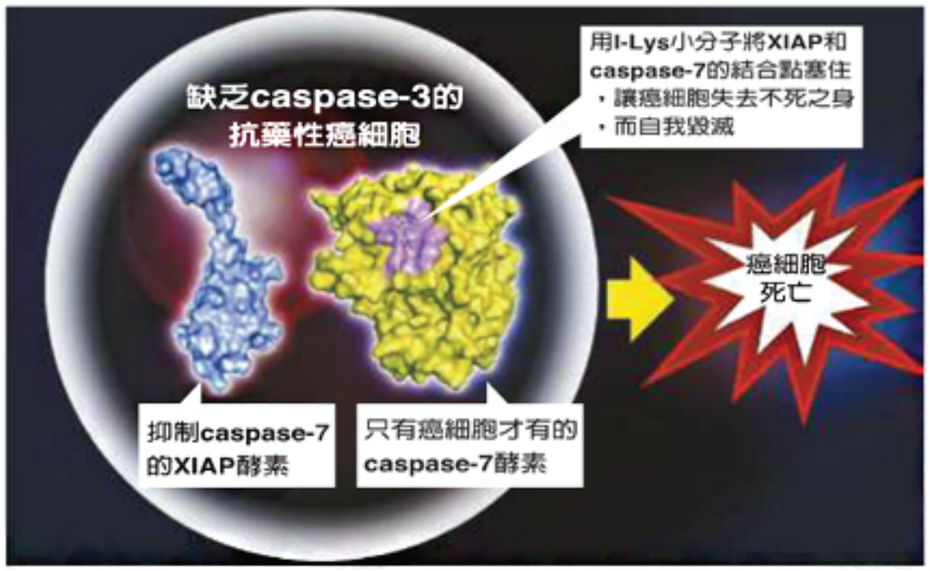
靈芝抗癌關鍵 中研院找到了

解開多年謎團 岩藻醣鍊才是癌細胞殺手 活化免疫系統 產生抗體限制腫瘤擴大



中研院提出靈芝促進免疫系統殺死癌細胞的關鍵因素，解開多年謎團。（圖：梁博煌提供）

記者陳皓嫻／台北31日電

中研院基因體中心昨天宣布，解開了「靈芝多醣增強抗癌活性」這多年難解的謎，提出靈芝促進免疫系統殺死癌細胞的關鍵因素，研究結果發表在本期美國國家科學院會報（PNAS）中，期刊特別撰文報導此項創新研究的重大成果。

過去研究認為，靈芝是可以強化人體免疫系統，甚至可以抗癌的中藥草。

研究團隊成員廖詩芬博士說，60多年來，許多科學家研究靈芝多醣的骨幹—葡聚醣（也就是即葡萄糖的聚合物），試圖找尋真正有效抗癌的部分，卻都鎩羽而歸。

專門研究醣分子的中研院院長翁啟惠認為，若靈芝的抗癌效果只來自於葡聚醣，那同樣含有葡聚醣的酵母菌、纖維素應該就可用來抗癌，但實驗結果卻顯示，葡聚醣只能幫助免疫反應，無法主動誘發免疫反應。

他推測靈芝多醣的分支上，一定還有其他的醣類是真正引發免疫反應的元素。

肺癌老鼠 腫瘤縮小剩1/4

基因體中心副研究員吳宗益說，在一次「試看看」的醣晶片測試中，竟發現施打靈芝多醣的肺癌老鼠所產生的抗體，會專門和癌細胞表面特有的醣分子Globo H結合，由於Globo H的尾端帶有「岩藻醣鍊」，團隊便推測一大串靈芝多醣中，應該就是具有岩藻醣鍊的分支，可以活化免疫反應。

經萃取後，含高度岩藻醣鍊的多醣片段FMS，果真能讓老鼠產生更多專門對付癌細胞的抗體，進而限制腫瘤擴大。

吳宗益說，實驗結果顯示腫瘤可縮小到原本的四分之一，如果將岩藻醣從靈芝多醣去除，則老鼠的免疫活性會大幅下降。

吳宗益表示，這是首次有研究從分子層面解開靈芝多醣可調節免疫系統及抗癌活性的神秘面紗，未來研究團隊希望能找到可抗癌的最小「有效醣單元」，才能分析岩藻醣鍊的結構，進一步合成，做為癌症疫苗的可能抗原。

不過岩藻醣鍊分支，占整個多醣的比率小於1%，要拆解非常困難，還有好長的路要走。

Uncover the mystery of Reishi polysaccharides effect on immunity and anti-cancer activity

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The polysaccharides in Reishi mushroom have been considered to have the ability to activate the human immune system and fight against cancer. However, the detailed functional mechinism remains a mystery to scientists. The research team of Genomic Research Center, Academia Sinica previously discovered that F3, a crude extract of fucose-containing polysaccharides from the Reishi mushroom, could stimulate the growth of many different immunocytes and boost the activity of the nature killer cells. This time, the research team further demonstrated that these polysaccharides, after injected into mice, can induce antibodies to recognize tumor-associated carbohydrate antigens on cancer cells and kill them. The results have just been published in this issue of "Proceedings of the National Academy of Sciences, USA" and already attracted great attention and highlighted by the same journal.

This work was started in Dr. Hsien-Yeh Hsu's group of National Yang-Ming University that when they injected F3 to mice with lung cancer could slow the tumor growth, but the anticancer mechanism was not clear. After collaboration with the research team led by Dr. Wong, Chi-Huey and Dr. Wu, Chung-Yi at the Genomics Research Center, Academia Sinica, it was found that the sera from the mice immunized with F3 contain the antibodies that recognize the tumor antigens GloboH and related structures. as shown in the glycan array designed by the groups led by Wong and Wu. Moreover, the inhibition of the tumor growth is directly related to the amount of these types of antibodies. In other words, the more the Globo H recognizing anitibody, the smaller the tumor. The research team further seprated the F3 into a fucose enriched fraction called FMS for immunization and found that FMS can induce even more anti-Globo H antibodies and, thus, more effectively inhibit tumor growth. The study further demonstrated that the fucose residue is the key of Reishi mushroom's cancer fighting ability as the anticancer activity was reduced dramatically when the fucose residue was removed. The array data further showed that FMS could induce even more specific antibodies that recognize fucose-containing tumor-associated carbohydrate antigens on the cancer cells. Moreover, Dr. Kuo-I Lin's group at the Genomics Research Center found that it is the immunocyte B1 produced antibody IgM to recognize Globo H and related molecules to kill cancer cells in a complement dependent manner. Finally, with the assistance of Dr. Khoo, Kay-Hooi on mass spectrometry analysis, the effective structures of the fucose-containing saccharides were elucidated. This research thus established the molecular mechanism of Reishi polysaccharides with regard to their anticancer activity.

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