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花蓮區農業改良場

Hualien District Agricultural Research and Extension Station
Council of Agriculture, Executive Yuan.

創新 科技 服務

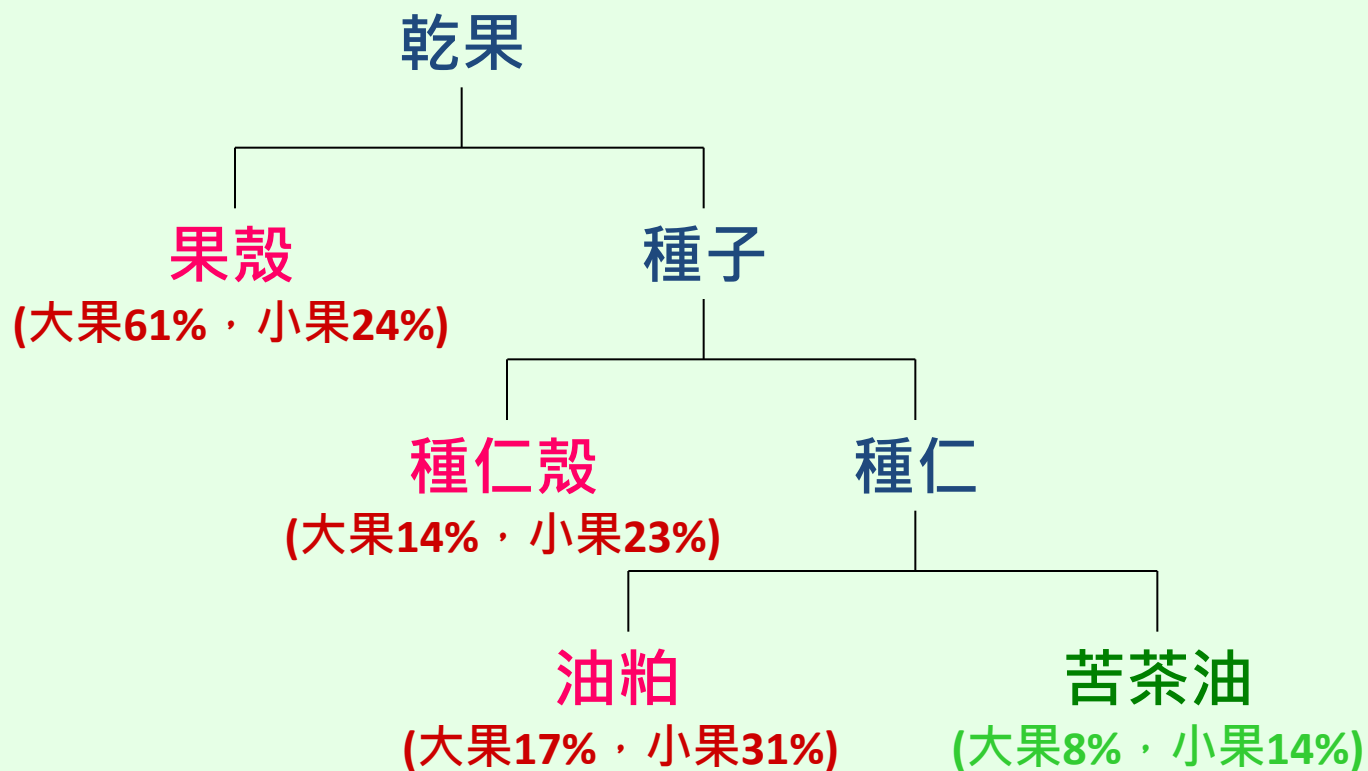
油茶副產物免疫調節活性評估

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油茶副產物一般成分分析

果殼(64%)	種仁殼(14%)	油粕(11-14%)
戊聚糖34% 皂素13.5% 單寧10% 碳酸鉀2% 其他	半纖維素 42% 木質素 35% 纖維素 15% 灰份 4%	碳水化合物47% 蛋白質 15% 脂質10% 灰份7% ---- 纖維素63% 碳水化合物22% 皂素6.7% 黃酮1.4%

引用：1. He SN, Gu Y: *Am Camellia Yearbk.* 37: 104-107 (1982).

2. Jian HL, Liao XX, Zhu LW, Zhang WM Jiang JX: *J. Colloid. Interface Sci.*, 359: 487-492 (2011).





近年來油茶副產物發現許多功能

- 油粕(/果殼)
 - 多醣：抗氧化、清除自由基、毒殺癌細胞
 - 蛋白質：抗氧化、清除自由基
 - 皂素：抗菌、毒殺細胞
 - 皂苷：抗發炎、神經細胞保護
 - 黃酮：抗氧化、清除自由基 (小果)
- 果殼
 - 多醣：毒殺癌細胞、抗氧化、清除自由基、抑制澱粉消化酵素活性
 - 黃酮：抗氧化、清除自由基
- 葉
 - 多醣：抗氧化、清除自由基





— 大果粕多醣：抗氧化、清除自由基

European Food Research and Technology

Zeitschrift für Lebensmittel-Untersuchung und -Forschung A

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10.1007/s00217-014-2183-2

Original Paper

Effects of extraction methods on antioxidant activities of polysaccharides from camellia seed cake

Shian Shen¹, Haoran Cheng¹, Xu Li¹, Tian Li², Ming Yuan¹, Yonghong Zhou³ and Chunbang Ding¹





— 大果粕多醣：毒殺癌細胞

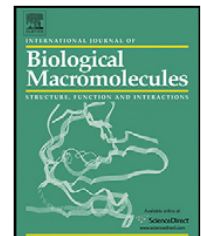
International Journal of Biological Macromolecules 51 (2012) 364–368



Contents lists available at SciVerse ScienceDirect

International Journal of Biological Macromolecules

journal homepage: www.elsevier.com/locate/ijbiomac



Antioxidant and antitumor activities of the polysaccharide from seed cake of *Camellia oleifera* Abel

Xianchun Jin^{a,*}, Yu Ning^b

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^b School of Life Sciences, Henan Agricultural University, Zhengzhou, 450002, China





— 大果粕蛋白質：抗氧化、清除自由基

Food Sci. Biotechnol. 23(6): 2075-2082 (2014)
DOI 10.1007/s10068-014-0282-2

RESEARCH ARTICLE

Antioxidant Activities and Functional Properties of Tea Seed Protein Hydrolysates (*Camellia oleifera* Abel.) Influenced by the Degree of Enzymatic Hydrolysis

Xu Li, Shian Shen, Junlin Deng, Tian Li, and Chunbang Ding





— 大果粕皂素：抗菌

Molecules **2014**, *19*, 7568-7580; doi:10.3390/molecules19067568

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Article

Qualitative and Quantitative Analysis of Triterpene Saponins from Tea Seed Pomace (*Camellia oleifera* Abel) and Their Activities against Bacteria and Fungi

Xin-Fu Zhang ¹, Shao-Lan Yang ¹, Ying-Ying Han ², Lei Zhao ¹, Gui-Long Lu ¹, Tao Xia ^{2,*}
and Li-Ping Gao ^{3,*}





— 大果粕皂素：毒殺細胞

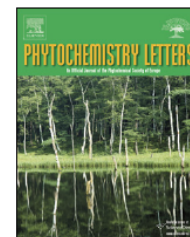
Phytochemistry Letters 8 (2014) 46–51



Contents lists available at [ScienceDirect](#)

Phytochemistry Letters

journal homepage: www.elsevier.com/locate/phytol



New triterpene saponins from the seed cake of *Camellia Oleifera* and their cytotoxic activity



Hao Zhou, Cheng Zhang Wang^{*}, Jian Zhong Ye, Hong Xia Chen

Institute of Chemical Industry of Forest Products, CAF, Nanjing, Jiangsu 210042, China





— 大果粕皂苷：抗發炎

Arch. Pharm. Res. (2013) 36:941–951
DOI 10.1007/s12272-013-0138-y

 Archives of
Pharmacological
Research
www.springer.com/12272

RESEARCH ARTICLE

Anti-inflammatory and analgesic activities of the hydrolyzed sasanquasaponins from the defatted seeds of *Camellia oleifera*

Yong Ye · Haiting Xing · Xuelan Chen





— 大果粕皂苷：神經細胞保護

JOURNAL OF
**AGRICULTURAL AND
FOOD CHEMISTRY**

Article

pubs.acs.org/JAFC

Isolation of the Sapogenin from Defatted Seeds of *Camellia oleifera* and Its Neuroprotective Effects on Dopaminergic Neurons

Yong Ye,* Fei Fang, and Yue Li





— 小果粕黃酮：抗氧化、清除自由基

JOURNAL OF
AGRICULTURAL AND
FOOD CHEMISTRY

Article

pubs.acs.org/JAFC

Antioxidant Activity, Delayed Aging, and Reduced Amyloid- β Toxicity of Methanol Extracts of Tea Seed Pomace from *Camellia tenuifolia*

Chia-Cheng Wei,^{†,||} Chan-Wei Yu,^{†,||} Pei-Ling Yen,[‡] Huan-You Lin,[‡] Shang-Tzen Chang,[‡] Fu-Lan Hsu,^{*,§}
and Vivian Hsiu-Chuan Liao^{*,†}





— 大果殼多醣：抗氧化、清除自由基

Wang et al. / J Zhejiang Univ-Sci B (Biomed & Biotechnol) 2014 15(2):173-180

173

Journal of Zhejiang University-SCIENCE B (Biomedicine & Biotechnology)
ISSN 1673-1581 (Print); ISSN 1862-1783 (Online)
www.zju.edu.cn/jzus; www.springerlink.com
E-mail: jzus@zju.edu.cn



***In vitro* antioxidant activity and potential inhibitory action against α -glucosidase of polysaccharides from fruit peel of tea (*Camellia sinensis* L.)^{*#}**

Yue-fei WANG^{1,2}, Jie WANG¹, Jing WU¹, Ping XU^{†1,2}, Yi-qi WANG³,
Jun-jie GAO¹, Danielle HOCHSTETTER¹





— 大果殼多醣：抗氧化、清除自由基

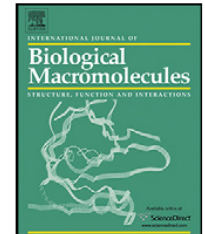
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Antioxidant and antitumor activities of the polysaccharide from seed cake of *Camellia oleifera* Abel

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— 大果果殼多醣：抑制 α -葡萄糖苷酶

Carbohydrate Polymers 115 (2015) 38–43



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Contents lists available at [ScienceDirect](http://www.sciencedirect.com)

Carbohydrate Polymers

journal homepage: www.elsevier.com/locate/carbpol

Inhibition of α -glucosidase by polysaccharides from the fruit hull of *Camellia oleifera* Abel

Sheng Zhang, Xiang-Zhou Li*

College of Materials and Engineering, Central South University of Forestry and Technology, Changsha 410004, PR China

Inhibition of α -glucosidase by polysaccharides from the fruit hull of *Camellia oleifera* Abel

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College of Materials and Engineering, Central South University of Forestry and Technology, Changsha 410004, PR China





— 大果殼多醣：毒殺癌細胞

Carbohydrate Polymers 87 (2012) 2198–2201



Contents lists available at SciVerse ScienceDirect

Carbohydrate Polymers

journal homepage: www.elsevier.com/locate/carbpol



Bioactivities of water-soluble polysaccharides from fruit shell of *Camellia oleifera* Abel: Antitumor and antioxidant activities

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— 大果殼黃酮：抗氧化、清除自由基

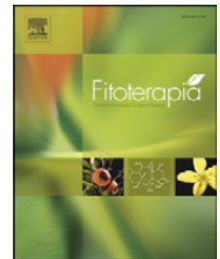
Fitoterapia 83 (2012) 1585–1589



Contents lists available at [SciVerse ScienceDirect](#)

Fitoterapia

journal homepage: www.elsevier.com/locate/fitote



Isolation and free radical scavenging activities of a novel biflavonoid from the shells of *Camellia oleifera* Abel.

Yong Ye*, Ya Guo, Yue-Ting Luo, Yan-Fang Wang

School of Chemistry and Chemical Engineering, South China University of Technology, Guangzhou 510640, PR China





— 大果葉多醣：抗氧化、清除自由基

International Journal of Biological Macromolecules 68 (2014) 7–12



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Contents lists available at ScienceDirect

International Journal of Biological Macromolecules

journal homepage: www.elsevier.com/locate/ijbiomac



Ultrasonic-assisted extraction and antioxidant activities of polysaccharides from *Camellia oleifera* leaves

Shiling Feng^a, Haoran Cheng^a, Liang Fu^b, Chunbang Ding^{a,*}, Li Zhang^a,
Ruiwu Yang^a, Yonghong Zhou^c

^a College of Life Sciences, Sichuan Agricultural University, Yaan, Sichuan 625014, China

^b Dazhou Institute of Agricultural Sciences, Dazhou, Sichuan 635000, China

^c Triticeae Research Institute, Sichuan Agricultural University, Wenjiang, Sichuan 611130, China





研究材料



果殼



種仁殼



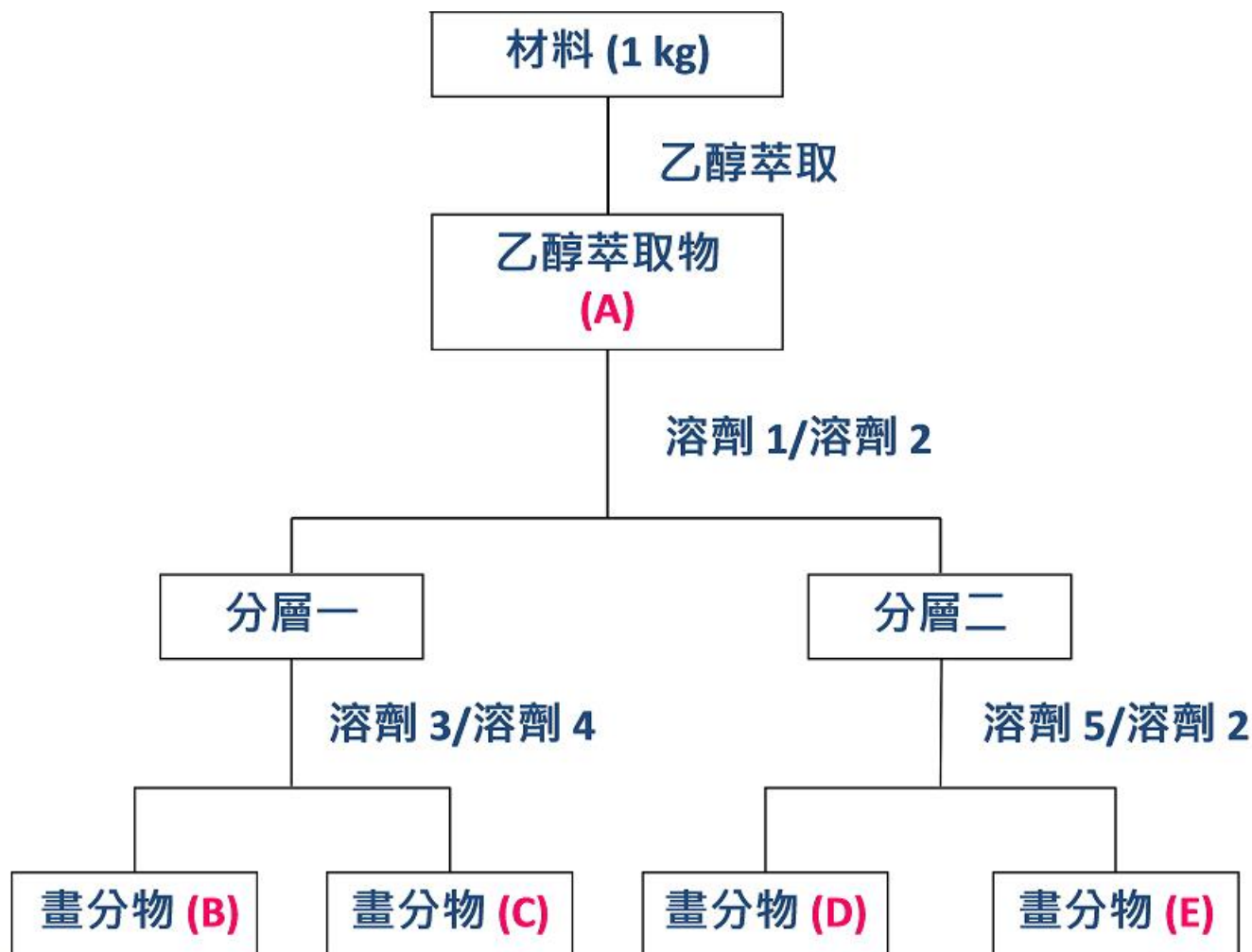
油粕（粉碎、脫脂）

- 大果（花蓮卓溪），小果（花蓮瑞穗）





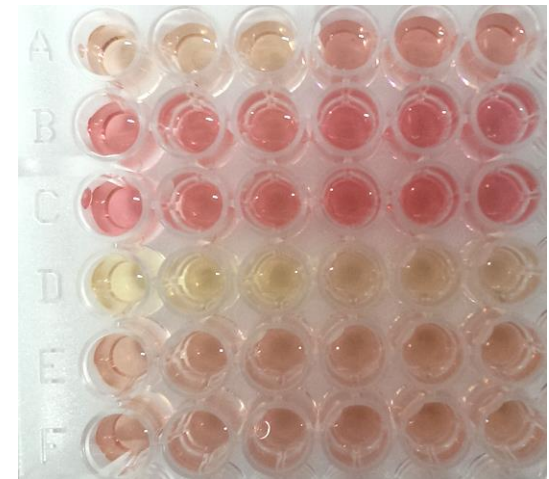
乙醇萃取+極性畫分





細胞培養+活性測定

- 小鼠細胞RAW 264.7(巨噬細胞)
- 萃取物刺激
 - 提升免疫力
 - 抗發炎
- 免疫調節活性
 - 發炎活性指標NO
 - 相關蛋白質(iNOS, HO-1, COX-2)表現量
 - 相關基因(iNOS, HO-1, COX-2)表現量





結果

結果

果殼



種仁殼



油粕



A B C D E

大果

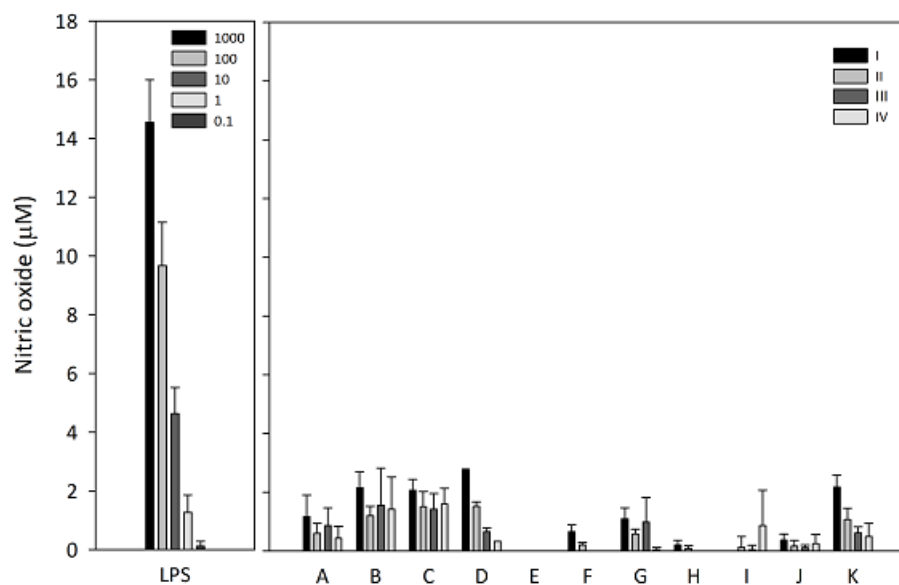


A B C D E

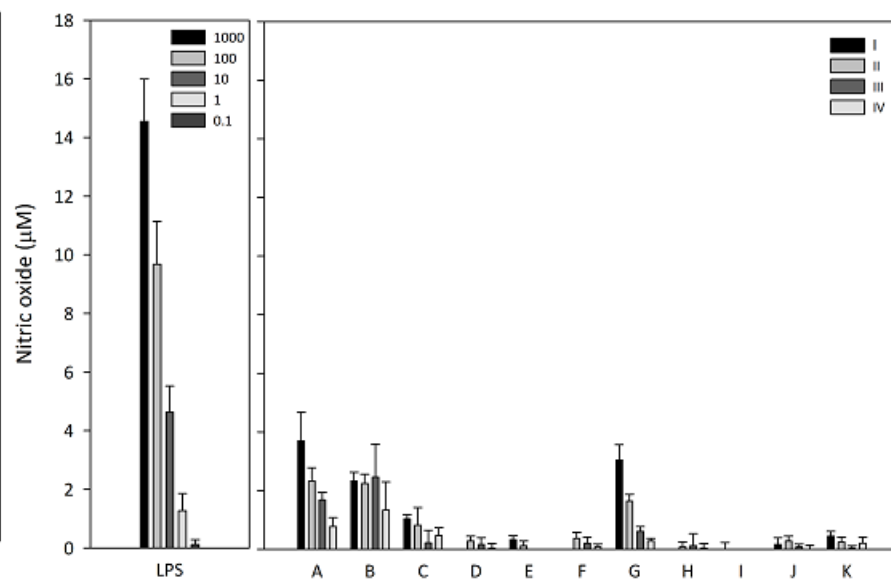
小果



免疫調節--提升免疫力活性篩選

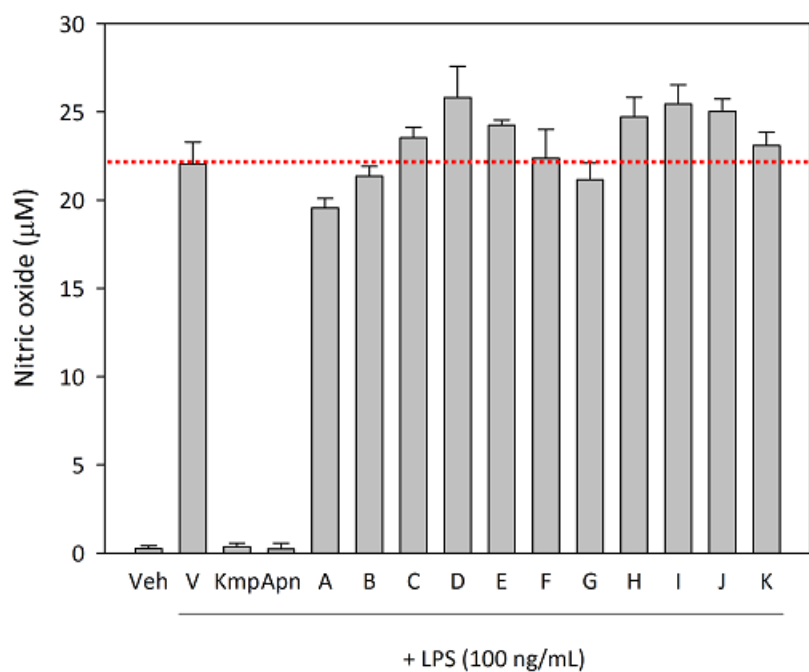


大果

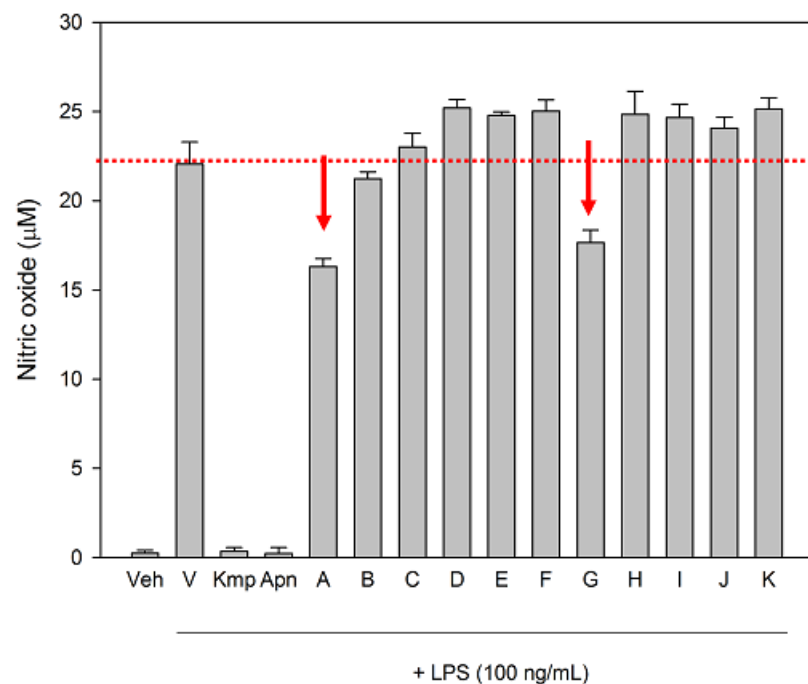


小果

免疫調節--抗發炎活性篩選

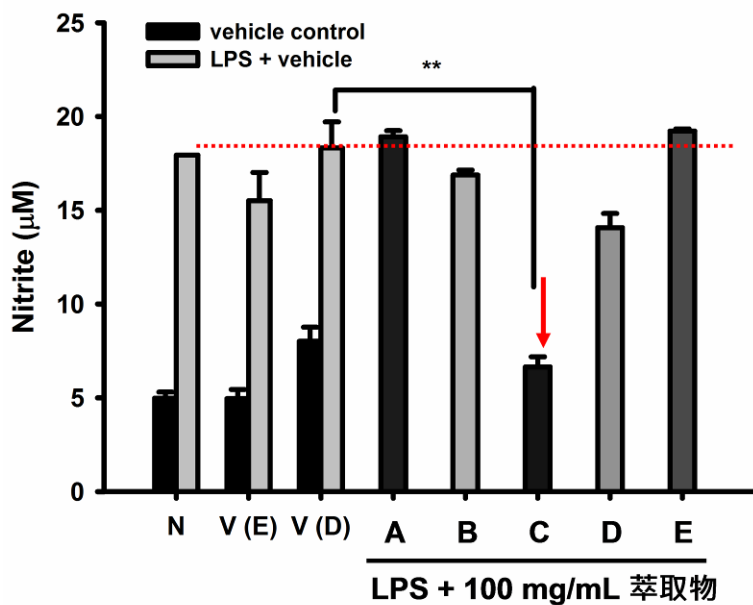


大果

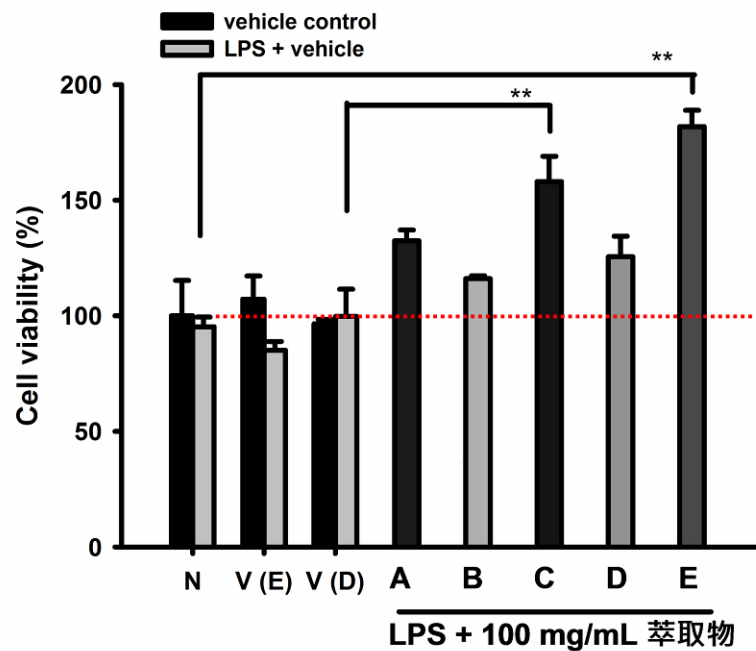


小果

免疫調節--抗發炎活性測定

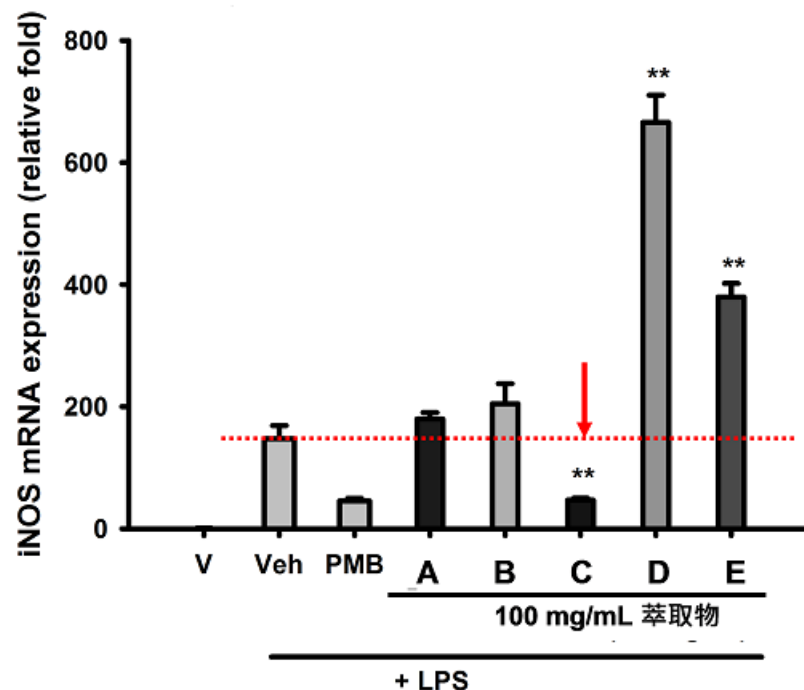


降低NO (發炎指標)

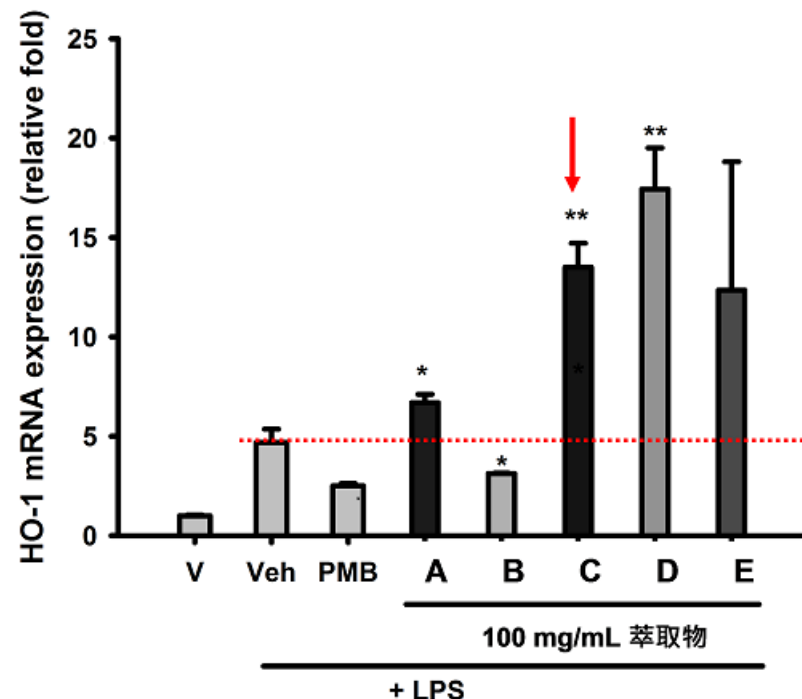


對試驗細胞無毒

免疫調節--抗發炎活性測定



iNOS基因表現受抑制



活化HO-1基因表現



結果

清除自由基(抗氧化)活性

小果油茶萃取物	清除DPPH自由基活性 (IC ₅₀ , µg/mL) ^a	總酚含量 (mg GAE/g dw) ^c
A	14.30 ± 1.01	91.42 ± 1.47
B	無	無
C	5.47 ± 0.28	266.30 ± 7.29
D	15.55 ± 0.10	106.95 ± 3.09
E	5.82 ± 0.09	88.90 ± 5.71
維生素E (對照)	11.89 ± 1.14	無





結論

- 1. 提高小果油茶副產物的附加價值

- 本研在**小果油茶**中找到兼具**抗發炎**與**抗氧化**活性的特有畫分

- 2. 抗發炎活性

- 該抗發炎畫分，可進一步評估在洗髮乳、消炎止癢等外用藥品之應用潛力

- 3. 清除自由基活性

- 可嘗試開發於資材、民生用品(甚至食品)上的可能應用，例如作為油性農業資材的抗氧化劑

