發明名稱

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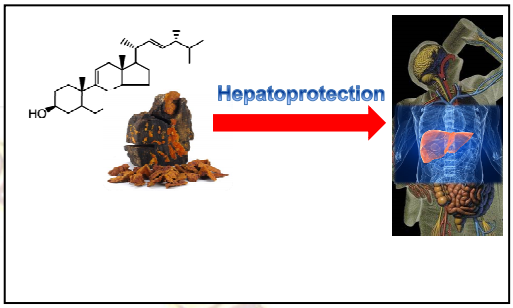

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簡　歷：http://www.ansc.ntu.edu.tw/people/bio.php?PID=123

市場及需求: 酒精濫用為引起致病率(morbility)及致死率(mortaility)的主要原因之一，根據世界衛生組織(World Health Organization, WHO)統計，2004 年酒精濫用在全球所造成的死亡率即高達 3.8%，而疾病負擔指標 DALYs (Disability adjusted life-years)也高達 4.6%，根據行政院衛生福利部 2014 年度統計，國人十大死因慢性肝病與肝硬化則排名第八，由此可知肝臟疾病對於國人健康有非常重大的影響，而飲酒則會加重肝臟疾病的惡化，因此針對慢性酒精攝取下肝臟保護的保健食品則具有相當大市場。

技術摘要(含成果):

八週齡雄性 C57BL/6 小鼠隨機分為五組：(1) control 組：餵飼正常流質飼糧+管灌生理食鹽水；(2) EtOH 組：餵飼酒精流質飼糧+管灌生理食鹽水；(3) EK100_1X：餵飼酒精流質飼糧+管灌 1 mg Antrosterol (ergostatrien-3β-ol, EK100)/Kg BW；(4) EK100_5X：餵飼酒精流質飼糧+管灌 5 mg EK100/Kg BW；(5) EK100_10X：餵飼酒精流質飼糧+管灌 10 mg EK100/Kg BW，實驗為期四週。結果發現，control 體重與採食量皆顯著高於其他組別(p<0.05)，補充 EK100 之組別，其體脂肪含量、血清及肝臟中脂質含量皆顯著低於 EtOH 組(p<0.05)，顯示 EK100 可有效改善因酒精攝取造成的脂質累積，而肝臟損傷指標 AST 及 ALT 活性在補充 EK100 之組別也明顯低於 EtOH 組(p<0.05)。同時，補充 EK100 之組別其小鼠肝臟 TBARS 值顯著低於 EtOH 組，而抗氧化酵素活性及能力則顯著高於 EtOH 組(p<0.05)，由此可知，EK100 可有效改善肝臟氧化壓力並提升其抗氧化能力。在酒精代謝方面，補充 EK100 之組別有顯著較高的 ADH 活性(p<0.05)，會導致自由基產生的 CYP2E1 其基因表現與蛋白質含量以及與血清中酒精濃度也顯著較 EtOH 組低(p<0.05)。導致肝臟發炎的 TNF-α 與 IL-1β 含量在補充 EK100 之組別中明顯低於 EtOH 組。由肝臟切片中可知，EtOH 組其肝細胞之間出現了許多油滴空泡，顯示了較多脂肪的累積，補充 EK100 之組別則可以改善脂質累積的現象。在補充 EK100 之組別與 EtOH 組相較之下，脂質氧化相關之基因(PPAR-α, RXR-α, CPT1, and UCP2)表現有顯著的上升(p<0.05)，脂質合成相關之基因(LXR-α, SREBP-1c, ACC, FAS, and ME)表現則顯著下降(p<0.05)，而發炎與纖維化相關之基因(TLR4, MyD88, NF-κB, iNOS, COX-2, and α-SMA)表現明顯減少(p<0.05)。綜觀上述，EK100 可藉由調節脂質恆定、抗氧化能力、酒精代謝及抗發炎能力來改善慢性酒精攝取對肝臟造成的傷害。

優勢: EK100 可藉由調節脂質恆定、抗氧化能力、酒精代謝及抗發炎能力來改善慢性酒精攝取對肝臟造成的傷害。

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Title of Invention

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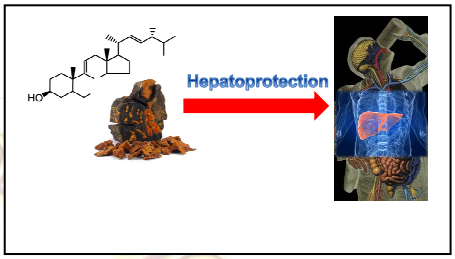

PI： Prof. Yi-Chen Chen, Department of Animal Science and Technology, National Taiwan U.

Experience:

http://www.ansc.ntu.edu.tw/people/bio.php?PID=123

Market Needs: Alcohol abuse is a major cause morbidity and mortality in the world. According to data from WHO, morbidity of alcohol abuse accounts for 4.6% DALYs (disability adjusted life-years) which is an indicator of disease burden and mortality of alcohol abuse is 3.8%. Meanwhile, the statistical report from Ministry of Health and Welfare of Taiwan (2014), the chronic liver diseases are the rank 8 among the 10-leading cause of death in Taiwan. Hence, the category of functional foods against chronic alcohol consumption should be very popular in the current market in the world.

Our Technology:

Eight week-old male B6 mice were used in the experiment and divided randomly into five groups: (1) control group: control liquid diet + normal saline; (2) EtOH group: ethanol liquid diet + normal saline; (3) EK100_1X: ethanol liquid diet + 1 mg antrosterol (ergostatrien-3β-ol, EK100)/Kg BW; (4) EK100_5X: ethanol liquid diet + 5mg EK100/Kg BW; (5) EK100_10X: ethanol liquid diet + 10mg EK100/Kg BW. After 4 weeks of experiment, supplementing EK100 reduced (p<0.05) serum and liver lipids in alcohol-fed mice while fecal lipid and bile acid outputs were increased (p<0.05). Supplementing EK100 promoted (p<0.05) hepatic antioxidant capability and lowered lipid peroxidation in alcohol-fed mice. Regarding the alcohol metabolism, alcohol-fed mice cotreated with EK100 had a higher (p<0.05) alcohol dehydrogenase (ADH) activity and gene expression of ADH, ALDH, and catalase; moreover, supplementing EK100 decreased (p<0.05) serum alcohol concentration and gene expression of CYP2E1. EK100 could reduce the CYP2E1 protein levels. Lower (p<0.05) hepatic TNF-α and IL-1β contents were also measured in alcohol-fed mice cotreated with EK100. Moreover; the H&E staining indicated that alcohol-fed groups existed clear and large lipid drops in livers but EK100 supplementation decreased them. Regarding the molecular mechanism of lipid homeostasis, EK100 upregulated (p<0.05) fatty acid oxidation, such as PPAR-α, RXR-α, CPT1, and UCP2, but downregulated (p<0.05) lipogenesis, such as LXR-α, SREBP1c, ME, ACC, and FAS. Besides, inflammation and fibrosis related genes, such as TLR4, MyD88, NF-κB, iNOS, COX-2, and α-SMA were downregulated (p<0.05) by supplementing EK100 as well. Based on current results, hepatoprotection of EK100 is attributed to its regulations of lipid homeostasis, antioxidant capability, alcohol metabolism, and anti-inflammation.

Strength: The *in vivo* hepatoprotection of EK100 is attributed to its regulations of lipid homeostasis, antioxidant capability, alcohol metabolism, and anti-inflammation

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