



新一代精氨酸消耗性高效抗癌藥物

Rational Design of Engineered Arginine Depleting Enzymes as Multi-potent Anti-cancer Agents

嶄新多效能抗癌藥物，自血液中消除精氨酸以促使癌細胞死亡

A novel multi-potent drug removes arginine from the blood and kills cancer cells

專利申請編號及國家：12/732,188 (美國), PCT/CN2010/071357 (PCT)

特色與優點

- BCA-PEG20能於動物體內測試中有效抑制肺癌、肝癌、結直腸癌、乳癌、胃癌、子宮頸癌和食道癌的生長。BCA-PEG20同時亦能有效對抗其他精氨酸依賴型的癌細胞，包括血癌、皮膚癌、胰腺癌、前列腺癌和眼癌
- BCA-PEG20安全有效
- BCA-PEG20能殺滅具抗藥性的癌細胞
- BCA-PEG20能作綜合治療，增強其他藥物的療效

應用

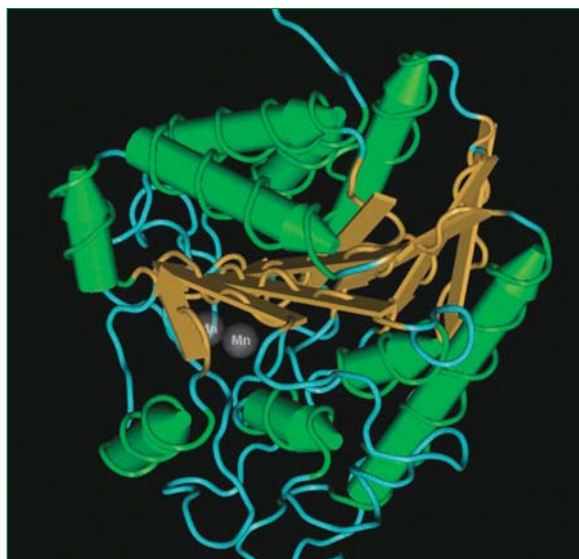
- 多效能的標靶抗癌藥物，用於對抗精氨酸依賴型癌細胞
- 化療增強劑，有效提升化療效果

獎項

- 日內瓦州政府大獎 (2009年4月)
- 第三十七屆瑞士日內瓦國際發明及創新技術與產品展覽 - 評審團特別嘉許金獎 (2009年4月)
- 中國金種子大賽 - 金種子入圍獎 (2010年)

消耗精氨酸以餓死癌細胞已發展為癌症治療的新模式。精氨酸是癌細胞生長所需的重要養分，正常細胞對精氨酸短缺有良好的耐受性，但消耗精氨酸卻能誘發癌細胞死亡。精氨酸脫亞胺酶 (ADI) 成功以此為治療癌症帶來新的可能性。然而精胺基琥珀酸鹽合成酶 (ASS) 陽性癌細胞系卻對ADI產生抗藥性。

透過嶄新的藥物設計，理大發展出新一代的耐熱性精氨酸酶 (BCA-PEG20)，能夠用來治療精氨酸依賴型癌細胞，並且適用於具ADI抗藥性的癌細胞系。BCA-PEG20於體外及動物體內測試中，均能有效抑制肺癌、肝癌、結直腸癌、胃癌、子宮頸癌及其他癌細胞的生長。BCA-PEG20更能聯合其他藥物作綜合治療，產生協同效應，是甚具潛力的高效能抗癌藥物。



耐熱性芽孢杆菌精氨酸酶(BCA)的三維分子結構
Three dimensional molecular structure of thermotable Bacillus arginase (BCA)



耐熱性芽孢杆菌精氨酸酶(BCA)生長在極高溫的泉水內
Thermotable Bacillus arginase (BCA) can be isolated from a hot spring bacterium

Arginine deprivation has become a new cancer treatment paradigm and has exploited for treatment of various cancers. Arginine is an essential amino acid for the growth of cancer cells. Deprivation of arginine induces cancer cells death but it is generally well tolerated in normal cells. The successful use of Arginine Deiminase (ADI) to treat argininosuccinate synthetase (ASS)-deficient tumors has opened up new possibilities for targeted therapy. Nevertheless, many ASS-positive cancers are resistance to ADI.

By rational drug design, we have developed a thermostable arginase (BCA-PEG20) to treat both ADI-sensitive and ADI-resistant cancers. BCA-PEG20 has demonstrated to have antitumor activities both in vitro and in vivo in lung cancer, liver cancer, colorectal cancer, gastric cancer, cervical cancer and other tumors. As a novel multipotent anti-cancer drug, BCA-PEG20 is able to work as a single agent and combine with other chemotherapeutic agents to enhance treatment effect.

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Special Features and Advantages

- BCA-PEG20 demonstrates in vivo antitumor activities in lung cancer, liver cancer, colorectal cancer, breast cancer, gastric cancer, cervical cancer and oesophageal cancer. Besides, it is actively against other arginine auxotrophic cancers, including, leukaemia, melanoma, pancreatic cancer, prostate cancer and eye cancer
- BCA-PEG20 is safe and effective
- BCA-PEG20 can treat drug-resistant cancers
- BCA-PEG20 can augment the therapeutic effect of other chemotherapeutic agents

Applications

- As a multipotent targeted therapy for cancers that are auxotrophic for arginine
- As a "chemo-enhancer" to augment the effect of other chemotherapeutic agents

Awards

- Prize of the State of Geneva (April 2009)
- Gold Award with the congratulations of the jury - 37th International Exhibition of Inventions, New Techniques and Products, Geneva (April 2009)
- Finalist Award- SEED Competition, China (2010)



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