ageLOC Vitality improves exercise endurance, glucose metabolism and antioxidant capacity in an aging model

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Abstract
A number of compounds were screened for their anti-aging effects through a high-throughput gene expression platform. On the basis of the differential gene expression patterns in skeletal muscle, heart muscle and brain between the young (3 months of age) and old (24m), an ageLOC Vitality product was formulated, including Cordyceps sinensis Cs-4 (a mycelia fermentation product of C. sinensis), GinsengMax (an extract of Ginseng), and a pomegranate extract (>65% polyphenols). We examined in this study the effect of ageLOC Vitality (400 or 800 mg/kg BW) in improving endurance exercise in ICR mice (10 months of age). Daily exercise training on treadmill reduced body weight, body fat, liver and gastrocnemius glycogen and increased blood lactate (+0.05). Consecutive 47 days of Vitality consumption (800 mg/kg) increased weight-loaded swim time to exhaustion in mice (+22% compared to exercise controls; p=0.024). Vitality consumption (800 mg/kg) for 14 days increased gastrocnemius glycogen (+28% compared to exercise controls; p=0.049) and liver glycogen (+12% compared to exercise controls; p=0.032), and reduced cellular ROS species concentration in post-exercise muscle tissues in a dose-dependent manner (+32% compared to exercise controls; p=0.005). In conclusion, ageLOC Vitality extends endurance swim time to exhaustion with increased cellular glycogen preservation and antioxidant capacity in old mice, suggesting the anti-aging benefit of ageLOC Vitality in enhancing exercise endurance in advanced ages and preventing muscle aging.

Introduction
1. Cordyceps sinensis and Ginseng are believed traditionally to be effective in anti-aging.
4. By use of gene chip technology, a number of compounds were screened for their anti-aging effects. On the basis of the differentiated gene expression patterns, ageLOC Vitality product was formulated, including C. sinensis Cs-4 (a mycelia fermentation product of C. sinensis), GinsengMax (an extract of Ginseng), and a pomegranate extract (>65% polyphenols).
5. The aim of this study was to test ageLOC Vitality the effect on physical vitality and mitochondria functions in mice and mental acuity in humans.

Summary
1. On the basis of gene chip analysis on aging-related changes in gene expression across 7 mouse strains, the robust transcriptional biomarkers were selected and confirmed by RT-PCR. This platform allowed to approach aging-related changes in mitochondria function related transcripts, and selection of ingredients for ageLOC Vitality product (C. sinensis CS-4, Ginseng and Pomegranate extracts).
2. This study demonstrated that ageLOC Vitality is effective in enhancing performance of endurance exercise with reduced blood lactic acid, overall muscle ROS, and increased gastrocnemius and hepatic glycogen after sub-maximal exercise.
3. The study also showed that ageLOC Vitality is effective in improving the functions of mitochondria respiratory chain complex:
   - Increases in total activities of mitochondria complex in gastrocnemius;
   - Increases in complex activities per muscle cell;
   - Increases in complex activities on the basis of mitochondria mass;
   - No significant changes in cell numbers per gram of muscle tissue, mitochondria mass and mitochondria biogenesis per muscle cell.
Cordyceps sinensis CS-4 restores aging-associated changes in gene expression and extends lifespan in normal aged mice

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Abstract

Cordyceps sinensis is believed traditionally to be an anti-aging traditional Chinese herb. We previously reported that C. sinensis CS-4, a mycelia fermentation product of C. sinensis, improves glucose, lipid and energy metabolisms and has antioxidant, anti-fatigue and endurance enhancement effects. In this study we examined gene expression (GE) profiles of neocortex and gastrocnemius from young (5 months of age), old (25 mo) and old CS-4-treated (3.3 mg/kg, i.g. for 12 months) mice. Gene transcripts examined, 1241 were classified with the mitochondria in some fashion (structural, enzymatic, signal transduction, etc.) Of them, 174 changed in GE with aging in brain and 220 in muscle tissues when compared GE in old controls vs. young controls. Age-related changes in mitochondria related GE were clustered (mtYGCs). CS-4 strongly suppressed mtYGCs of many changes that occurred with age (p<0.05). This anti-aging effect at the gene transcription level was examined in a lifespan study in male & female (ICR mice fed either control or CS-4 (0.5, 1.0, or 1.5 g/kg; n=48 each group) beginning at 1 year of age. Calorie intake was adjusted twice a week to match the controls. No differences in body weight were noted among the groups. All control mice died before 3 years of age, with a median lifespan of 754 days and the longest lifespan of 1061 days. The average lifespan of the longest 10% mice was 1028 days, or of the longest 20% mice 935 days. The lifespan for CS-4 group was extended 19-66 days at 50% survival and 45-153 days at 10% survival. The age of the oldest surviving mice was extended 236 and 152 days at the dose of 0.5 and 1.5 g/kg, respectively, and >278 days (1 mouse still alive) for 1.0 g/kg. Kaplan-Meier analysis revealed the extended lifespan and reduced the risk of death in mice receiving CS-4 0.5 g/kg (p<0.03). In conclusion, C. sinensis CS-4 reverses age-related changes in GE and extends the lifespan of mice, supporting the traditional belief that C. sinensis CS-4 conveys anti-aging benefits to humans.

Introduction

1. C. sinensis is traditionally believed as a medicinal herb to combat aging-related diseases and promote longevity.
2. Literature indicates the therapeutic functions of C. sinensis CS-4 in improving energy, glucose, and lipid metabolisms and benefiting to cardiovascular, the liver, the lungs and kidneys health. (Zhu et al. J. Altem Compl. Med. 1998; 4: 280-303, 429-457)
3. We have reported anti-fatigue and vitality-endurance enhancement properties of CordyMax, and improvement of energy, glucose, and lipid metabolisms by CordyMax in animals and in humans in previous studies.
4. The aim of this study is to test the lifespan extension effect of CordyMax in mice.

Cordyceps sinensis (Berk.) Sacc. 冬虫夏草
(Collected from Qinghai-Tibetan plateau of China)

Isolation & Purification

(A Paecilomyces hepialii
Chen et Dai strain)

Industrial Fermentation

Cordyceps sinensis CS-4

Experimental Design: Lifespan study in mice

Vehicle control (n=48 mice)
CS-4 500 mg/kg (n=48 mice)
CS-4 1000 mg/kg (n=48 mice)
CS-4 1500 mg/kg (n=48 mice)

3+ years
8m-o
Treatment starts at 12 months of age

Summary

1. Screened changes in gene expression across 7 mouse strains through gene chip analysis. The robust transcriptional biomarkers were confirmed by RT-PCR.
2. Analysis with use of Kaplan-Meier Cumulal Survivor Plot showed significant extension of mouse lifespan and reduced death risks by CordyMax: p=0.049 (Week 36); p=0.036 (Week 40); p=0.059 (Week 48); p=0.027 (Week 64).
3. The low dose CordyMax treatment (equivalent to the human dose) appeared to show the best survivor curve.
4. This study demonstrates the lifespan-extending effects of CordyMax in mice, while the experiment is still ongoing.