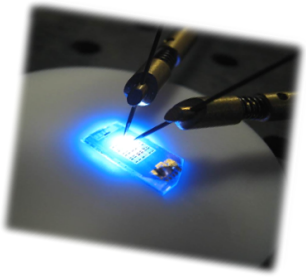
The University of Hong Kong
Technology Transfer Office

VERSITECH LTD.
The University Technology Transfer Company

Technology Transfer at the University of Hong Kong
香港大學技術轉移處的工作介紹





Technology Transfer Office / Versitech Limited
The University of Hong Kong

Our Mission
香港大學技術轉移處的使命

- To promote education, research and technology transfer
  促進教學、科研和技術轉讓

- To facilitate the commercialization of the University's applied research results for the betterment of society
  推廣大學之應用科研成果產業化，使社會大眾得益

- To manage the University's intellectual property assets and transfer such assets to industry via licensing, spinout companies or collaborations
  管理大學的知識產權並透過專利授權、成立衍生公司或以合作形式把學校科研成果轉讓至業界

HKU Strategy for Technology Transfer
香港大學技術轉移的策略

- Assist academic colleagues in applying for research funding, e.g. ITF, Guangdong-HK Innovation Support Fund
  協助教學人員申請應用科研經費，如創新科技基金 －粵港科技合作資助計劃

- Arrange collaboration, contract research and consulting services with industry, so as to strengthen the University experience in industrialization and commercialization
  安排合約研究及顧問服務，以增強大學教師和科研員工對科研產業化的經驗

- Provide support to academic colleagues:
  - Protect intellectual property (IP)
  - Draft, review and advice on research related contracts
  - IP licensing, negotiate commercial collaborations, help evaluate the commercial viability of the research results and prepare business plans

  支援教學人員:
  - 保護知識產權 －為科研成果申請專利
  - 草擬，評審和對研究相關的合同提供意見
  - 辦理專利授權、商業談判或合作、評估把研究成果商業化的可行性，並擬訂業務計劃書

HKU Strategy for Technology Transfer (Cont'd)

香港大學技術轉移的策略 (續)

- Encourage academic colleagues to further commercialize their applied research results
  - This is considered as one of the evaluation criteria in their performance appraisal exercises
  - Academic colleagues can share the royalties brought by the commercialization successes of their research
  - 1/3 : 1/3 : 1/3 ⇒ inventor : department : university

- 鼓勵教學人員更進一步把應用研究成果產業化
  - 這是被視為其中一項工作表現的評估標準
  - 員工可共享產業化的利潤
  - 1/3：1/3：1/3 ⇨ 發明者：其工作的部門 :大學

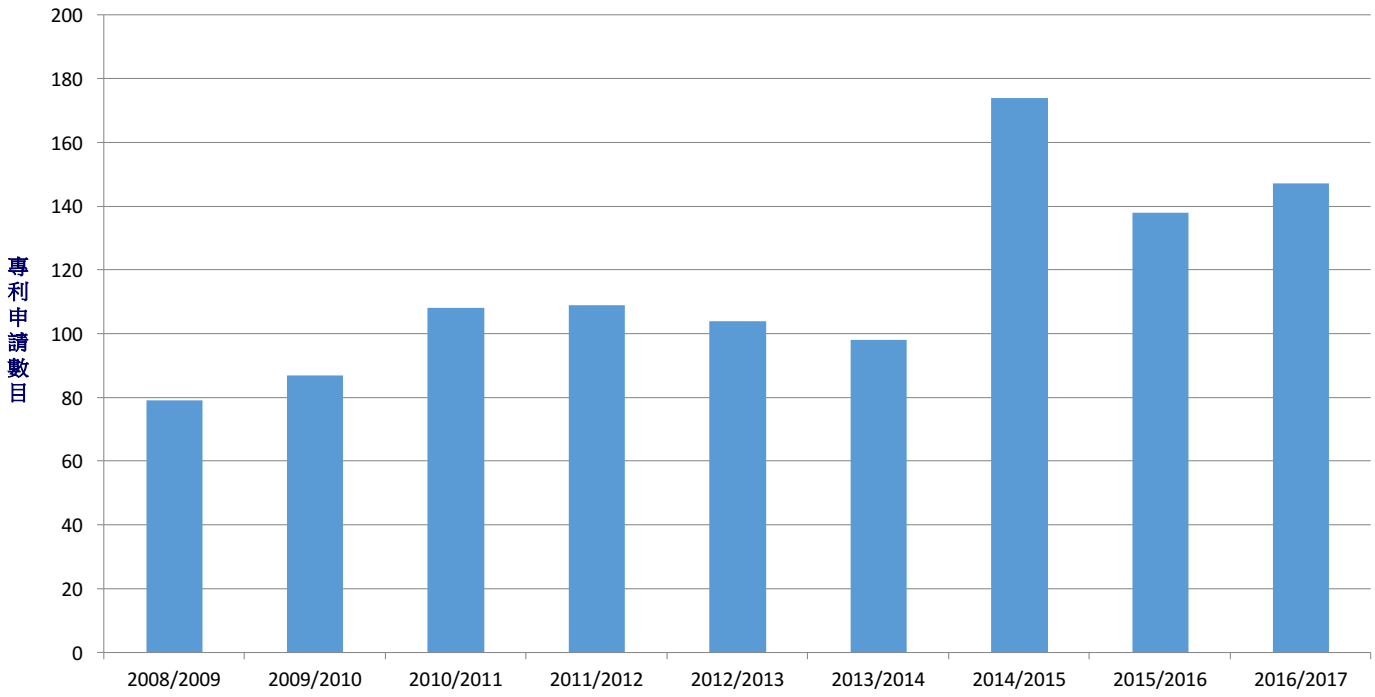
TTO vs Versitech
技術轉移處與港大科橋

- TTO is responsible for providing services to academic colleagues (internal)
  技術轉移處負責為大學教師提供轉移大學發明的服務 (對內)

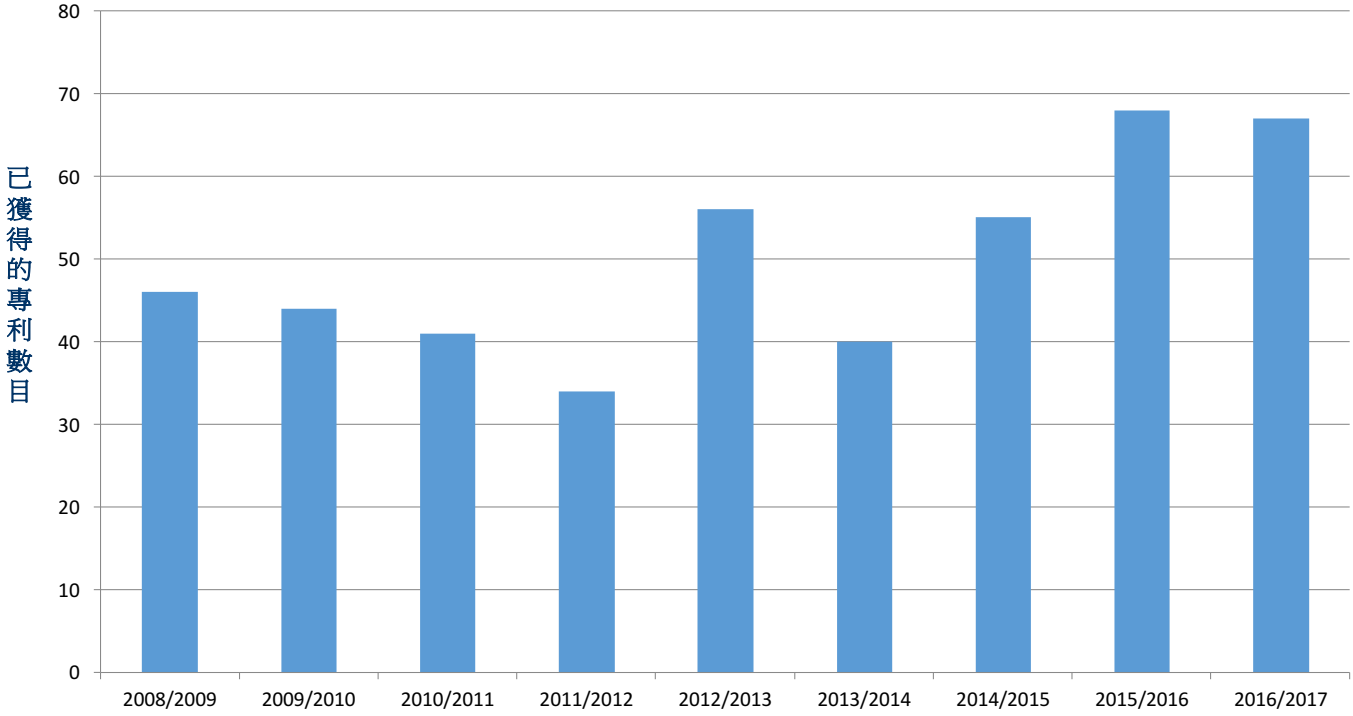
- Versitech is responsible for commercialization activities and for business arrangements with industry (external)
  港大科橋負責策劃和組織科研成果產業化活動，並作相關的商業安排 (對外)

HKU's technology transfer activities - A snapshot
香港大學技術轉移處的運作概況

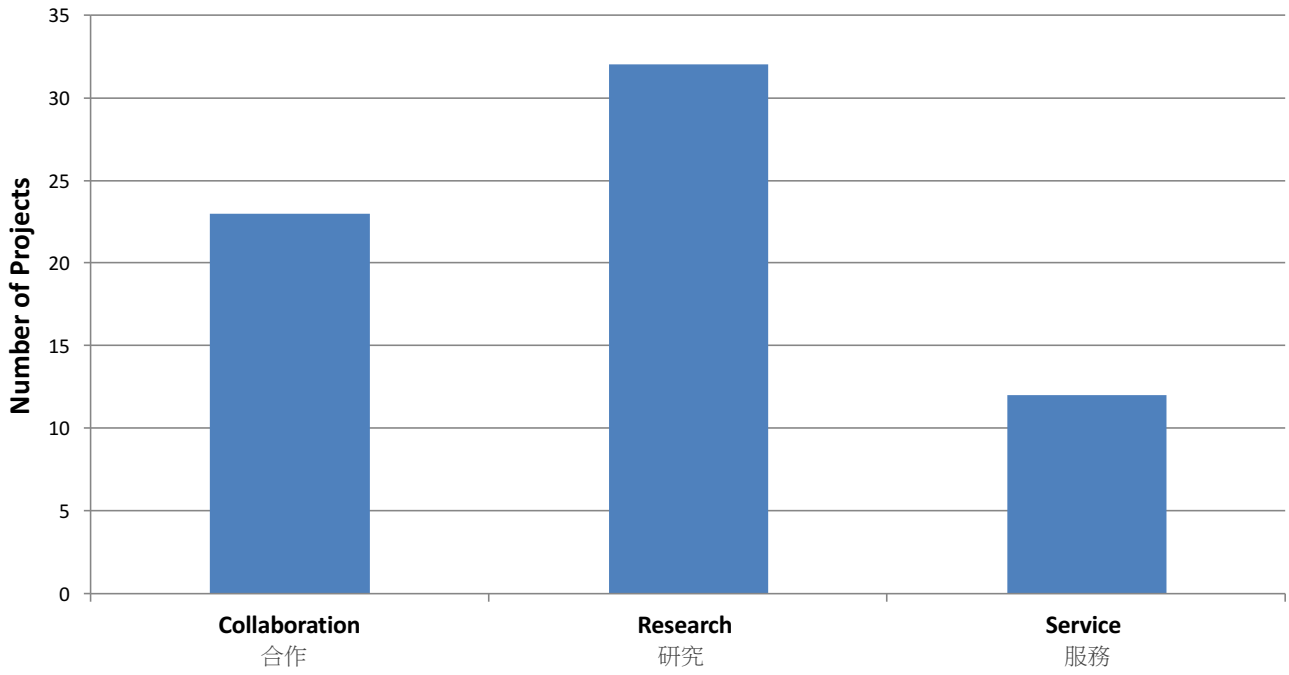
Number of Patent Applications Filed
已申請的專利數目



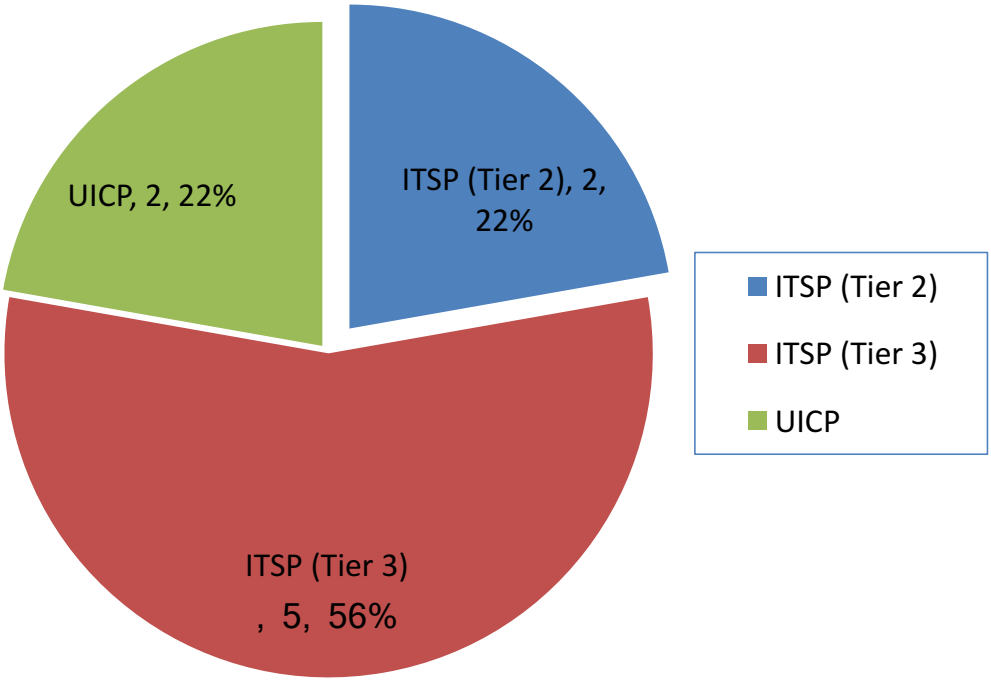
Number of Patents Granted
已獲得專利權的數目



與中醫藥有關的項目 (2011/6 - 2017/9)



與中醫藥有關的項目(2011/7 – 2017/9)



香港大學的中藥之研究項目

經香港大學化學系驗證之中藥

Radix Bupleuri (柴胡)	Fructus kochiae (地膚子)	Radix et Rhizoma Cynanchi Paniculati (徐長卿)
Radix Angelicae Pubescentis (獨活)	Semen Oroxyli (木蝴蝶)	Polyporus (豬苓)
Radix Glycyrrhizae (甘草)	Semen Persicae (桃仁)	Omphalia (雷丸)
Radix et Rhizoma Rhei (大黃)	Herba Lysimachi (金錢草)	Herba Arimoniae (仙鶴草)
Medulla Junci (燈心草)	Cacumen Platycladi (側柏葉)	Radix Inulae (土木香)
Herba Junci (燈心全草)	Cyperi Rhizoma (香附)	Fructus Piperis (胡椒)
Radix Scutellariae (黃芩)	Rhizoma cibotii (狗脊)	Citri Reticulatae Pericarpium (陳皮)
Fructus Ligustri Lucidi (女貞子)	Herba Eupatorii (佩蘭)	Chrysanthemi Indici Flos (野菊花)
Herba Leonuri (益母草)	Desuraiaine Semen (南葶藶子)	Herba Potentillae Chinensis (委陵菜)
Rhizoma Anmearrhenae (知母)	Lepidii Semen (北葶藶子)	Herba Glechomae (連錢草)
Herba Artemisiae Annuae (青蒿)	Folium Pyrrosiae (石韋)	Herba Potentillae Discoloris (翻白草)
Fructus Cnidii (蛇床子)	Semen Ricini (蓖麻子)	Radix Trichosanthis (天花粉)
Hydrargyrum Chloratum Compositum (白降丹)	Semen Cuscutae (菟絲子)	Herba Ardisiae Japonicae (矮地茶)
Calomelas (輕粉)	Herba Artemisiae scopariae (茵陳)	Radix Ranunculus Ternati (貓爪草)
Cinnabaris (朱砂)	Fructus Chebulae (訶子)	Rhizoma Osmundae (紫萁貫眾)
Hydrargyri Oxydum Rubrum (紅粉)	Fructus polygoni orientalis (水紅花子)	Semen Nigellae (黑種草子)
Folium Artemisiae Argyi (艾葉)	Flos Buddlejae (密蒙花)	

Chinese medicine research projects by Prof CM Che in HKU

OUR AIM

To Search for Non-toxic Natural Products from Traditional Chinese Medicine for Cancer Treatment

從傳統中藥中探索可用於癌症治療的無毒天然產物

Saponins - our major research interest

Radix Ginseng (人參)

Ginsenosides

Radix Notoginseng (三七)

Notoginsenosides

Radix Astragali (黃芪)

Astragalosides

Radix Bupleuri (柴胡)

Saikosaponins

P. zanlanscilanense (湖北黃精)

Dioscin saponins

Our research team

Rhizoma Anemarrhenae (知母)

Timo saponins

Rhizoma Paridis (重樓)

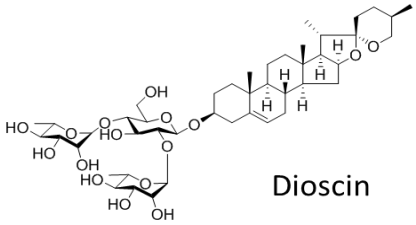
Polyphyllin saponins

Our publication on saponins:
Organic Letters. 2005, 2010
Proteomics 2006, 2008
J Proteome Res. 2008
Cancer Research 2008
J. Biol. Chem 2011
Chemical Science 2016

Dioscin – induction of mitochondria-related apoptosis

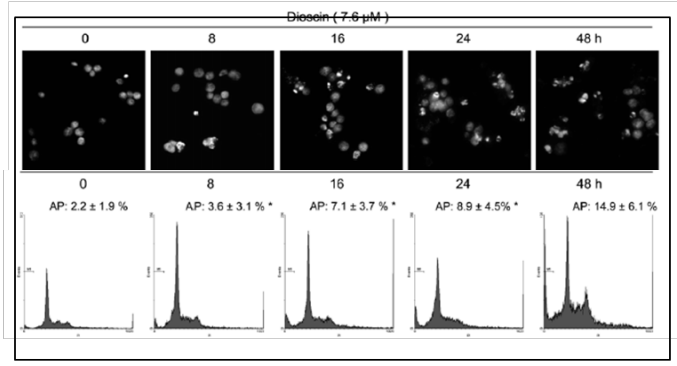
P. zanlanscilanense (湖北黃精)

補氣養陰，健脾, 潤肺，益腎

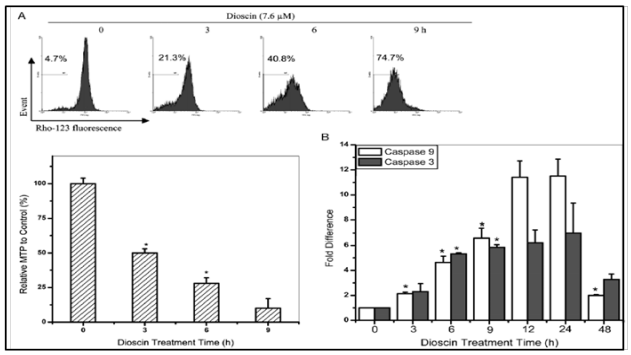


Dioscin

Apoptotic cell death was detected in dioscin-treated HL-60 cells



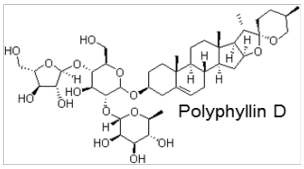
Dioscin exhibits cytotoxicity through mitochondria-initiated apoptosis pathways



Proteomics 2006, 6: 2422-2432

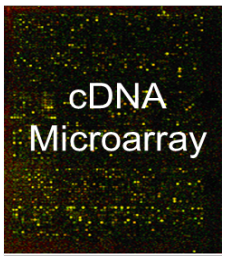
Polyphyllin D – induction of ER stress by proteomic and transcriptomic studies

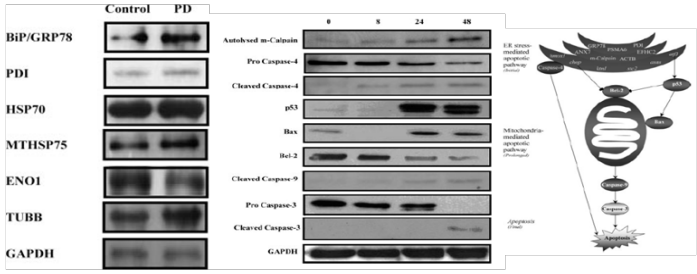
Identification of ER stress pathway as the anticancer mechanisms by transcriptomic and connectivity map analysis



清熱解毒，消腫止痛，涼肝定驚

Name	Rank	Score	Inhibitor	ER stress-related response
MG132	1	0.993	Proteasome	Unfolded protein
Celastrol	2	0.987	Proteasome	Unfolded protein
2-deoxy-D-glucose	4	0.906	Glycosylation	Glucose deprivation





Genomic data obtained from PD treatment

Connectivity Map - Computational pattern mapping with existing drug libraries (Broad Institute, USA)

Identification of drugs with similar actions – prediction of the drug target

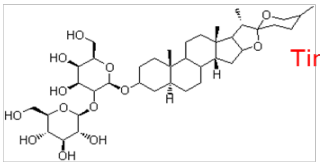
Experimental validation of hypothesis

Proteomics 2008, 8(15): 3105-3107

Timosaponin AIII (TAIII) - An anticancer agent with autophagic-inducing properties

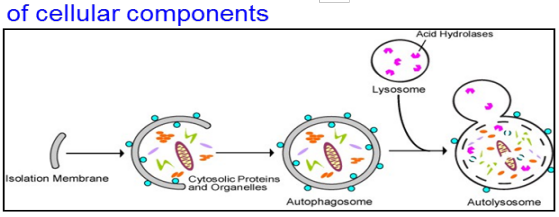
Rhizoma Anemarrhenae

One of the 165 important Kampo remedies of traditional Japanese medicine (日本漢方)

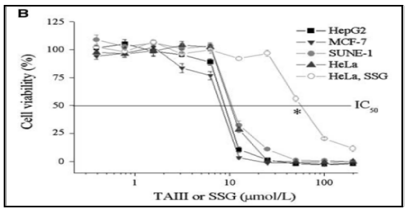


Timosaponin AIII (TAIII)

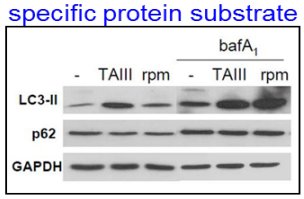
Autophagy - allows degradation and recycling of cellular components



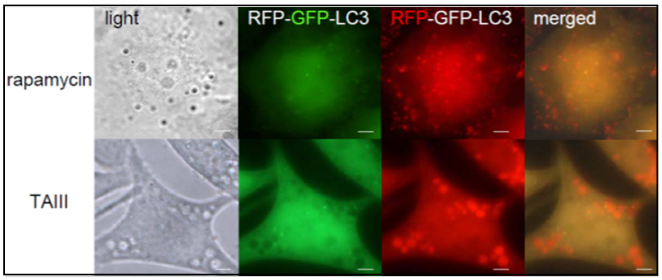
TAIII is cytotoxic to cancer cells



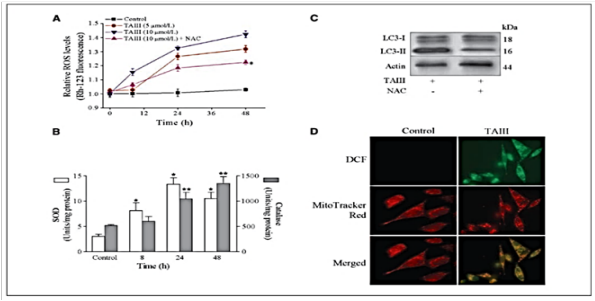
TAIII induces autophagic flux with degradation of specific protein substrate



Autophagy properties: punctate fluorescence indicative of LC3 recruitment to the autophagosome

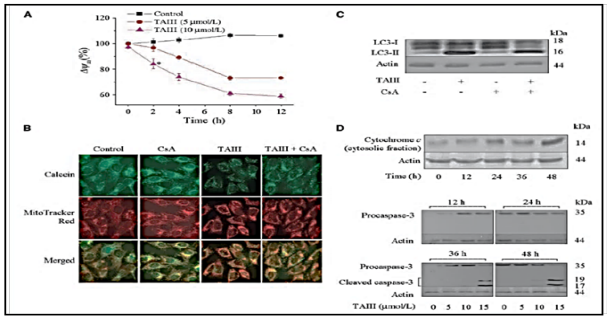


TAIII induces oxidative stress contributing to autophagy in cancer cells

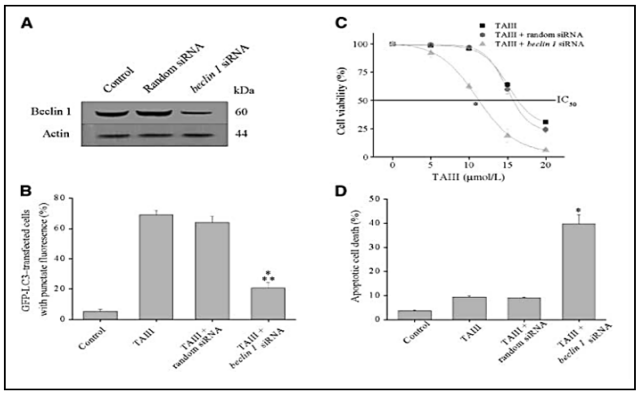


Timosaponin AIII (TAIII) - An anticancer agent with apoptotic cell death

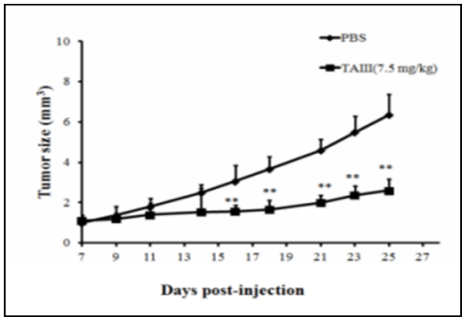
TAIII perturbed mitochondrial activities: overproduction of ROS, reduction of mitochondrial membrane potential, induction of mitochondrial permeability transition

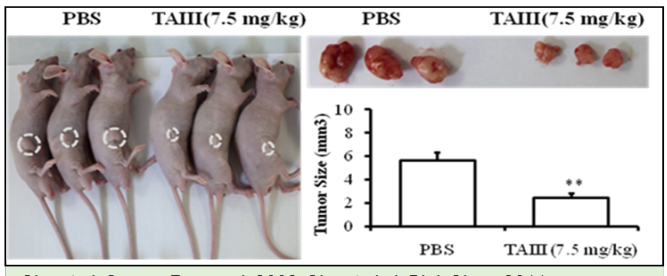


Beclin 1 siRNA enhanced the cytotoxicity of TAIII



TAIII Inhibited hepatocarcinoma xenograft in mice



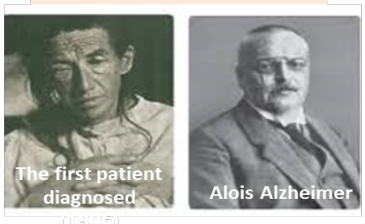


Che et al, Cancer Research 2008; Che et al, J. Biol. Chem 2011;
Che el at , US patent application 2012; Che CM and Feng YB, BBA 2013;

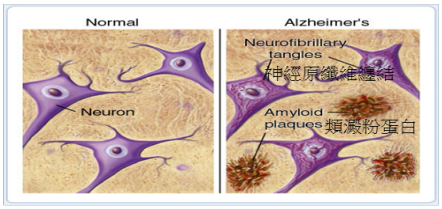
Timosaponin AIII (TAIII) – A potential agent for anti-Alzheimer's disease (AD)

阿茲海默症是一種腦部疾病，此症導致思考能力和記憶力逐漸退化，並使個人日常生活功能受到影響，現時沒有醫治的方法.

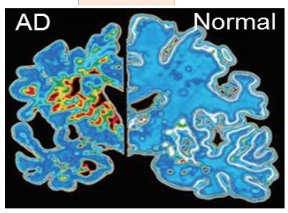
Alzheimer's Disease



Hallmarks of AD

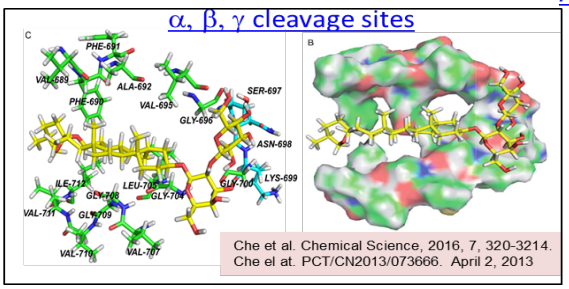


Brain



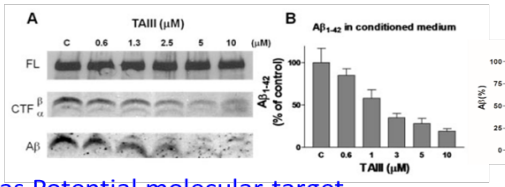
Aβ precursor protein as potential molecular target

APP transmembrane domain showing α, β, γ cleavage sites

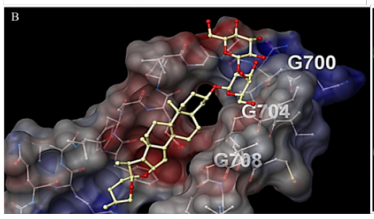


Che et al. Chemical Science, 2016, 7, 320-3214.
Che el at. PCT/CN2013/073666. April 2, 2013

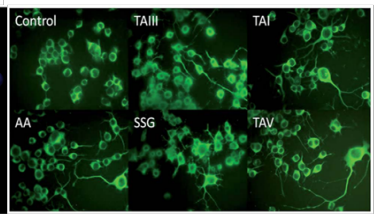
In vitro and in vivo Aβ-lowering activities



APP as Potential molecular target

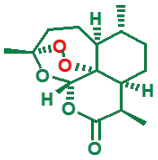


Stimulation of neurite outgrowth

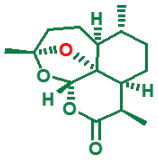


Exploring synthetic artemisinin derivatives as anticancer compounds

Artemisia annua



Artemisinin (Qinghaosu, **1**)

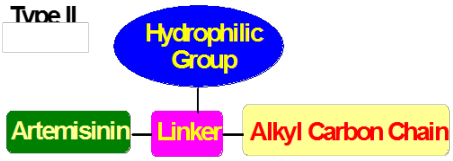


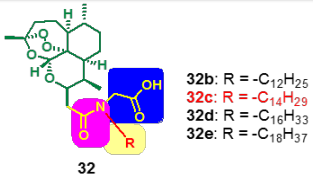
Deoxyartemisinin (**2**)

Biologically inactive

- Isolated in China in 1972
- Highly active against human malaria

Synthesis of more potent artemisinin derivatives





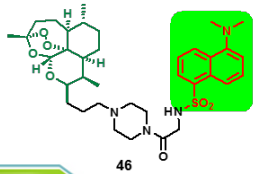
32

32b: R = -$C_{12}H_{25}$
32c: R = -$C_{14}H_{29}$
32d: R = -$C_{16}H_{33}$
32e: R = -$C_{18}H_{37}$

IC_{50} = 0.18 - 0.40 μM

Artemisinin derivatives 500-fold more potent than natural artemisinin

Synthesis of fluorophore conjugated artemisinin probe



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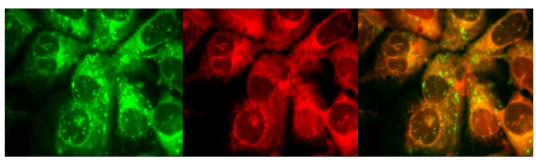
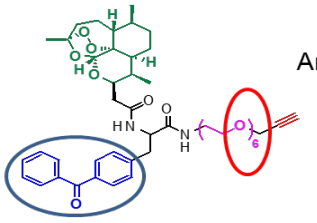
IC_{50} = 8.7 μM (HepG2)
IC_{50} = 7.8 μM (Hep3B)



Cellular localization at endoplasmic reticulum

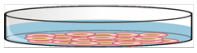
Organic Letters. 2005, 2010

Molecular targets identification of cytotoxic artemisinin derivatives

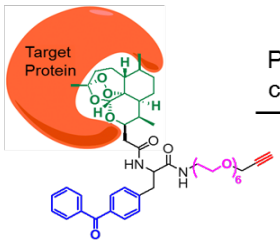


Artemisinin-
Click Chemistry
Photoaffinity Probe

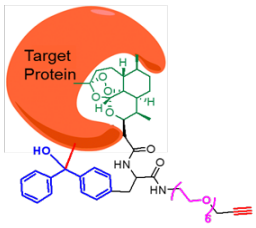
Artemisinin-protein interaction

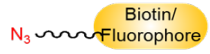


HepG2 cells

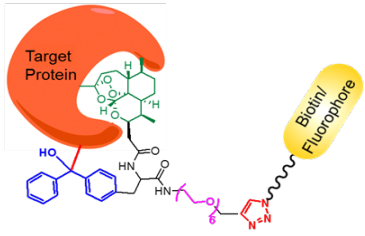


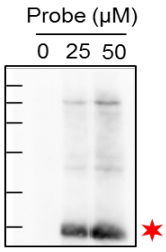
Photoaffinity crosslinking





Click chemistry reaction





Biotin immunoblot

2D gel fluorescence

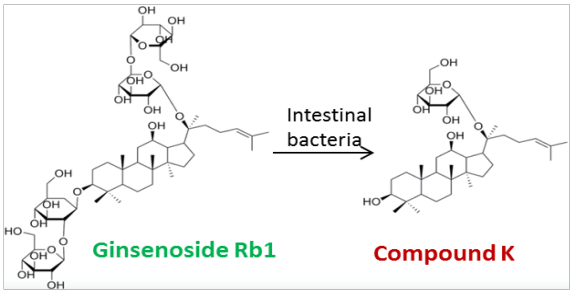
MS analysis of artemisinin-probe-labeled proteins

Target Protein ID

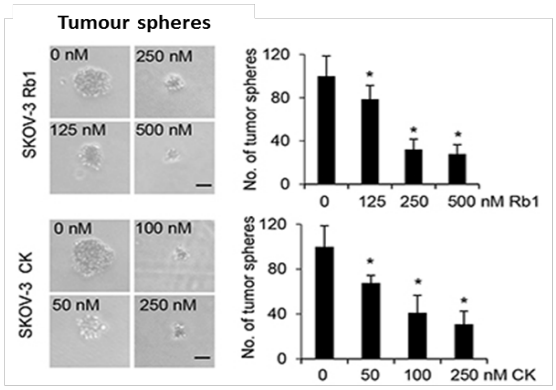
Improving the bioavailability of ginsenoside Compound K

Investigators: Prof CM Che and Prof. Alice Wong (School of Biological Science)

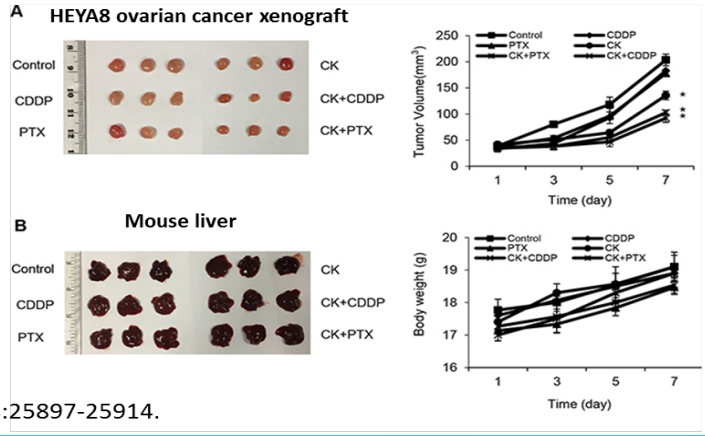
Compound K is the intestinal bacterial metabolites absorbed in the plasma after oral administration of the ginsenoside Rb1.



Rb1 and its metabolite compound K inhibit self-renewal and growth of ovarian cancer stem cells



Compound K enhances anticancer activities of cisplatin and paclitaxel



Oncotarget 2017,8:25897-25914.

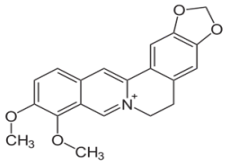
Anti-cancer mechanisms of berberine on human hepatocellular carcinoma

Investigators: Prof CM Che and Dr. YB Feng (School of Chinese Medicine)

Rhizoma Coptidis

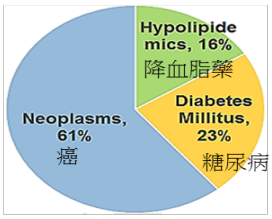
(CR) 黃連

功效: 清熱燥濕，瀉火解毒。

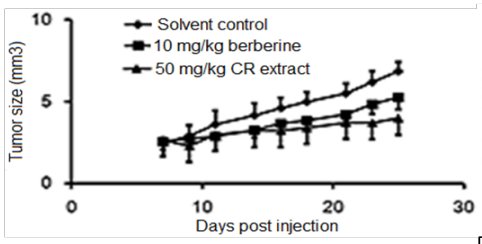


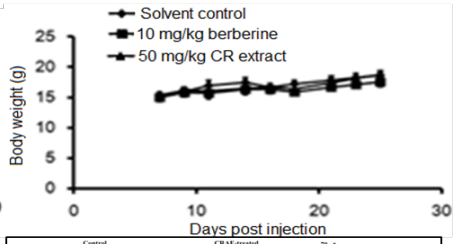
Berberine 黃連素

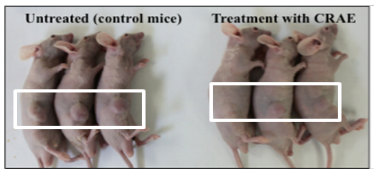
Publication on berberine and CR
2010 to 2015



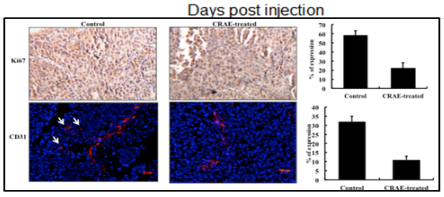
Anti-tumor activity of Berberine and CR aqueous extract (hepatocarcinoma xenograft)
黃連素, 黃連提取物抗腫瘤活性檢測 (肝癌)

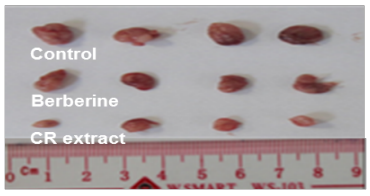






Berberine and CR extract inhibited tumor growth of nude mice without affecting the body weight.
黃連素，黃連提取物抑制小鼠腫瘤生長。小鼠體重無明顯變化。





Proteomics and Keynode-mediated Quantitative Pathway Analysis

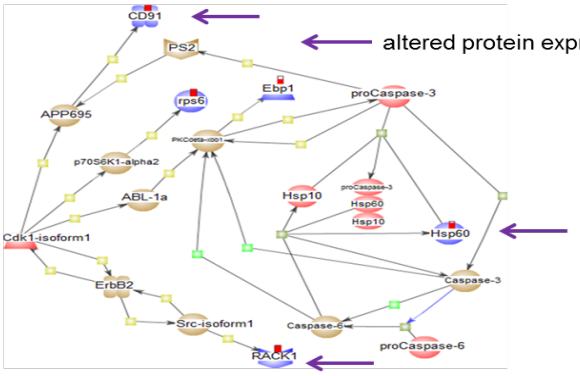
A

Key-nodes		Hits*
Protein	Gene symbol	
proCaspase-3	CASP3	CD91, Ebp1, Hsp60, RACK1
proCaspase-6	CASP6	Hsp60
Cdk1-isoform1	CDK1	CD91, Ebp1, RACK1, rps6
Hsp60	HSPD1	Hsp10
Hsp10	HSPE1	Hsp60

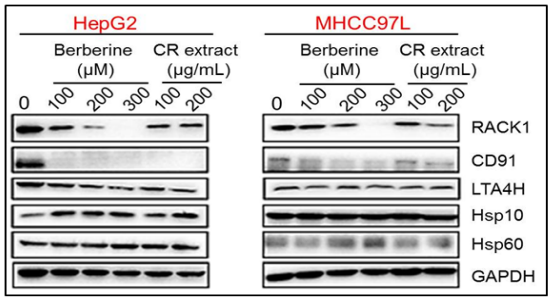
Hits*: berberine and CRAE-responsive proteins that each key-node searched upstream from

Signaling pathways affected by CR or berberine	
Pathway name	Pathway Function
E2F network	Cell cycle
Caspase Network	Cellular Apoptosis
Fas Pathway	
JNK Pathway	

B

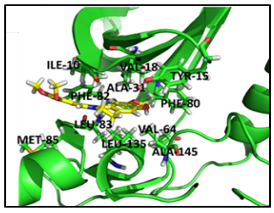


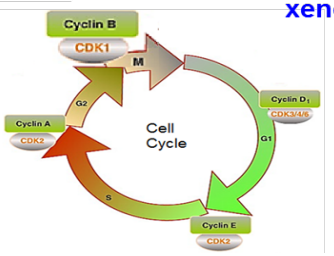
Verification of altered proteins in hepatoma cells



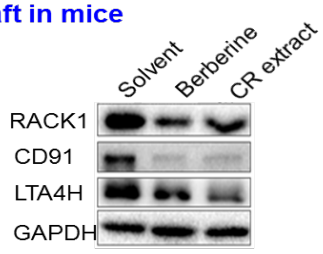
QM/MM calculations indicated that CDK1 is the potential target of Berberine

(unpublished results)





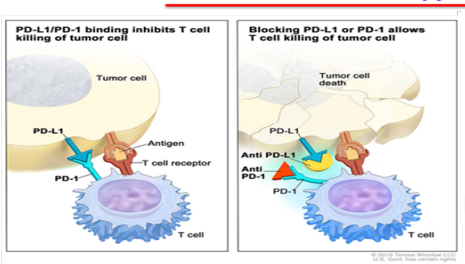
Verification of altered proteins in hepatoma xenograft in mice



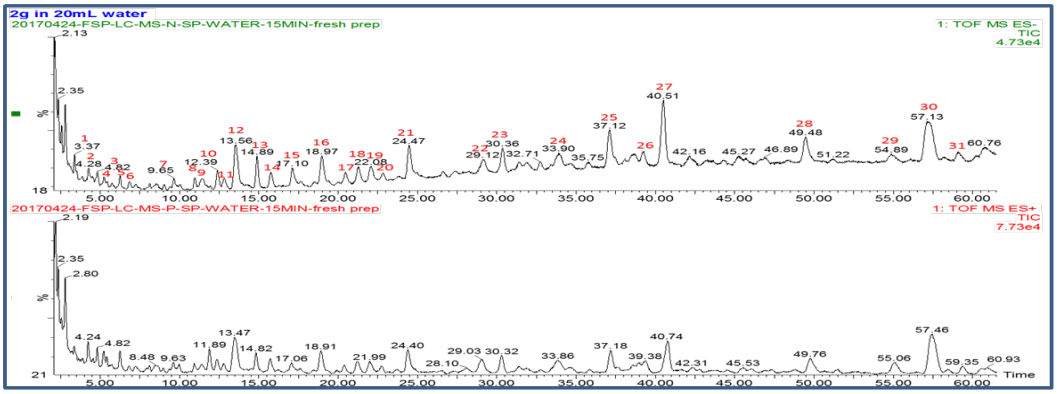
Peanut Skin extracts for adjuvant treatment to chemotherapy

Investigators: Prof. CM Che, Drs. Tsz Him So (Clinical Oncology) and
Dr. Victor Lee (Clinical Oncology)

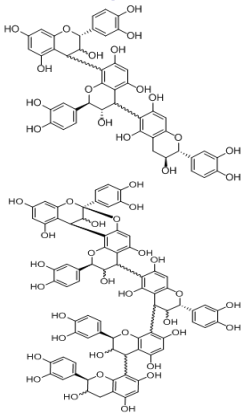
Cancer Immunotherapy



Chemical profile of peanut skin by UPLC-ESI-QTOF



Procyanidin oligomers



(unpublished results)

Chinese medicine formulation for cancer treatment

Investigators: Prof. CM Che (HKU Chem) and Charm Grace Ltd.

A University-Industry Collaboration Program 大學與產業合作計劃

Innovation and Technology Commission

↓

ITF UICP
~HK$3,000,000

↓

The anticancer effect of Chinese medicine formulation Olive Branch-1

Chinese herbal formulations used by lung cancer patient after Surgery and Chemotherapy 肺癌病人術後之中藥處方

黃芪25g，枸杞子12g，麥冬12g，百合12g，玄參12g，桑白皮20g，菊花12g，夏枯草15g，紫蘇子10g，枇杷葉（炙）20g，桔梗15g，瓜蔞20g，枳殼（炒）12g，薏苡仁30g，貓爪草15g，遠志（製）12g，酸棗仁（炒）30g。

黃芪30g，黃精12g，枸杞子12g，菟絲子15g，三七6g，丹參12g，鹿角膠10g，阿膠12g，黨參12g，雞血藤30g，熟地黃10g，北沙參20g，甘草（炙）10g，神曲15g，白朮（炒）12g，雞內金20g，首烏藤20g，酸棗仁（炒）30g。

黃芪25g，黃精12g，枸杞子12g，雞血藤30g，熟地黃10g，黨參12g，丹參12g，茯苓12g，陳皮10g，浙貝母12g，白朮（炒）12g，菊花12g，金錢草12g，魚腥草20g，白花蛇舌草15g，珍珠母30g，首烏藤25g，酸棗仁（炒）30g。

西洋參15g，黃芪25g，黃精12g，枸杞子12g，雞血藤30g，熟地黃10g，黨參12g，丹參12g，炙甘草10g，茯苓12g，陳皮10g，浙貝母12g，白朮（炒）12g，墨旱蓮15g，魚腥草20g，白花蛇舌草15g，珍珠母30g。

黃芪25g，紫苑12g，紫蘇子10g，遠志12g，石菖蒲12g，生地黃12g，北沙參20g，玄參12g，麥冬12g，黃芩10g，木蝴蝶12g，連翹12g，白花蛇舌草15g，百合20g，桔梗15g，法半夏10g，陳皮10g，腫節風15g。

黃芪25g，防風10g，遠志12g，石菖蒲12g，炙甘草10g，炒白朮12g，黨參12g，赤芍10g，白花蛇舌草15g，魚腥草20g，薏苡仁30g，苦杏仁12g，法半夏10g，陳皮10g，瓜蔞20g，腫節風15g。

Olive Branch -1 (OB-1)

- A Chinese medicine formulation prescribed to over 350 cancer patients since 2000 in mainland China
- A small number of cancer patients survived with tumor disappeared; 30-40% cancer patients survived with the tumor for longer than 3-5 years
- It is particularly effective for lung, colorectal and lymphatic cancers
- Animal safety and toxicity evaluation from China Food and Drug Administration (CFDA) approved laboratory
- Free from contamination of heavy metals, pesticide residues and aflatoxins.

Participating industry: Charm Grace

A formulation prescribed by Chinese medicine practitioners for cancer treatment

Clinical cases of OB-1 oral administration

例 1：周某女，92 歲，中心型肺癌，呼吸衰竭住院搶救，穩定後因不宜手術回家，每日於稀飯中早晚調服散劑各一次 5-10 克，維持良好生存狀態五年之久，97 歲去世，逝前胸片報告“肺炎”。

例 2：林某男性 65 歲，舌癌，已手術切除半邊舌體左側上下頷骨，清掃頸體把群，出院胸片兩肺已見多發性轉移灶，堅持服“欖枝 I 號”迄已 5 年，每日外出散步，生活質素甚佳，胸片仍見轉移灶但無胸痛咳嗽。

例 3：蔡某男性 59 歲，淋巴癌，多發，放、化療之外四年前加服“欖枝 I 號”二月，頭髮再長，淋巴結消小，已痊癒恢復行政工作二年（局級幹部）。

例 4：林某女性 35 歲，腎透明細胞癌手術除後轉移，服“欖枝 I 號”7 個月痊癒。

例 5：張某男性 50 歲，肺瘤已轉移至腦部，服藥 2 月後，CT 報告腦部病灶已消失，肺部 8 cm 腫塊消小 90 姐，後再寄藥(巴西)經海關沒收，改用貴價西藥二月後復發惡化去世。

例 6：商某女 37 歲，腮腺混合瘤惡變，手術切除後服藥三個月痊癒。

例 7：王某女 78 歲，腸癌，腹部瘤塊較大，患者堅拒手術治療，單服用散劑三年之久，最後以腹梗阻去世。

例 8：王某男 56 歲，肺癌轉移肝、腦、左側上下肢偏癱，分期放化療，體力不支停止，服用“欖枝 I 號”已近二年維持良好，體力恢復，偏癱明顯好轉，行走樓梯如，生活自理，行動敏捷迄今健在。

例 9：鄭某女 45 歲，三年前因　癌全胃切除，術後化療體力不支停藥，改服“欖枝 I 號”迄今健生，生活正常，繼續服藥。

例 10：柯某女 43 歲，胃癌全胃切除，化療體力不支停藥，改服“欖枝 I 號”迄今已二年半，生活正常，繼續服藥。

例 11：邱某女 75 歲，肝癌半年瘤塊破裂，開膛引流，體力不支，服“欖枝 I 號”維持生存一年半之久，因引流物不斷消耗衰竭去世。

1. A Chinese male was suffering from stage 4 lung cancer and had bone metastasis. He took OB-1 in conjunction with chemotherapy and radiotherapy. He has been taking OB-1 for two years and still living.
2. A Chinese male, 34 years old, was suffering from b-cell lymphoma and has metastases from spleen to peritoneal area. After splenectomy, he started to take OB-1. After one year, his condition became much better.
3. A Chinese male, 86 years old, was suffering from prostate cancer. He has been taking OB-1 for 10 months and his condition became better.
4. A Chinese male, 63 years old, was suffering from lung cancer. He took OB-1 in conjunction with chemotherapy. He has been taking OB-1 for 8 months and felt no pain or discomfort by chemotherapy.
5. A male patient in Canada and suffering from prostate cancer. He had a urinary problem and found out his prostate is enlarged with PSA over 300 after CT scan and some tests. After taking OB-1 for half a year, his blood test result became normal and the PSA came down to 0.11.
6. A male patient in Canada was suffering from lung cancer. After taking OB-1 for half a year endorsed by his oncologist and dietitian in Canada, CT scan report showed no more “active” cancer but just some scars caused by radiotherapy.
7. A Chinese female in Taiwan was suffering from colon cancer. She did not want any chemotherapy and would like to try the OB 1. After taking OB-1 for half a year, her condition became better and was very vital. She had been taking OB-1 for 4 years and is still living.
8. A Chinese male, 50 years old, was suffering from non-hodgkin lymphoma. He took OB-1 in conjunction with CHOP therapy. After a few months, he gained some weights and PET scan report could not trace cancer cells in his body.
9. A Chinese female in Canada was suffering from mantle cell lymphoma. He took OB-1 in conjunction with chemotherapy therapy. After a few months, her condition became much better and her hair started to grow.
10. A male patient in Indonesia, 70 years old, was suffering from T-cell lymphoma. He took OB-1 in conjunction with chemotherapy. After a year, his condition became better and was very vital.

Olive Branch -1 (OB-1)

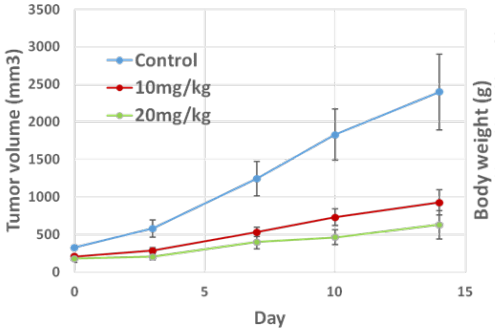
In vitro anti-cancer activities of Olive Branch OB-1

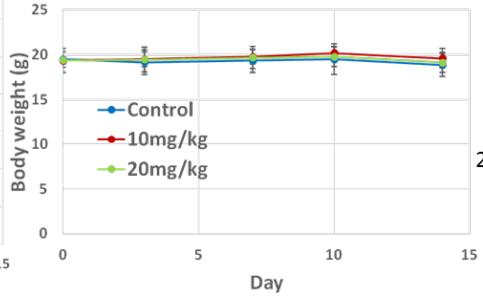
	IC_{50} (μg/mL)			
Extraction	A549 Lung	NCI-H460 Lung	A2780 Ovarian	CCD-19Lu
10% H_2O	0.16	1.64	0.82	>2.5
10% EtOH	0.46	0.75	0.70	1.70

Animal safety tests by CFDA laboratory

	Acute	Chronic
Maximal Tolerable Dose	>18.2 g/kg (mice)	> 1.71g/kg (SD rat) Daily for 6 weeks
c.f. Human daily dose	108 times higher	10 times higher
Lethality	No	No
Pathology	No significant observation	No significant observation

Effects of OB-1 on tumor growth of nude mice bearing NCI-H460 lung cancer xenograft

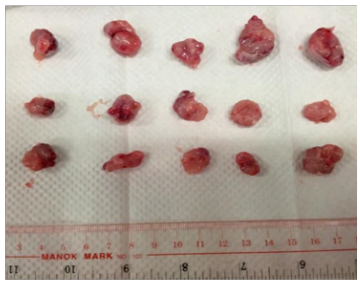




Control

10 mg/kg

20 mg/kg



香港大學中醫學院

新藥開發的過程

治療更年期綜合症

中藥山藥蛋白的研究與開發

Sci report (2015)
IF: 5.228

資源選擇：
選擇中药来原地
中藥組支
提取分離有效成份
質量控制及分析

活性及药理测试：
動物，細胞，及臨床受試
型態學，細胞學，分子生物学，药理学等

科研成果转化及产品化：
專利申請
制剂剂型
企業合作
產品設計及銷售

美國專利

從山藥中分離DOI蛋白

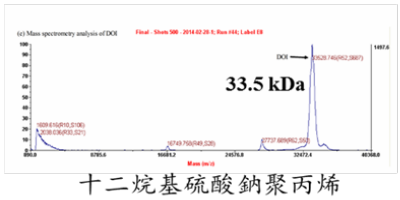
DOI isolation from raw Dioscorea *opposita*

山藥
Raw *Dioscorea opposita*

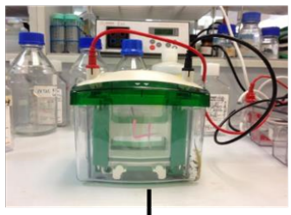
蛋白提取
Protein extraction

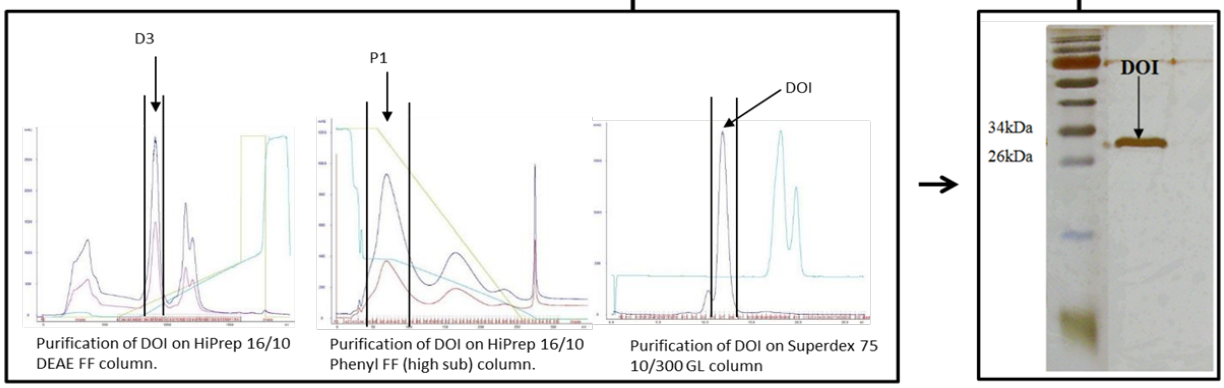
快速蛋白液相色譜
FPLC

MS



十二烷基硫酸鈉聚丙烯
醯胺凝膠電泳
SDS-PAGE





Purification of DOI on HiPrep 16/10 DEAE FF column.

Purification of DOI on HiPrep 16/10 Phenyl FF (high sub) column.

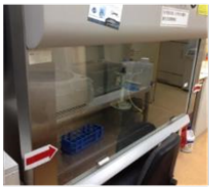
Purification of DOI on Superdex 75 10/300 GL column

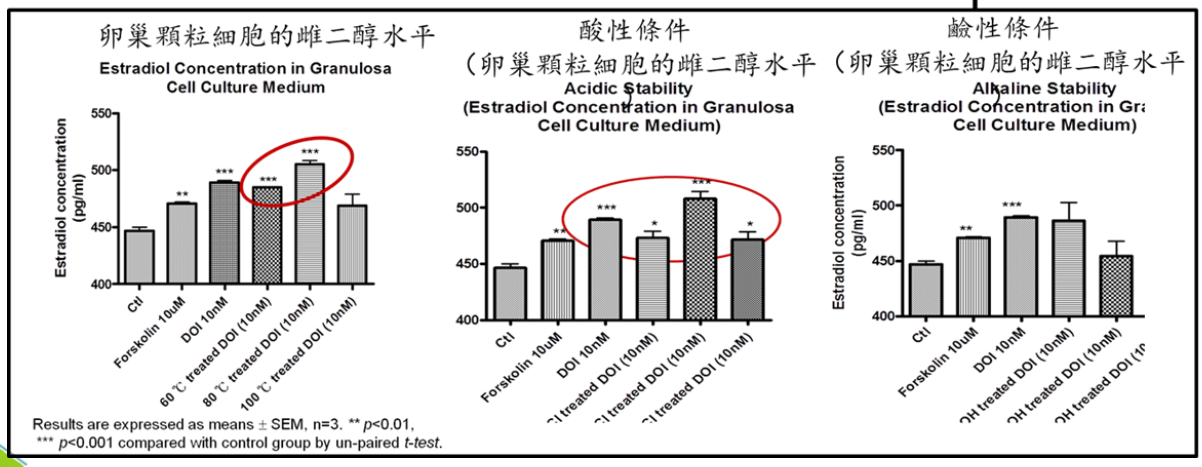
N-terminal amino acid sequence of DOI：Gly-Ile-Gly-Lys-Ile-Thr-Thr-Tyr-Trp-Gly-Gln-Tyr-Ser-Asp-Glu-Pro-Ser-Leu-Thr-Glu-Ala

在卵巢顆粒細胞內驗證不同溫度、pH值對DOI蛋白的提高雌激素合成作用的影響—60 ℃ 、80℃可顯著提高E2水平，酸性條件下（0.1M HCl）可顯著提高E2水平

(DOI increases E_2 level under 60 ℃ and 80℃, it is an acid stable protein)

卵巢顆粒細胞分離
Isolation of ovarian granulosa cell → 卵巢顆粒細胞培養
Primary cell culture of ovarian granulosa cell → 雌激素水平檢測
E_2 detection





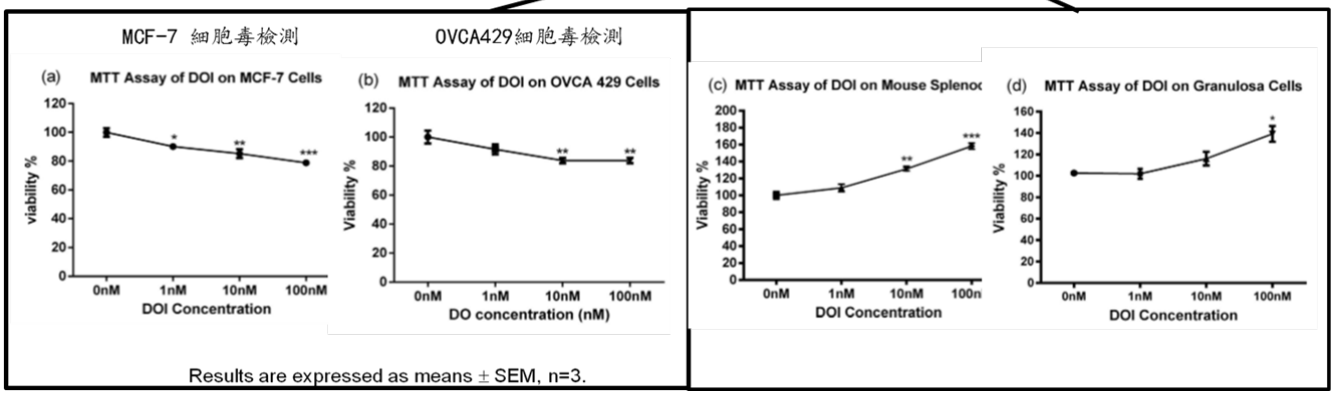
Results are expressed as means ± SEM, n=3. ** p<0.01, *** p<0.001 compared with control group by un-paired *t-test*.

DOI 蛋白對卵巢癌和乳腺癌細胞具有一定的抑制作用，但對脾細胞和卵巢顆粒細胞沒有抑制作用.

(DOI does not stimulate proliferation of BT-483 (breast cancer) and OVCA-429 cells (ovarian cancer), but not in splenocyte and ovarian granulosa cell.)

卵巢癌細胞培養
ovarian and breast cancer cell culture

細胞毒檢測
MTT assay



在卵巢顆粒細胞內驗證DOI蛋白提高雌激素合成作用 — DOI蛋白可以提高E2的水平，使Aromatase酶和FSHR水平升高

(DOI increases estradiol biosynthesis and up-regulates aromatase and FSHR in ovarian granulosa cells)

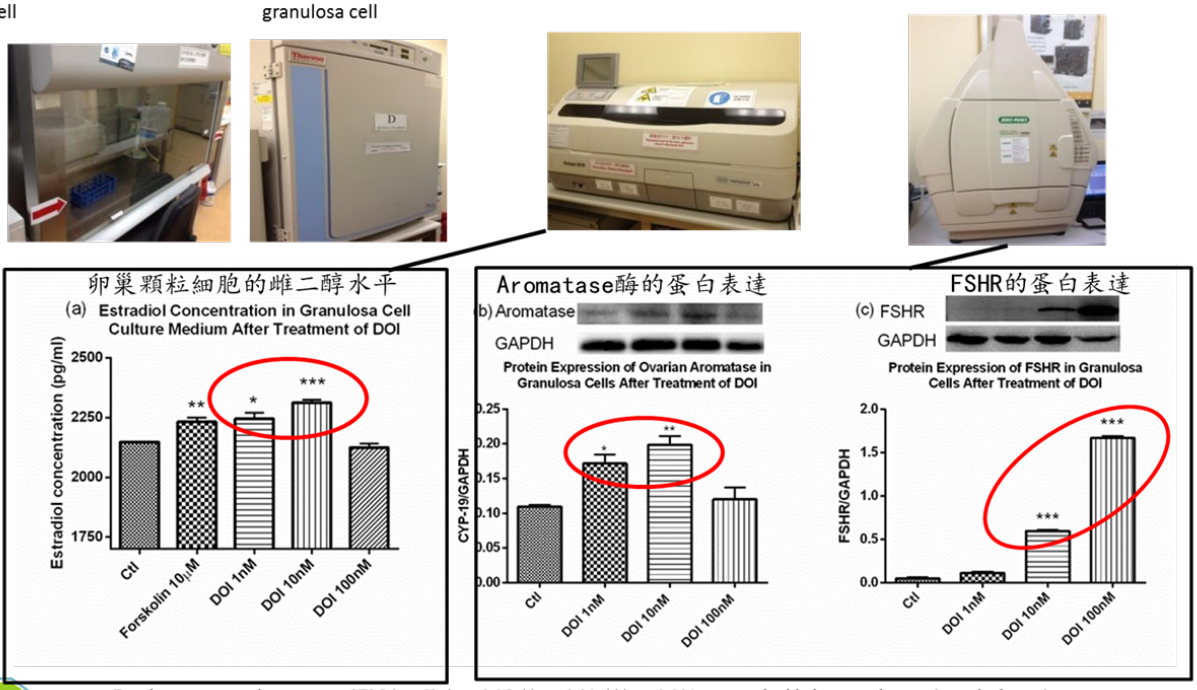
卵巢顆粒細胞分離 → 卵巢顆粒細胞培養 → 雌激素水平檢測 → 相關分子標記檢測

Isolation of ovarian granuolsa cell

Primary cell culture of ovarian granulosa cell

E_2 detection

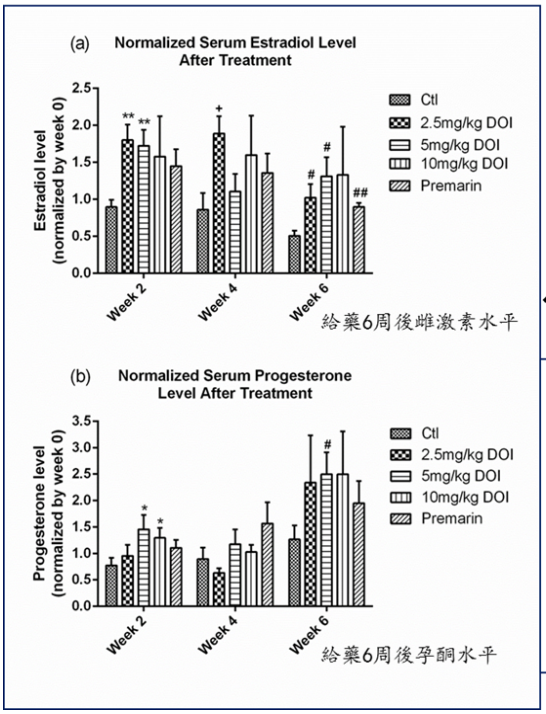
FSHR and Aromatase detection



Results are expressed as means ± SEM (n = 3). *p < 0.05, **p < 0.01, ***p < 0.001 compared with the control group (un-paired *t*-test).

在SD大鼠體內驗證DOI蛋白對雌激素及孕酮合成的作用—
DOI蛋白可以提高SD大鼠血清中E2/P的水平，升高Aromatase酶和FSHR表達

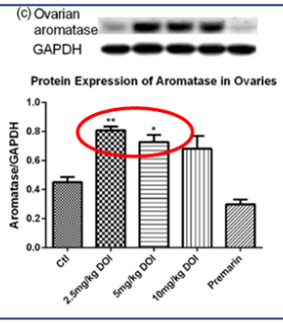
(DOI increases serum estradiol level, progesterone level and protein levels of aromatase and FSHR in ovaries of aged female SD-rats)



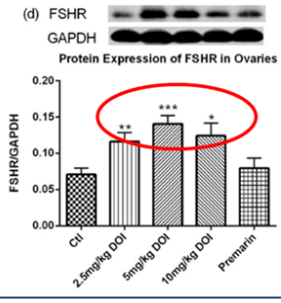
雌激素水平檢測
E2 detection

相關分子標記檢測
FSHR and Aromatase detection

Aromatase酶蛋白表達

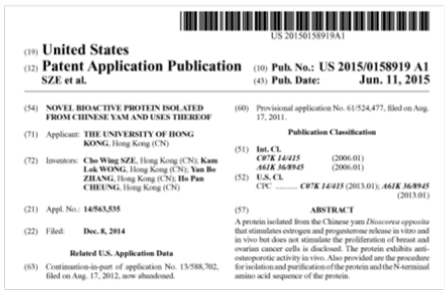


FSHR蛋白表達



討論與總結

美國專利



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SZE et al.

(10) **Pub. No.: US 2015/0158919 A1**
(43) **Pub. Date: Jun. 11, 2015**

(54) **NOVEL BIOACTIVE PROTEIN ISOLATED FROM CHINESE YAM AND USES THEREOF**

(71) Applicant: **THE UNIVERSITY OF HONG KONG**, Hong Kong (CN)

(72) Inventors: **Cho Wing SZE**, Hong Kong (CN); **Kam Lok WONG**, Hong Kong (CN); **Yau Bo ZHANG**, Hong Kong (CN); **Ho Pan CHEUNG**, Hong Kong (CN)

(21) Appl. No.: **14/563,535**

(22) Filed: **Dec. 8, 2014**

Related U.S. Application Data

(63) Continuation-in-part of application No. 13/588,702, filed on Aug. 17, 2012, now abandoned.

(60) Provisional application No. 61/524,477, filed on Aug. 17, 2011.

Publication Classification

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A61K 36/8945 (2006.01)

(52) **U.S. Cl.**
CPC ***C07K 14/415*** (2013.01); ***A61K 36/8945*** (2013.01)

(57) **ABSTRACT**

A protein isolated from the Chinese yam *Dioscorea opposita* that stimulates estrogen and progesterone release in vitro and in vivo but does not stimulate the proliferation of breast and ovarian cancer cells is disclosed. The protein exhibits anti-osteoporotic activity in vivo. Also provided are the procedure for isolation and purification of the protein and the N-terminal amino acid sequence of the protein.

科研成果轉化及產品化:

專利申請

制劑劑型

企業合作

產品設計及銷售

- 目前，本研究組從山藥中提取了出一種具生物活性的蛋白，**可提高雌激素及孕酮的生物合成**，用以治療由於血清雌激素及孕酮水平低下而導致的相關疾病，**包括骨質疏鬆、更年期綜合症及其伴隨的認知下降**. 美國專利 [U.S. Patent No.: US9273105B2; Date of Patent: 1st Mar, 2016.]

- 這項研究將會為治療更年期綜合症**提供更好的治療方案和理念**，並將會有益於香港乃至全世界的健康事業。

- 這**專利的使用權**於去年12月份透過香港大學技術轉移辦公室**售出**，這是港大**中醫藥學院第一個成功的例子**。

香港大學李嘉誠醫學院分子中藥研究室與中藥公司合作計劃

- 治療類風濕關節炎
  - 單味藥
  - 新藥研發和臨床前研究階在本實驗室進行
  - 臨床研究會在加拿大和澳洲進行
  - 新藥藥效和提取方法已獲專利權
- 抗流感複方
  - 生產工藝改進
  - 提升抗流感功效
  - 抗流感病毒化合物已獲專利權

香港大學李嘉誠醫學院分子中藥研究室與中藥公司合作計劃

- 增強化療後的做血功能
  - 複方
  - 新藥藥效研究已完成
  - 改善製作工藝，從而提升藥效
- 檢測藥材中的有效化合物
  - 化學檢測
  - 生物藥效測試
  - 制定生產準則，提升藥物質素

Enhancing Technology Transfer Between University and Industry
促進大學與業界間之技術轉移

Technology Transfer and Knowledge Exchange form one of the three pillars that underpin all activities of HKU

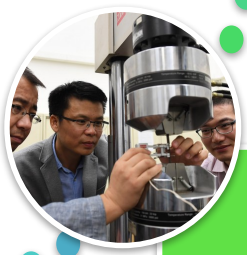
技術轉移與知識交流是支持港大所有活動的三大支柱之一

- HKU researchers are encouraged to work with industry on collaborative and contract research
- 鼓勵香港大學的研究人員與行業合作和合同研究
- Industry are encouraged to commercialize HKU innovations and intellectual property through technology transfer
- 鼓勵行業通過技術轉讓將香港大學的創新和知識產權商業化

大學與業界間之協作框架

技術授權及建立分拆公司

- 排他/非排他性，使用領域，使用地域
- 勤勉的要求
- 里程碑和授權使用費



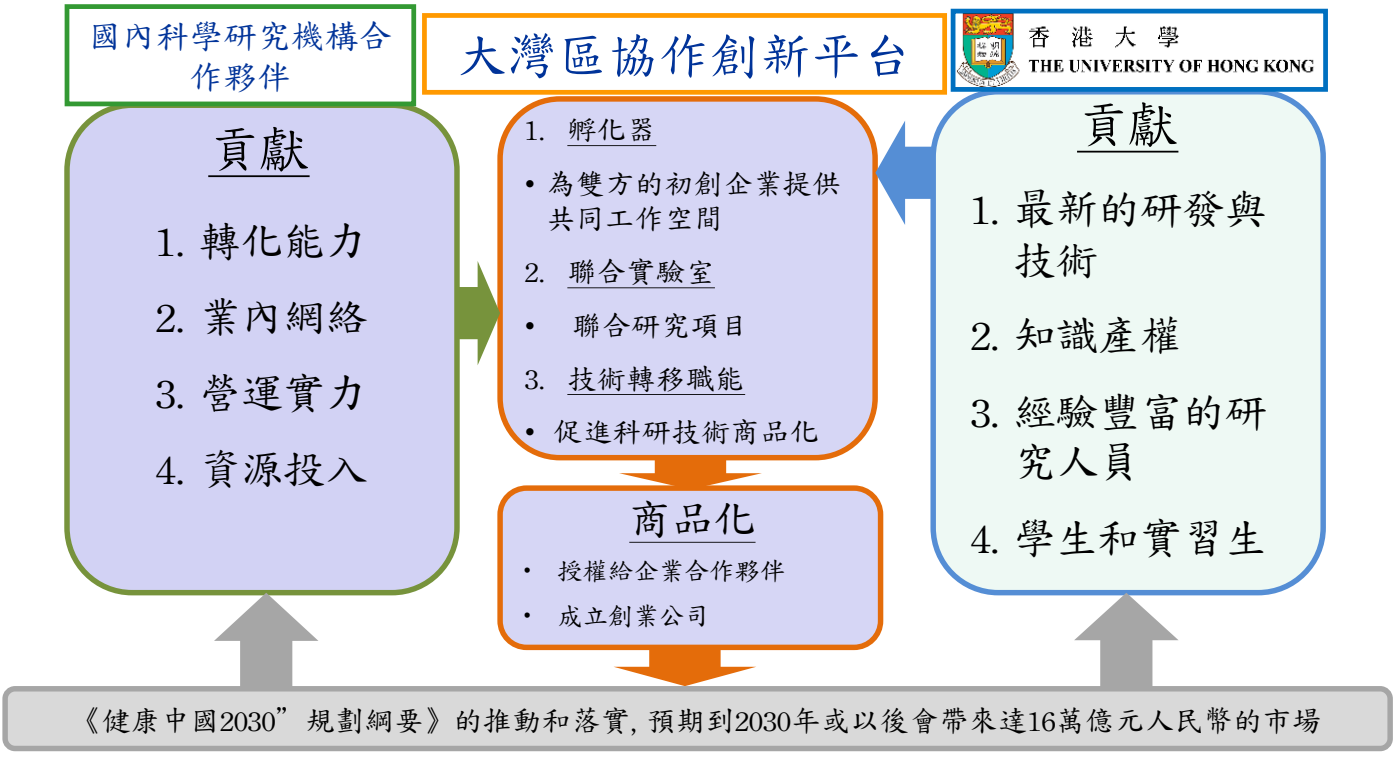
贊助和合作研究

- 由教授發起或由公司發起
- 研究/合作範圍
- 知識產權和商業化安排

合約研究和顧問服務

- 工作範圍
- 交付件
- 項目進度表

合作框架：協作創新平台



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