

## 附件四、技術說明表

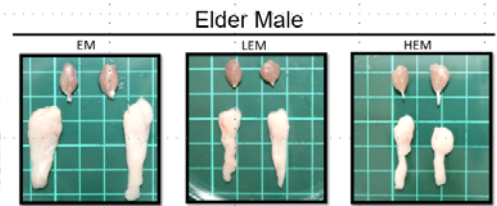


## 發酵黑豆及薏仁產品之應用

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簡歷：<https://panmhlab1.wixsite.com/pan-mhlab>



市場及需求：本產品於動物實驗中發現其具有延緩老化，預防老年肥胖及改善老化肌肉量減少之問題，可以作為銀髮族及老年化趨勢上升的國家的膳食補充品。

技術摘要(含成果)：動物實驗以自然老化 72 週齡與 28 週齡之 C57BL/6 雄性與雌性小鼠，將 BAA 冷凍乾燥後分別以 2% 與 6% 的比例混入飼料中餵食共 14 週。結果顯示，BAA 能顯著降低小鼠之老化指標 GLB1、p16INK4A ( $p < 0.05$ )，並且也能降低肝臟中發炎物質 MCP-1、IL-6 與發炎相關路徑蛋白 p-PI3K/PI3K、p-Akt/Akt、p-NF- $\kappa$ B/NF- $\kappa$ B 之比值 ( $p < 0.05$ )，肝臟中氧化壓力指標 MDA 與 8-oxodG 之含量也有顯著改善 ( $p < 0.05$ )；此外，BAA 之介入在雄性小鼠中也觀察到性腺脂肪減少 ( $p < 0.05$ )、肌肉含量增加 ( $p < 0.01$ ) 與 T-CHO/HDL 比率降低 ( $p < 0.001$ ) 等明顯改善情形，而雌性小鼠中則發現肝臟重量減輕 ( $p < 0.05$ ) 與肌肉含量增加 ( $p < 0.05$ ) 的顯著變化。而在腸道菌相分析中則發現 Peptococcaceae 科與 Akkermansiaceae 科 Akkermansia 屬等有益菌種之比例上升，Candidatus Saccharimonas 屬、Ruminococcaceae 科、Tannerellaceae 科中 Parabacteroides 屬與 Enterobacteriaceae 科等菌種之比例降低，使高齡小鼠腸道菌相組成更接近於年輕小鼠之狀態，而維持腸道健康與抑制腸道發炎情形。綜上所述，黑豆與薏仁共同發酵並搭配藻類 (BAA) 能透過降低發炎反應和氧化壓力進而達到延緩老化之功效，同時也能調節腸道菌相至較年輕之組成，並使健康相關數值明顯改善，而有改善老化相關指標之作用。

優勢：本專利產品競爭性高，目前尚無類似延緩老化之產品於國內。台灣為逐漸高齡化的社會，作為銀髮食品，其可行性高。

競爭產品：一般納豆產品

專利現況：

本研究團隊具有數十年研究經驗，尤其在食品植化素對於疾病預防之研究，已有 270 餘篇學術發表。

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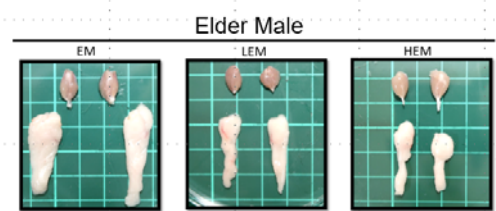


## Title of Invention

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**Market Needs:** This product effectively retarded ageing, prevented ageing-related obesity and improved the problem of muscle loss in our animal study. It has high potential to be functional food for elderly, especially in aging society of the developed area like Taiwan.

**Our Technology:** our sample (BAA) is composed of black bean and adlay, processed by fermentation to increase its digestibility. In addition to the above, adding algae powder to enhance its taste and smell along with intensive nutrient. We supplemented BAA into normal diet at the percentage of 2 % and 6 % respectively, while 72 and 28 weeks old C57BL/6J mice were fed for fourteen weeks. Results show that BAA can significantly decrease the senescent markers GLB1 and p16INK4A, and also attenuate pro-inflammatory cytokines, MCP-1 and IL6, as well as PI3K/Akt pathway protein p-PI3K/PI3K, p-Akt/Akt, and p-NF- $\kappa$ B/NF- $\kappa$ B ratio. Furthermore, the oxidative stress markers, MDA and 8-oxodG significantly decrease as well. Additionally, we revealed improvement in muscle mass, perigonadal fat, and T-CHO/HDL ratio in male mice, as well as liver weight and muscle mass in female mice during the experiment. In addition to the beneficial effects above, the gut microbiota composition changed as well. Including rising abundances in Peptococcaceae, Akkermansiaceae families, and Akkermansia genus; and decreasing abundances in Ruminococcaceae, Tannerellaceae, Enterobacteriaceae families, and Candidatus Saccharimonas, Parabacteroides genus. After the intervention of BAA, the gut microbiota mentioned above altered, which was much closer to the composition of young mice rather than elder mice. In conclusion, BAA can delay aging via anti-inflammatory and anti-oxidative effects, and also improve aging related markers and gut microbiota composition as well.

**Strength:** Our product has high competitiveness in the functional food field because there is no similar product showing same benefits to improve ageing in Taiwan.

**Competing Products:** Normal natto products.

**Intellectual Properties:** Our research team focus on the benefits of phytochemicals or functional foods against several diseases and there are up to 270 research articles have been published in this field.

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