

Anthocyanidins series E-newsletter, April 2022 Kangcare Bioindustry Co.,Ltd

Research Background:

What are anthocyanins?

Anthocyanins are an all-natural anti-aging nutritional supplement that has been proven to be the most effective antioxidant found today. Anthocyanins have 50 times more antioxidant power than vitamin E and 200 times more antioxidant power than vitamin C. Unlike other antioxidants, anthocyanins can cross the blood-brain barrier and directly protect the brain and nervous system.

Anthocyanins are mainly used in food coloring, and can also be used in dyes, medicine, cosmetics and other aspects. As a natural food coloring, it is safe and non-toxic, and has certain nutritional and medicinal values. With great application potential, it has been widely concerned by relevant researchers.



These products are rich in anthocyanins and have significant effects:

(1) Blueberry Extract;

According to an analysis in the United States, blueberries contain the highest amount of anthocyanins among fruits and vegetables, and the most abundant anthocyanins are found in the purple skin of the fruit.

Kangcare cooperative research of ultrasonic assisted was optimized by response surface curve of blueberry anthocyanin extraction process is shown in Figure 1A, established the blueberry anthocyanin HPLC detection method, to determine the composition structure of blueberry anthocyanin, successfully parsed blueberry anthocyanin composition distribution, and build the nearly hundred varieties of blueberry anthocyanin chemical fingerprint, Blueberry anthocyanin extract mainly includes 13 components (Fig. 1B).

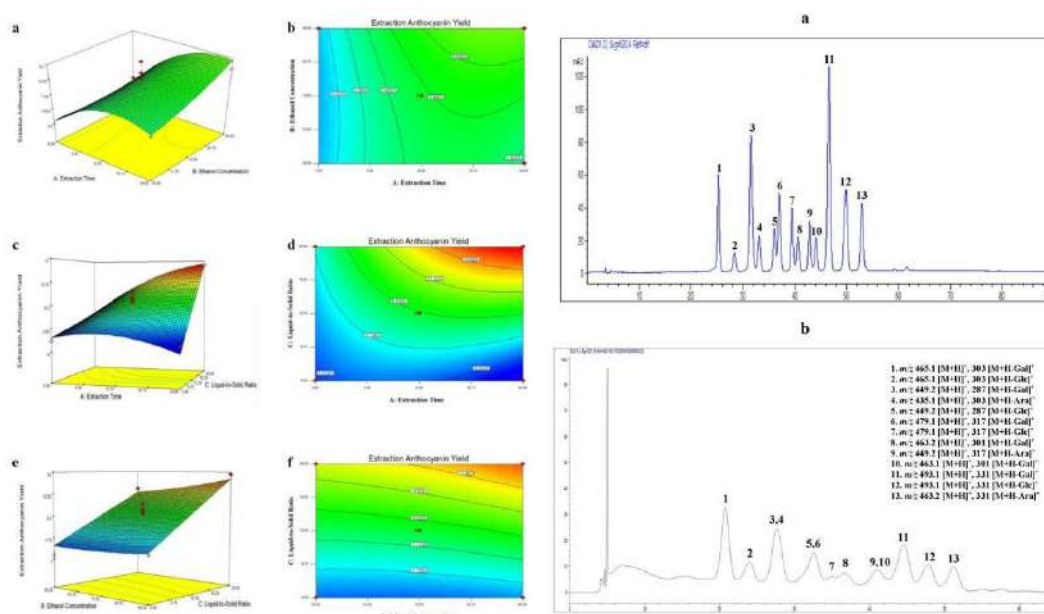


Figure 1. Extraction optimization and component analysis of anthocyanins from blueberries

1. Delphinidin galactoside; 2. Delphinidium glucoside; 3. Centaurea galactoside; 4. Delphinidin arabinoside; 5. Bluebonnet glucoside; 6. Petunia galactoside; 7. Centaurea arabinoside; 8. Petunia glucoside; 9. Paeoniflorin galactoside; 10. Petunia arabinoside; 11. Mallow pigment galactoside; 12. Mallow pigment glucoside; 13. Mallow pigment arabinoside

Blueberry anthocyanins have superior free radical scavenging ability and can inhibit TNF- α -induced inflammatory factors MCP-1, ICAM-1 and VCAM-1 in human umbilical vein endothelial cells HUVEC by intervening NF- κ B signaling pathway (Figure 2). In human retinal microvascular endothelial cells (HRCEC), NF- κ B and PI3K-Akt signaling pathways inhibited inflammation induced by high glucose. In the human retinal pigment epithelial cell ARPE-19 oxidative stress model, blueberry anthocyanins inhibited cell damage through PI3K/Akt and MAK(P38) signaling pathways.

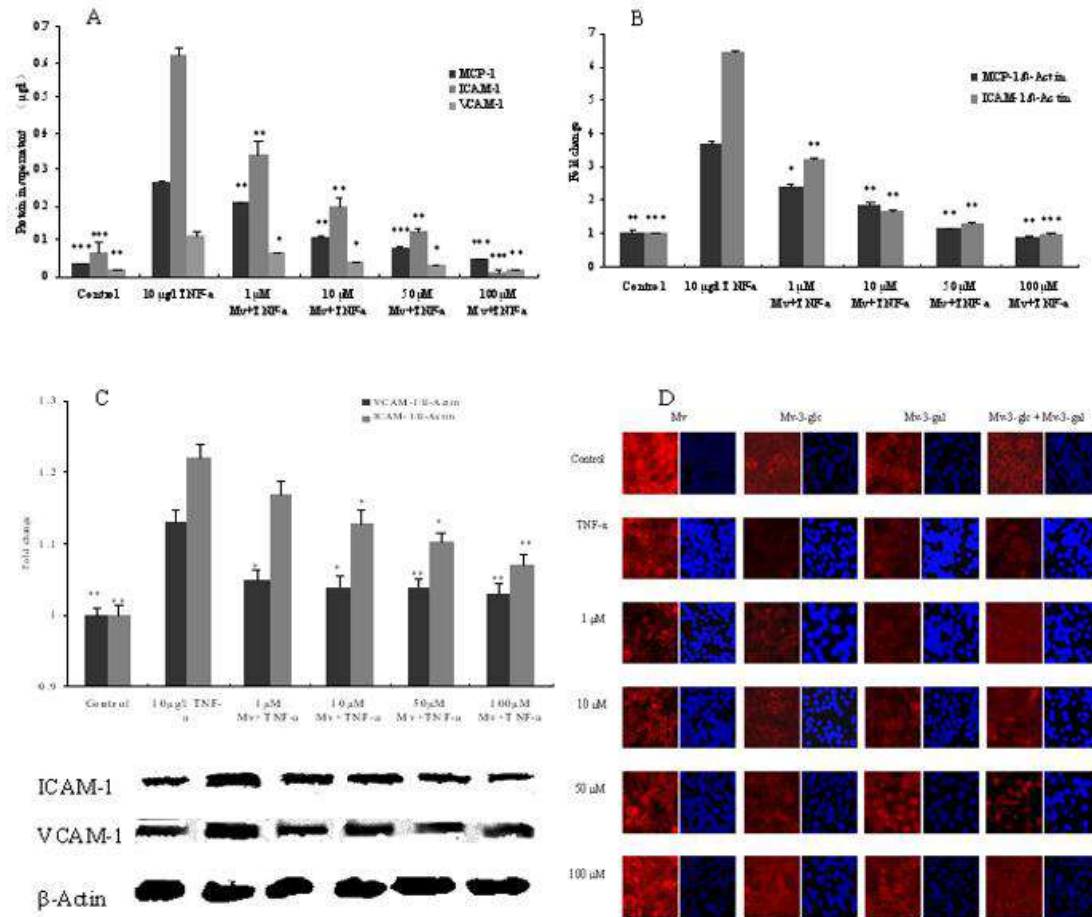


Figure 2. Anti-inflammatory effects of blueberry anthocyanins

(A) Extracellular protein levels of MCP-1, ICAM-1 and VCAM-1; (B) mRNA levels of MCP-1 and ICAM-1; (C) Intracellular protein levels of ICAM-1 and VCAM-1; (D) Inhibition of NF-κB signaling pathway

In vitro and in vivo experiments confirmed that blueberry anthocyanin has the effect of improving glucose and lipid metabolism. In HepG2 cells stimulated by high glucose, blueberry anthocyanins down-regulated glycogen synthesis (FOXO1 and pGS), fat synthesis (ACC and HMGCR) and glucose transport (GLUT2) related proteins, and up-regulated glycogen (P-GSK3 β) and fat decomposition (HSL) related proteins by activating AMPK signaling pathway. In C57BL/6J type 2 diabetes animal model constructed by feeding high-glucose and high-fat diet combined with intritoneal injection of streptozotocin, feeding blueberry anthocyanin extract can reduce blood glucose, postprandial blood glucose and urine glucose, and can down-regulate the contents of triglyceride (TG) and total cholesterol (TCHO) in serum, but the insulin level remains unchanged. These results suggest that blueberry anthocyanins regulate glucolipid metabolism by inhibiting insulin resistance (Figure 3).

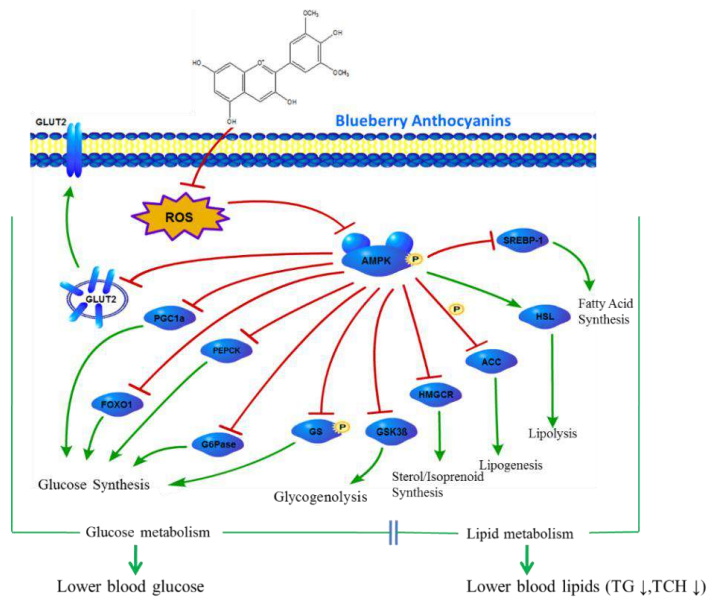
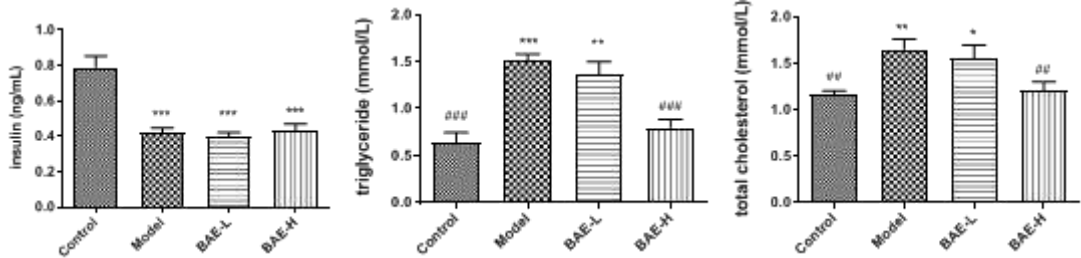
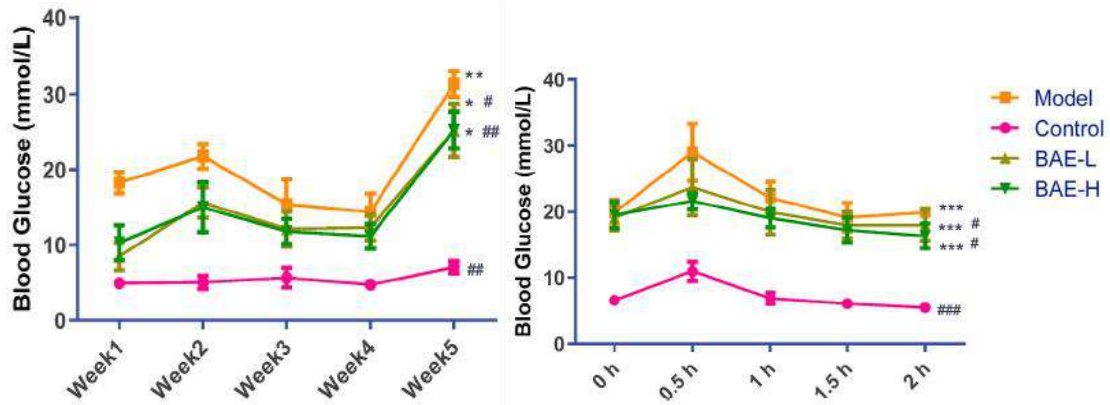
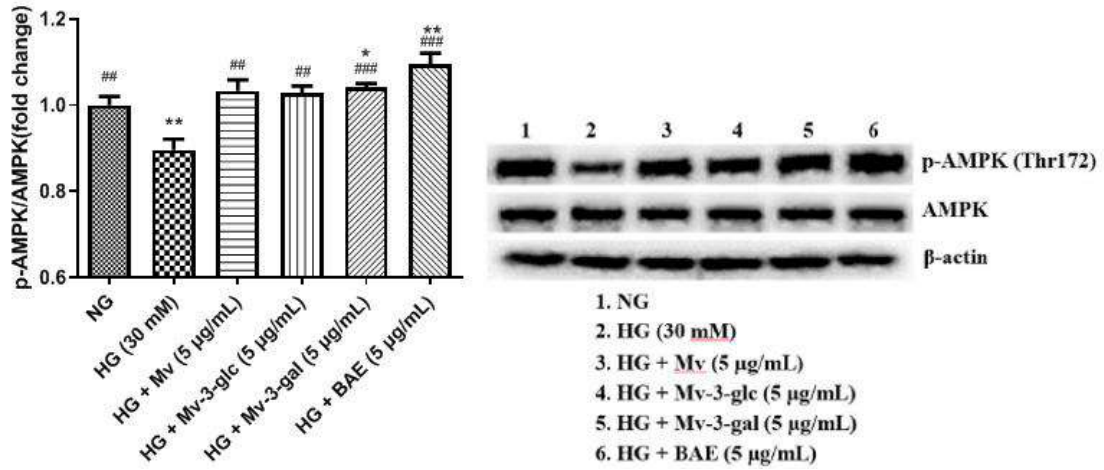


Figure. 3 Effects of blueberry anthocyanins on glucose and lipid metabolism

(A) Blueberry anthocyanin activates HepG2 intracellular AMPK signaling pathway (B) Effects of blueberry anthocyanin on blood glucose, glucose tolerance, insulin, triglyceride and total cholesterol in diabetic mice (C) Schematic diagram of blueberry anthocyanin regulating glucose and lipid metabolism through AMPK pathway to achieve hypoglycemic and lipid lowering effect

Our product specifications are as follows for your reference:

Blueberry Extract, The ratio of extraction 6:1;

Blueberry Powder, water soluble;

(2) Bilberry Extract;

Bilberry extract is rich in anthocyanins, in which more than 15 different anthocyanins are found. The main compounds are anthocyanin-2-glucoside, anthocyanin-3-xylanoside, anthocyanin-3-hif glucoside, anthocyanin-2-rhonoside, trialose-3-rhonoside, trialose-5-glucoside, 3-O-protriflorin, malinolin-3, 5-diglucoside and 3, 3-diprotriflorin, etc.

The main effects of Bilberry extract are to protect eyesight, antibacterial, antiviral, anti-cancer and so on.

It is commonly used in food additives, functional foods and the pharmaceutical industry. Among food additives, it is a food colorant with good color quality and wide color gamut, which is allowed to be used in drinks, dairy products and cakes. As a functional food, it can be used directly as a dietary supplement.

Our product specifications are as follows for your reference:

Freeze Dried European Bilberry Powder, 100%;

Bilberry Extract, Anthocyanidins 5% HPLC;

Bilberry Extract, Anthocyanidins 25% UV;

Bilberry Extract, Anthocyanins 25% HPLC;



(3) Grape seed Extract;

Grape seed extract is rich in procyanidins, one of the most potent plant-derived antioxidants. Its antioxidant effect is 30 to 50 times that of vitamin C and vitamin E, and it is mostly used in cosmetics and skin care products. This ingredient is also relatively safe and non-toxic. It has the effect of anti-oxidation, fade spots, reduce wrinkles, anti-radiation, remove free radicals, nourishing and moisturizing skin, brighten skin tone and so on.

In addition, grape seed extract also has health benefits. It can help lower LDL cholesterol in the blood and raise HDL cholesterol, and do both. It is rich in unsaturated fatty acid - linoleic acid is essential but can not be synthesized by the human body, from unsaturated to saturated state can consume cholesterol, can effectively reduce blood lipid.

Our product specifications are as follows for your reference:

Grape seed Extract, Proanthocyanidins 95% UV Polyphenols 95% UV;

Grape seed Extract, Polyphenols 70% UV;

Grape seed Extract, Proanthocyanidins 95% UV Polyphenols 70% UV;

Grape Seed Extract, OPCs 60%HPLC;

Grape Seed Extract, OPCs 40%HPLC;

Kangcare will always be here if you have any inquiries.



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研究背景:

什么是花青素?

花青素是纯天然的抗衰老营养补充剂,研究证明是当今人类发现的最有效的抗氧化剂。花青素的抗氧化性能比维生素 E 高五十倍,比维生素 C 高二百倍。与其他抗氧化剂不同的是,花青素能通过血脑屏障,直接保护大脑和神经系统。

花青素主要用于食品着色方面,也可用于染料、医药、化妆品等方面,作为一种天然食用色素,它安全无毒,且具有一定的营养和药用价值,具有非常大的应用潜力,深受相关研究学者的广泛关注。



如下这些产品富含花青素，且作用显著：

一，蓝莓提取物；

根据美国的一项分析指出，在众多的水果和蔬菜中，蓝莓所含有的花青素含量是最高的，而蓝莓的花青素最丰富的部分就是它的紫色果皮部位。

Kangcare 合作研究通过响应面曲线优化了超声辅助的蓝莓花青素提取工艺（图 1 A）、建立了蓝莓花青素 HPLC 检测方法，确定了蓝莓花青素的成分结构组成，成功解析蓝莓花青素成分分布，并构建了近百个品种的蓝莓花青素化学指纹图谱，蓝莓花青素提取物中主要包括 13 种成分（图 1 B）。

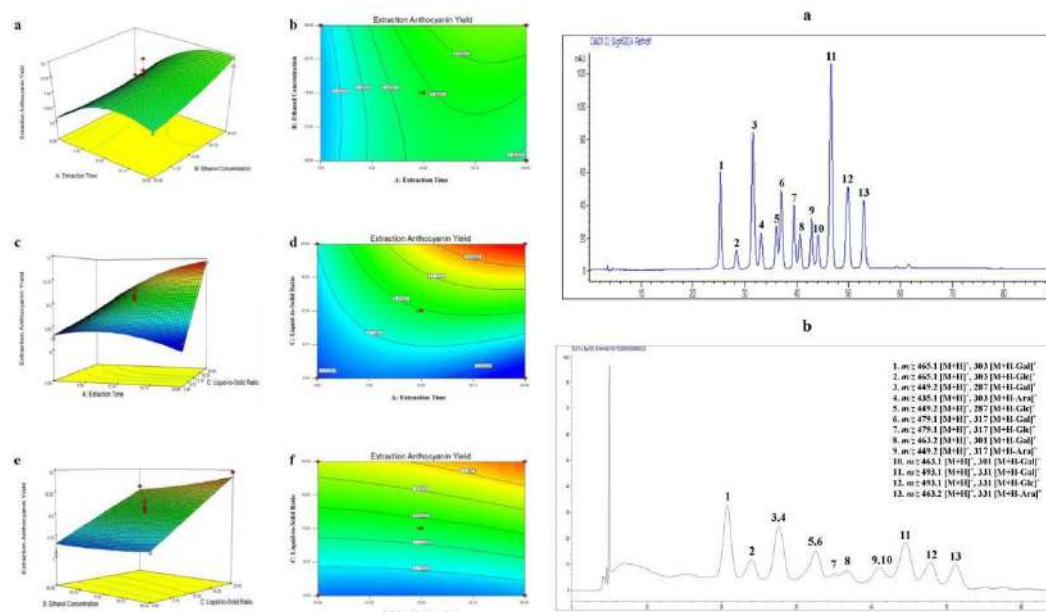


图 1. 蓝莓花青素的提取优化和成分分析

1. 飞燕草素半乳糖苷; 2. 飞燕草素葡萄糖苷; 3. 矢车菊素半乳糖苷; 4. 飞燕草素阿拉伯糖苷; 5. 矢车菊素葡萄糖苷; 6. 矮牵牛素半乳糖苷; 7. 矢车菊素阿拉伯糖苷; 8. 矮牵牛素葡萄糖苷; 9. 芍药素半乳糖苷; 10. 矮牵牛素阿拉伯糖苷; 11. 锦葵色素半乳糖苷; 12. 锦葵色素葡萄糖苷; 13. 锦葵色素阿拉伯糖苷

蓝莓花青素具有优越的清除自由基能力，通过干预 NF- κ B 信号通路在人脐静脉内皮细胞 HUVEC 中抑制 TNF- α 诱导的炎症因子 MCP-1、ICAM-1、VCAM-1 发挥抗炎作用（图 2）；在人视网膜微血管内皮细胞 HRCEC 中通过 NF- κ B 和 PI3K-Akt 信号通路抑制高糖诱导的炎症损伤；在人视网膜色素上皮细胞 ARPE-19 氧化应激模型中，蓝莓花青素通过 PI3K/Akt 和 MAK(p38) 信号通路抑制细胞损伤。

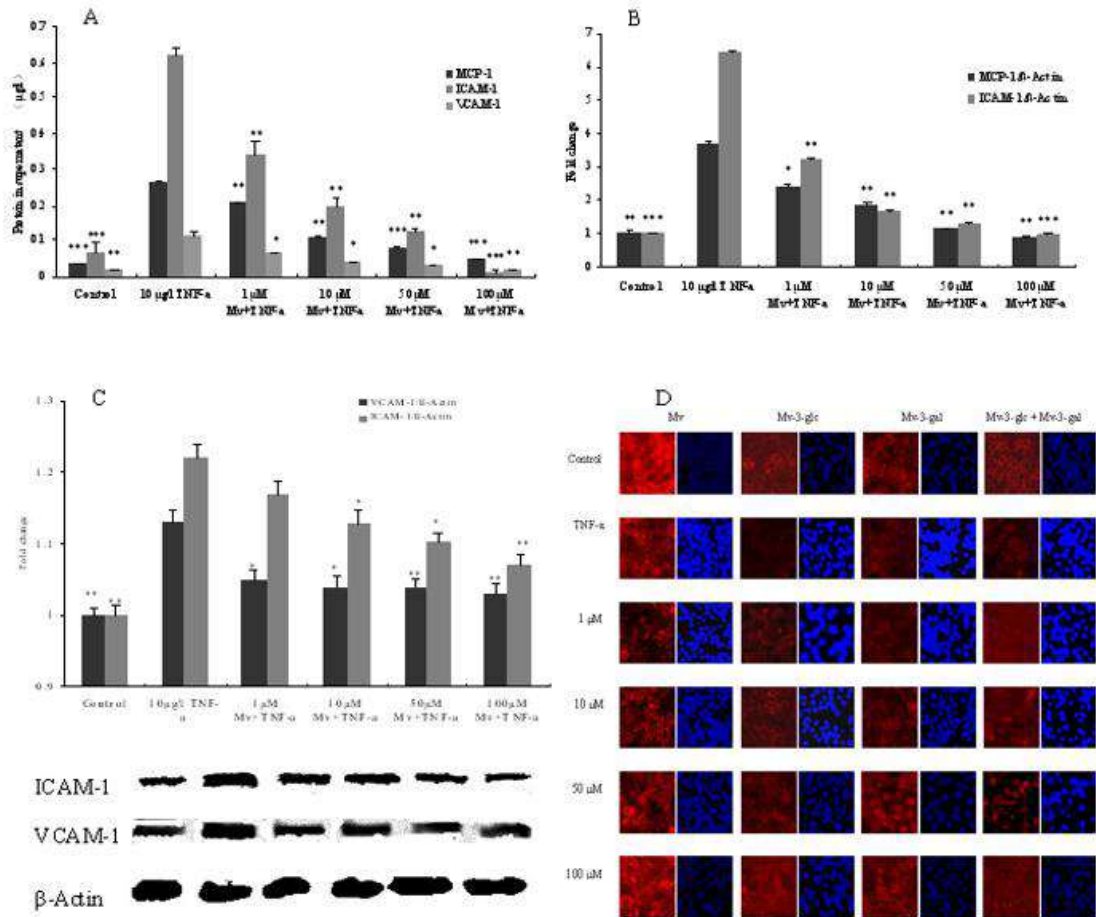


图 2. 蓝莓花青素的抗炎作用

(A) MCP-1、ICAM-1、VCAM-1 胞外蛋白水平；(B) MCP-1、ICAM-1 的 mRNA 水平；(C) ICAM-1、VCAM-1 胞内蛋白水平；(D) 阻断 NF-κB 信号通路作用

体内外实验证实蓝莓花青素具有改善糖脂代谢的功效。在高糖刺激 HepG2 细胞中，蓝莓花青素通过激活 AMPK 信号通路下调糖原合成(FOXO1 和 pGS)、脂肪合成(ACC 和 HMGCR)和糖转运(GLUT2)相关蛋白，上调糖原异生(p-GSK3β)和脂肪分解(HSL)相关蛋白；C57BL/6J 喂食高糖高脂饮食配合腹腔注射链脲佐菌素构建的 2 型糖尿病动物模型中，喂食蓝莓花青素提取物可以降低血糖、餐后血糖和尿糖，并能够下调血清内的甘油三酯(TG)和总胆固醇(TCHO)含量，但胰岛素水平不变，表明蓝莓花青素是通过抑制胰岛素抵抗调节糖脂代谢(图 3)。

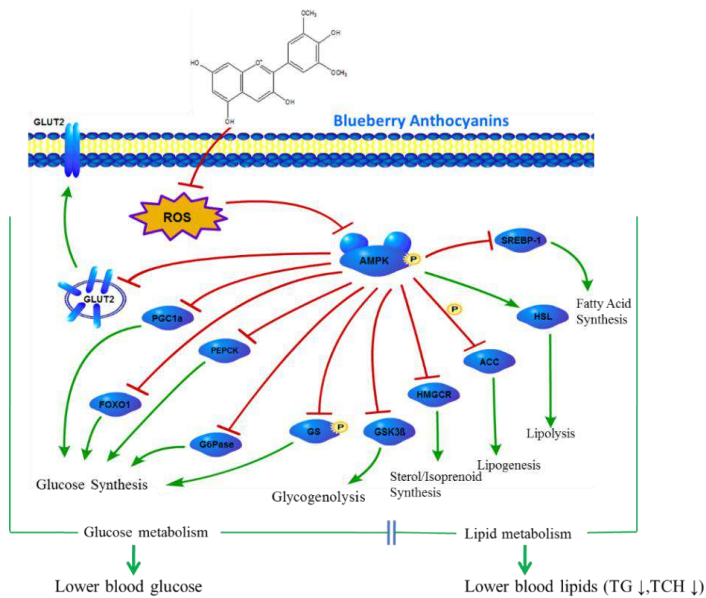
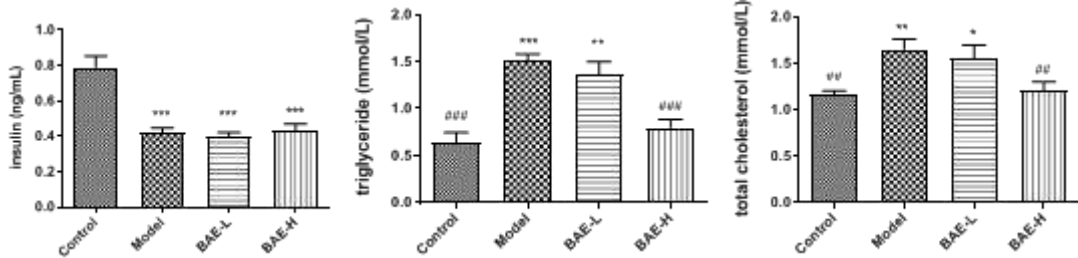
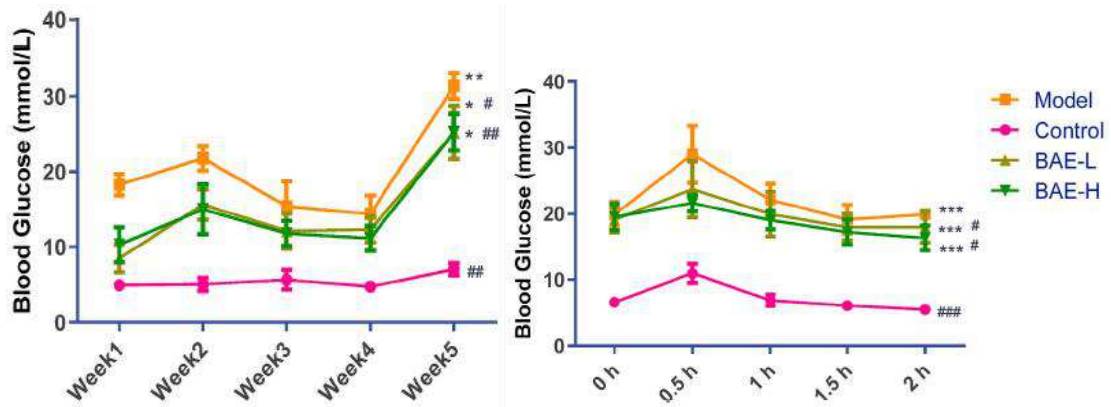
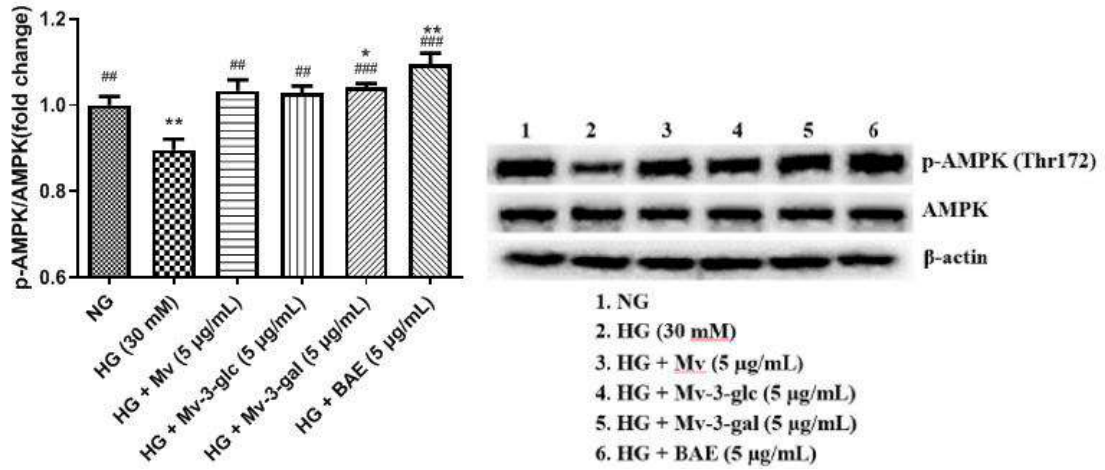


图3 蓝莓花青素调节糖脂代谢功效

(A) 蓝莓花青素激活 HepG2 胞内 AMPK 信号通路 (B) 蓝莓花青素对糖尿病小鼠血糖、糖耐量、胰岛素、甘油三酯、总胆固醇的影响 (C) 蓝莓花青素通过 AMPK 通路调节糖脂代谢达到降糖降脂功效的示意图

我司的该产品规格供参考如下：

蓝莓提取物 比例提取 6:1；

蓝莓果粉 可水溶；

二，越橘提取物；

越橘提取物富含花青素，在其中发现出超过 15 种不同的花青素。主要为花青素-2-葡萄糖苷、花青素-3-木糖苷、花青素-3-半乳糖苷、花青素-2-鼠李糖苷、翠雀花-3-鼠李糖苷、翠雀花-5-葡萄糖苷、3-O-酰原花翠素、锦葵色素-3、5-二糖甙和 3、3-二-酰原花萃素等。

越橘提取物的主要功效有保护视力、抗菌、抗病毒、抗癌等作用。

它的应用领域通常有食品添加剂，功能性食品和医药工业。在食品添加剂中，它是一种色质好、色域宽的食品着色剂，被允许在饮料、乳制品及糕点中使用。作为功能性食品时，它可以被直接使用做成膳食补充剂。

我司的该产品规格供参考如下：

欧洲越橘冻干粉 100%；

越橘提取物 5%花青素 HPLC；

越橘提取物 25%花青素 UV；

欧洲越橘提取物 25%花青素苷 HPLC；



三，葡萄籽提取物；

葡萄籽提取物中富含原花青素，它是植物来源的最高效的抗氧化剂之一。其抗氧化效果是维生素 C 和维生素 E 的 30~50 倍，多被应用于化妆品和护肤品中，该成分也较安全无毒。它的功效作用有抗氧化，淡化色斑，减少皱纹，抗辐射，清除自由基，营养滋润皮肤，提亮肤

色等。

此外，葡萄籽提取物还具有保健功效。它可以帮助降低血液中低密度胆固醇，同时能提高高密度胆固醇的水平，两者兼顾。它富含的不饱和脂肪酸-亚油酸是人体必需但是不能合成的，由不饱和到饱和状态可以消耗胆固醇，能够有效地降低血脂。

我司的该产品规格供参考如下：

葡萄籽提取物 原花青素 95%UV 多酚 95%UV；

葡萄籽提取物 多酚 70%UV；

葡萄籽提取物 原花青素 95%UV 多酚 70%UV；

葡萄籽提取物 低聚原花青素 60%HPLC；

葡萄籽提取物 低聚原花青素 40%HPLC；

