



Purple Tea Extract

New Clinical Data on Beneficial Effect for Exercise



Purple Tea Cultivation

TRFK: Tea Research Foundation of Kenya

A new variety of *Camellia Sinensis*, Purple Tea was developed by the Tea Research Foundation of Kenya after 25 years of crossbreeding. (*Camellia Sinensis*, TRFK306)



TRFK

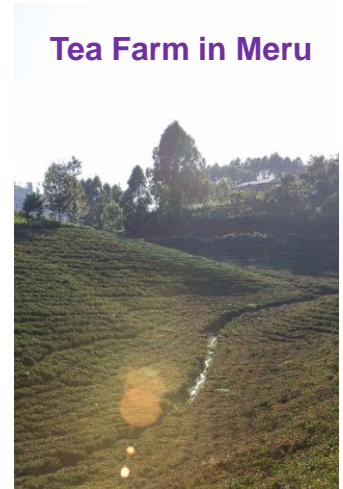
Purple Tea Cultivation Area

Kenya

- A country below the equator
- The tea is cultivated at mountain areas with 1,500 and 2,500 meters (4,900ft – 8,200ft) above sea level and exposed to strong UV rays from the sun.



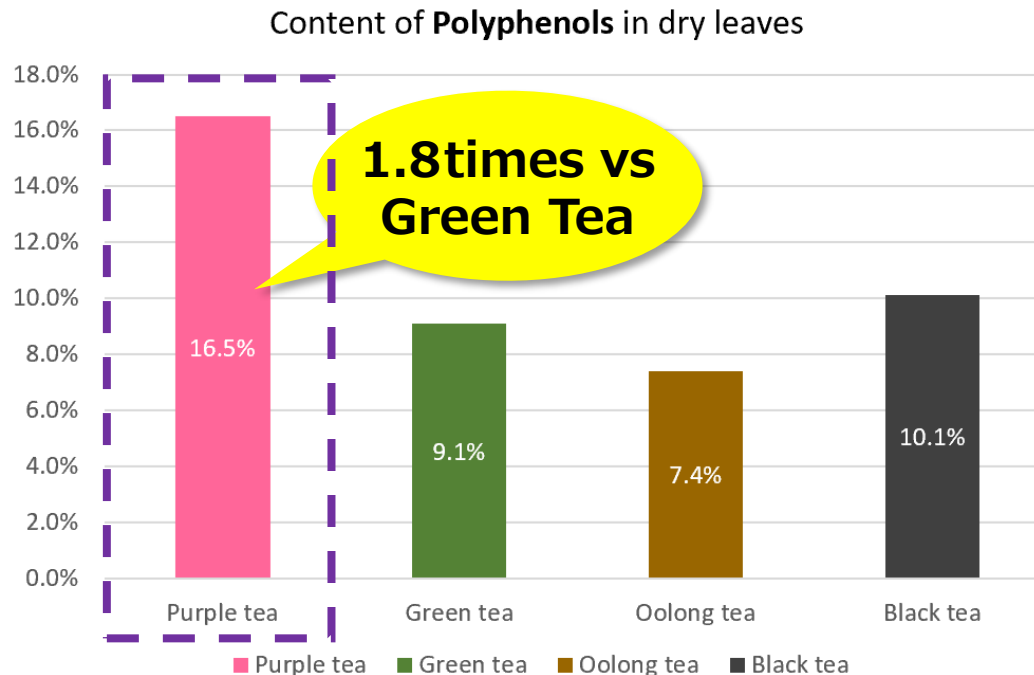
Tea Farm in Meru



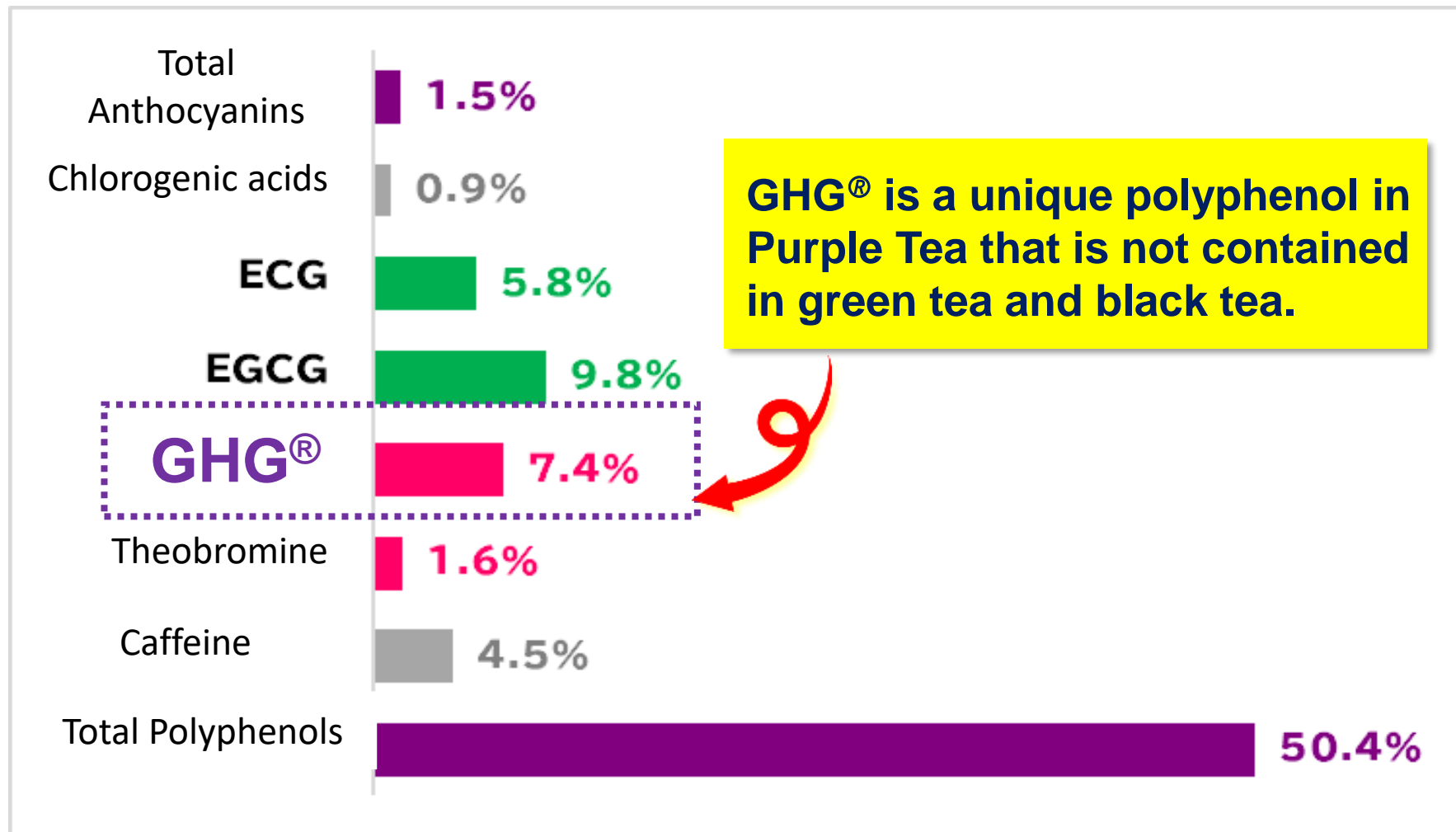
Purple Tea naturally contains high amount of polyphenols to protect from strong UV radiation.

Characteristics of Purple Tea

1. Pesticide-free in Kenya
2. Carefully hand picked only the sprout and young leaves
3. Rich in functional ingredients including GHG®
4. Rich in polyphenols (compared to other teas)

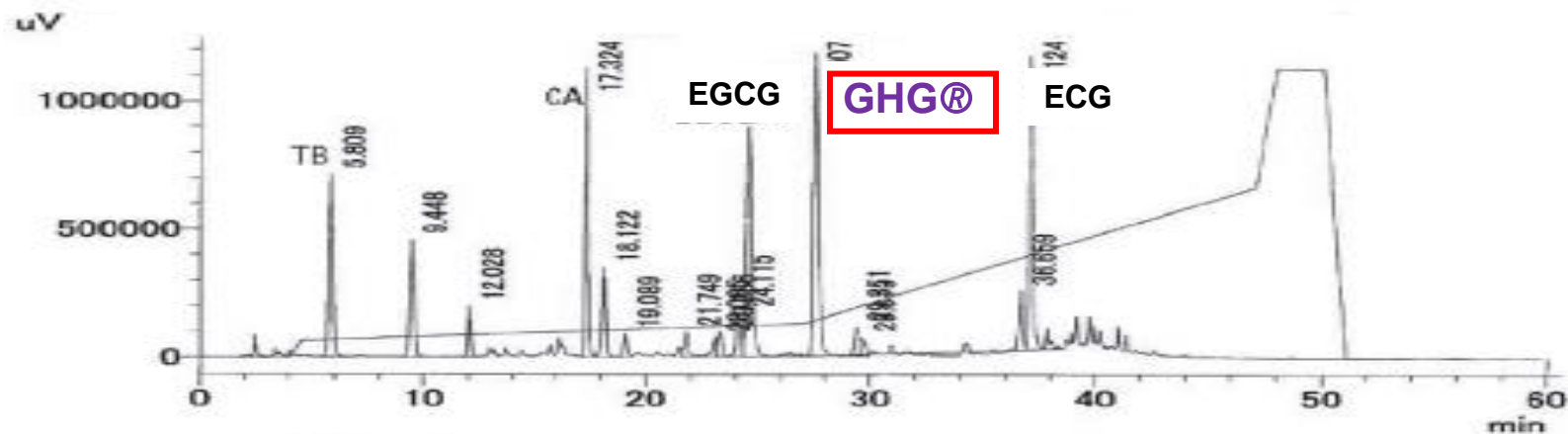


Contains polyphenols and anthocyanins

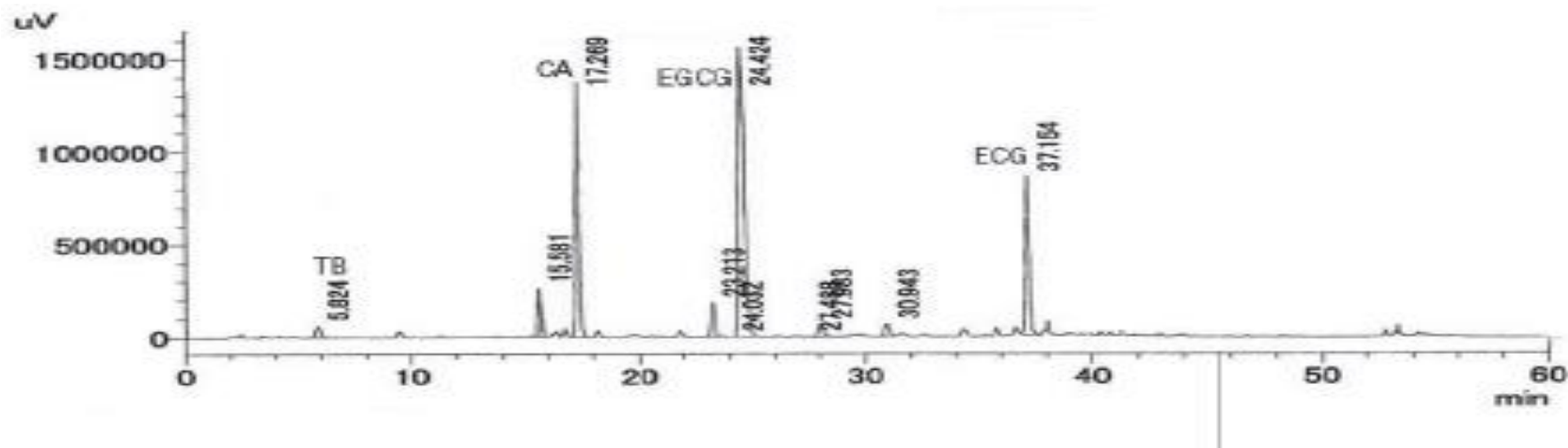


GHG® is a unique polyphenol that is contained only in Purple Tea

HPLC (Purple Tea Extract)

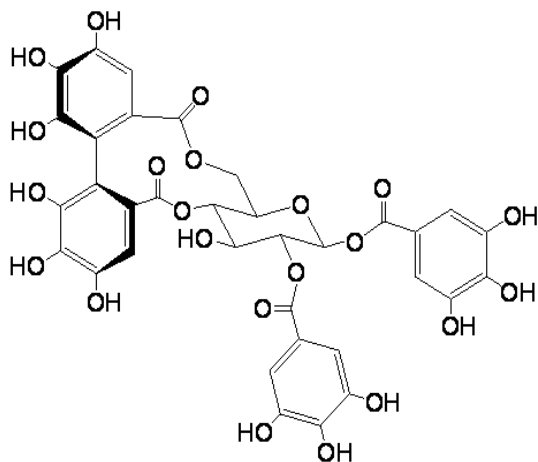


HPLC (Green Tea Extract)

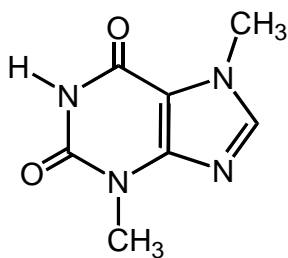


Only Purple Tea Extract contains the special component GHG®

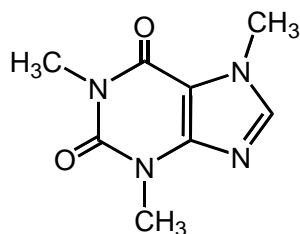
Active ingredients of PurpleForce™



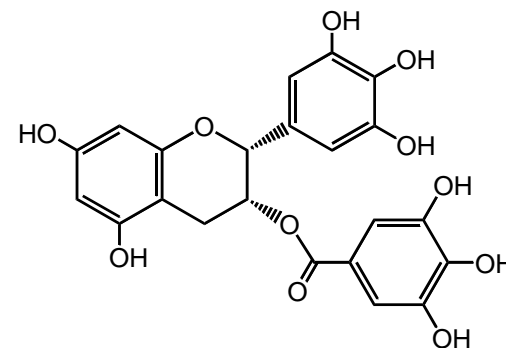
GHG®
(1,2-di-**G**alloyl-4,6-**H**exahydroxy-
diphenoyl-b-D-**G**lucose)



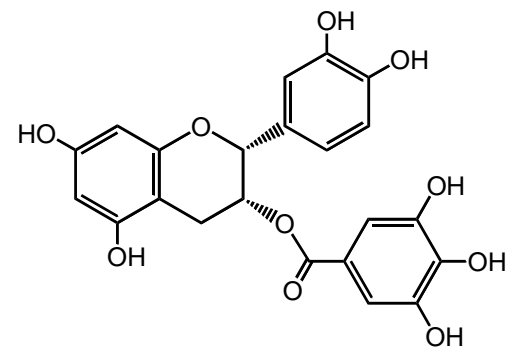
Theobromine



Caffeine



EGCG
(Epi**G**allo**C**atechin **G**allate)



ECG
(Epi**C**atechin **G**allate)

Purple Tea Extract contains the special active called GHG® not found in green tea



New Sports Performance Study



Dr. Hector Lopez

MD : Doctor of Medical Science

CSCS : Certified Strength & Conditioning Specialist

FAAPMR : The Society of physical Medicine Rehabilitation Special Member

FISSN : International Sports Nutrition Society Special Member



NovaNutra, LLC : CEO

Supplement Safety Solutions, LLC.; co-founder

THR Biosciences, LLC. : co-founder

Center for Applied Health Sciences, LLC : Partner

- Dr. Lopez is a leader in sports medicine , exercise science, nutritional biochemistry and clinical trials in the USA . He moved from clinical medicine to the fields of nutritional biosciences , dietary supplements and functional foods .
- He is active in R&D , development formulation with patented and safety and regulatory opinion leaders .
- He is also partner of Center for Applied Health Sciences (CAHS) that prominent clinical institutions .
- He holds multiple patents in the dietary supplements field as a researcher of novel bioactive compounds for licensing a broad category (Dietary supplements , natural products and functional foods and beverages)
- The main research subjects are longevity. Health aging, brain health , neurocognitive function , blood flow and vascular health , joint , muscle etc.

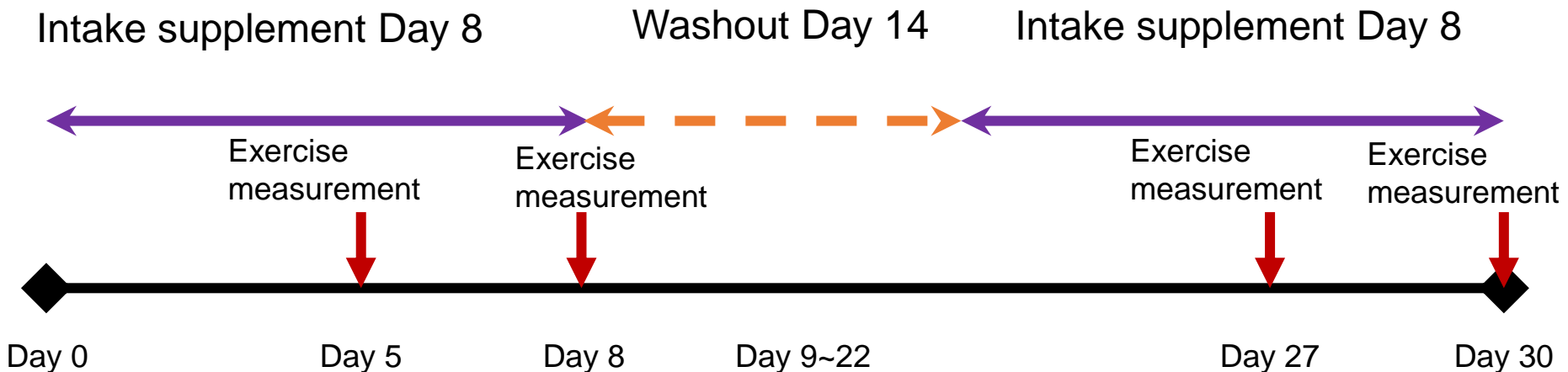


PurpleForce™ - Sports Performance Study Protocol 1

Design	Randomized placebo-controlled double-blind crossover comparison trial
Subject	BMI25~35、 Gym exercise frequency 1 - 2 time/week Men 32 persons (30 peoples have completed the test including dropouts)
Dose	Purple Tea Extract - P : 100mg (Control) Dextrin : 100mg (Placebo)
Period	Each supplement take consecutive 8 days , After 2 weeks washout , cross over and take again for consecutive 8 days . ※Subjects should maintain normal exercise and diet routines throughout the study .
Evaluation	<ul style="list-style-type: none"> • DEXA/Bone density measurement • Performance test (Impedance test /Measurement of body tissue by weak current , Muscle tissue oxygen concentration , Arm/leg circumference measurement) • Evaluation of body pain by VAS , Exercise recovery level. • Measurement of nitric oxide level in blood • CRP (Blood test) • Creatine kinase measurement

<Schedule>

- Day 0 : Screening , Randomization
- Day 5 : Intake supplement Day 5
- Day 8 : Intake supplement Day 8
- Day 9~ Day 22 : Washout (replacement of control and placebo)
- Day 27 : Intake supplement Day 5
- Day 30 : Intake supplement Day 8 (Same measurement as Day5)



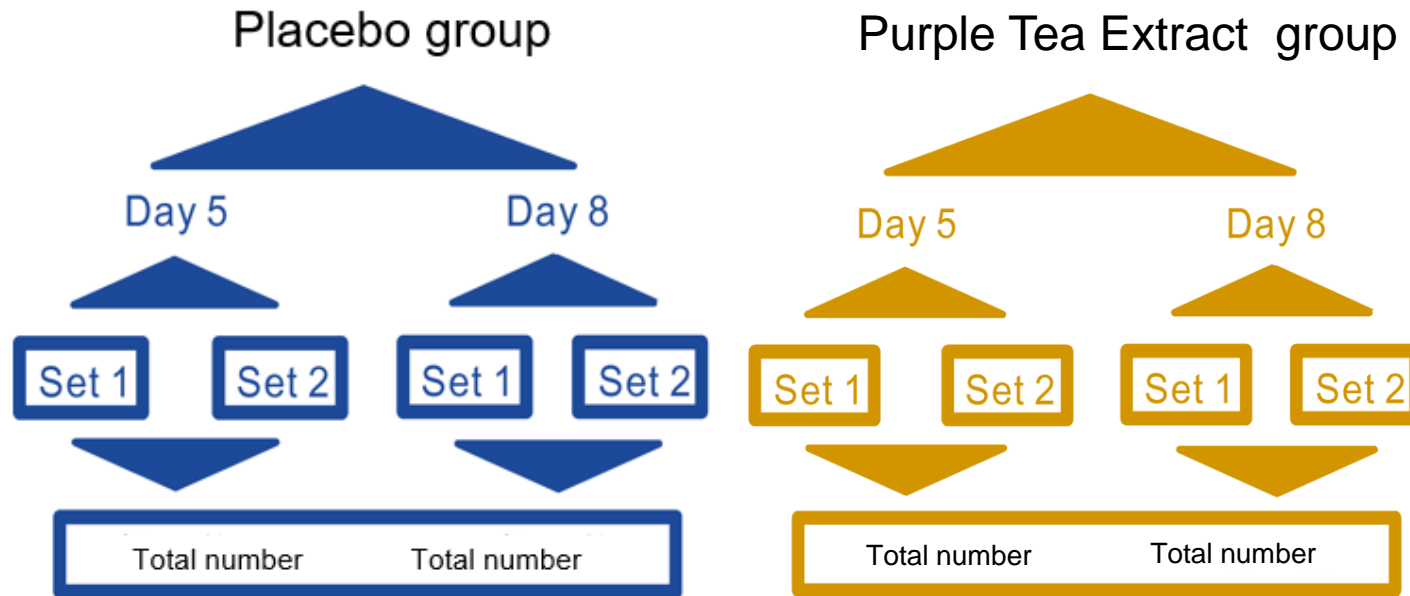
Exam period : JULY 2019~FEB 2020

PurpleForce™ - Sports Performance Study

Subject Background

	Mean ± standard deviation	Minimum value	Maximum Value
Age	33.5 ± 11.4	18	52
Body Height (cm)	178.4 ± 7.6	165	193
Body Weight (kg)	92.5 ± 13.3	73.7	126.2
BMI (kg/m ²)	29.0 ± 3.4	24.2	34.0
Systolic blood pressure (mm Hg)	127.4 ± 9.4	104	143
Diastolic blood pressure (mm Hg)	78.3 ± 7.1	64	90
Pulse (time/MIN)	64.2 ± 9.0	50	82

Physical Performance



Set 1 and Set 2 are including Bench press and Leg extension

- ◆ After Set 1, take 60 seconds break then exercise Set 2.
- ◆ Bench press: Weight equivalent load
- ◆ Leg extension: 50% of body weight load
- ✂ Carried out to the limit

Leg Extension

- ✓ The leg extension is a resistance weight training exercise that targets the quadriceps muscle in the legs
- ✓ Contribute to increase muscle strength and muscle mass of quadriceps

Quadriceps strength & performance in leg extension has been correlated with transfer to peak power, and anaerobic capacity in field athletes and middle distance runners. They are the largest muscle group in the body

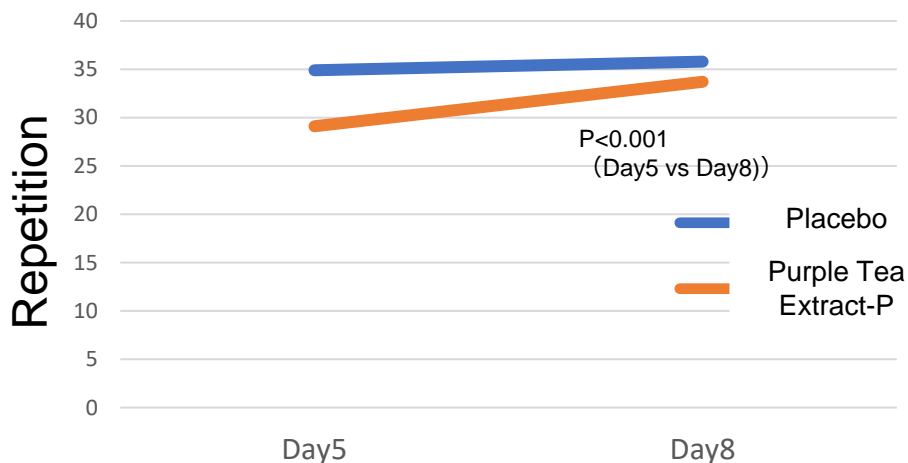


Physical Performance

Evaluate leg extension Day5 and Day8

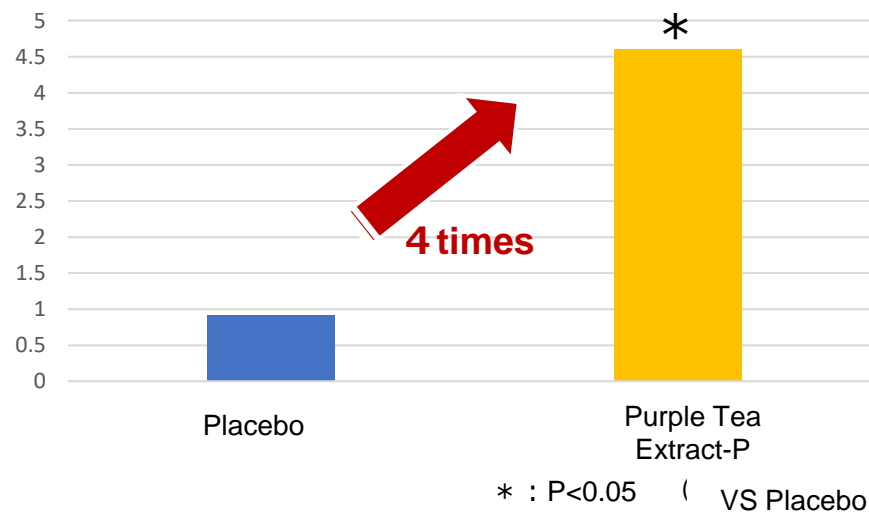
Reps of leg extension

Set1



Amount of change Leg extension

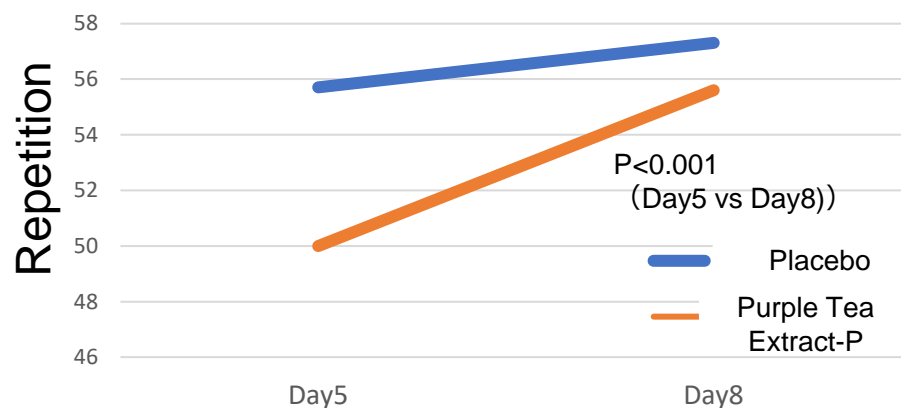
Set1



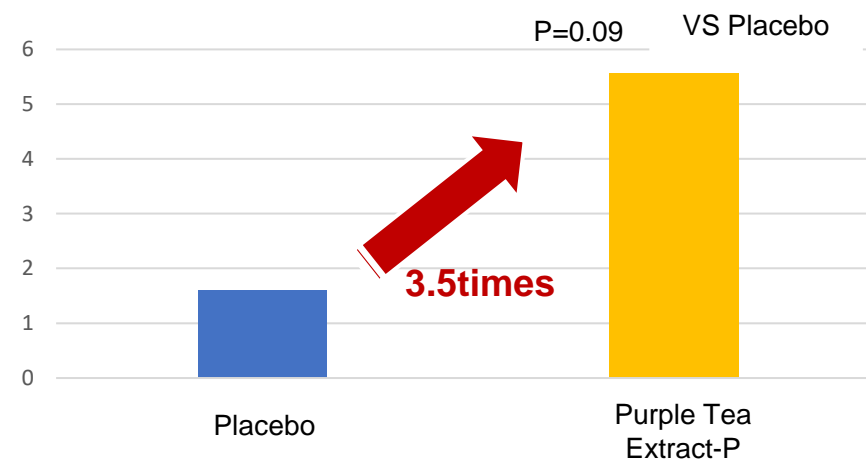
- ✓ Reps: Purple Tea extract increased (Day5 vs Day8)($P < 0.001$)
- ✓ Amount of Change: Purple Tea Extract increased more than 4 times .

Evaluate leg extension Day5 and Day8

Reps of leg extension Total



**Amount of change
Leg Extension Total**

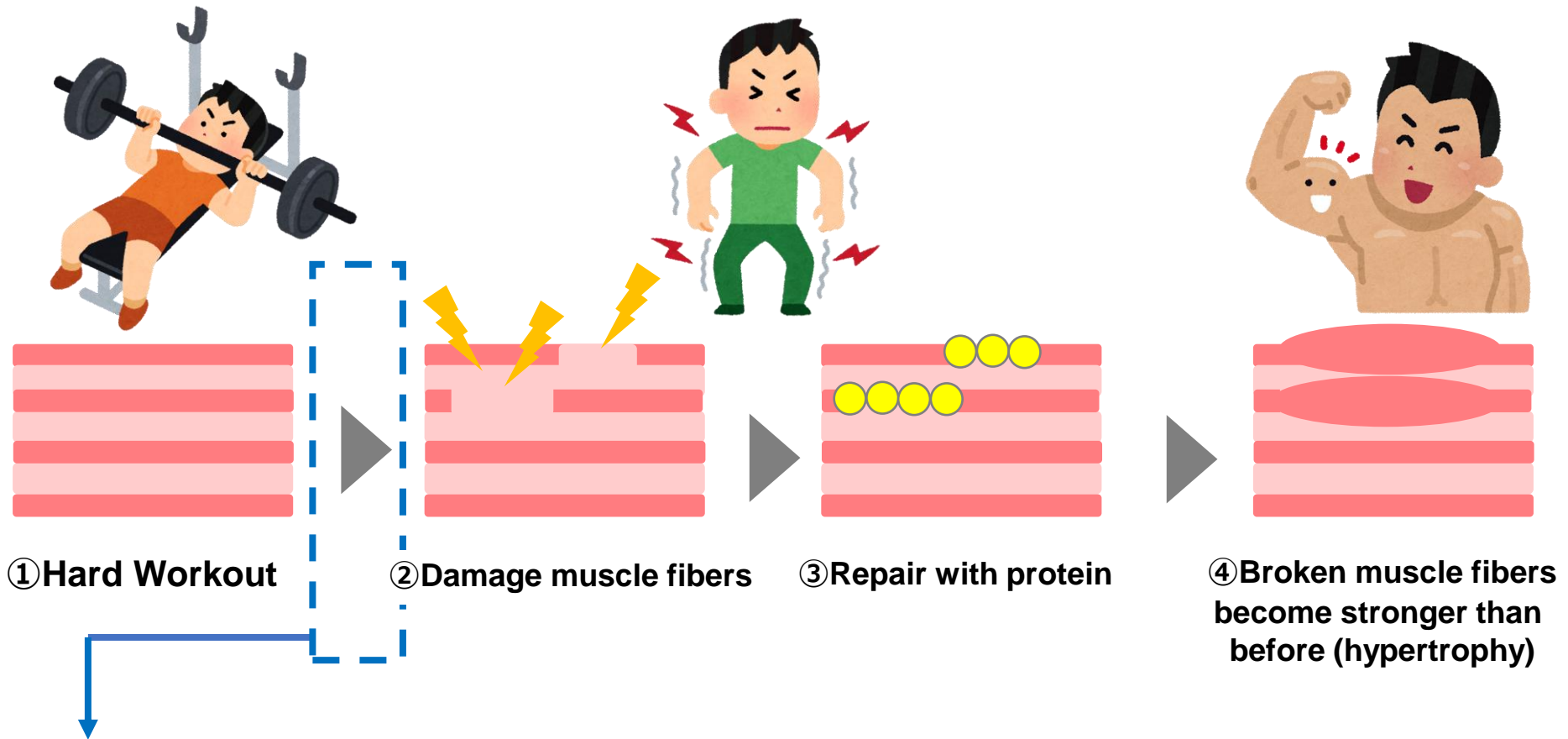


- ✓ **Total Reps: Purple Tea extract increased (Day5 vs Day8) ($P < 0.001$)**
- ✓ **Total Amount of change: Purple Tea Extract increased of total reps ($p = 0.09$)**

Intake of Purple Tea Extract may lead to improve anaerobic exercise!

2. PUMP-UP Effect

What does it mean to have “Hypertrophy”?



Extracellular fluid moves into muscle cells. Due to the increase in muscle cell fluid, the cells are swelled (=Pump-Up) which leads to increased damage of muscle fibers (=Muscle Hypertrophy).

➡ Confirm the Pump-Up effect by measuring the flow of body fluid by "Bioelectrical impedance method"

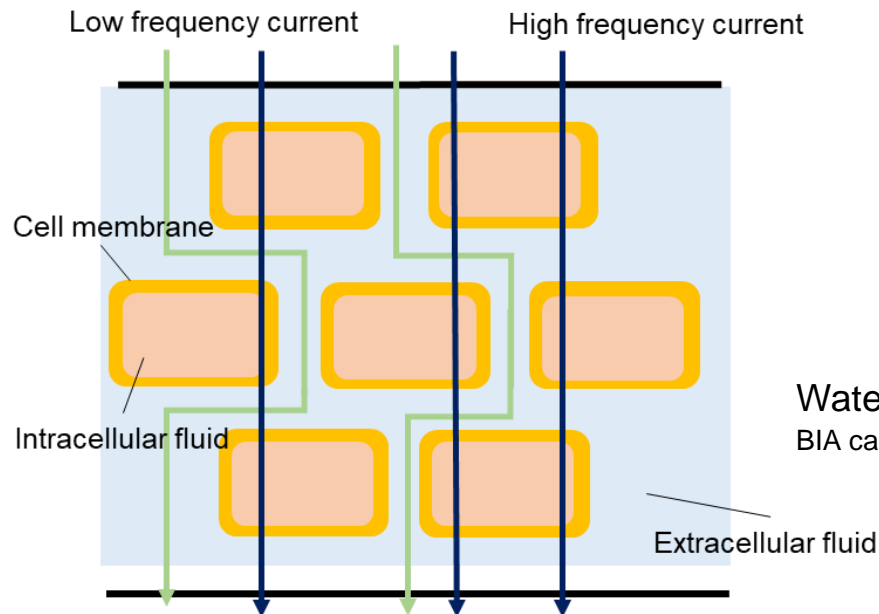
PurpleForce™ - Sports Performance Study

Bioelectrical impedance analysis

bioelectrical impedance method

Like body composition monitor
(it takes 3-10 minutes)

Total Body Water (TBW), Extracellular Fluid (ECF), Intracellular Fluid (ICF) are measured.
Fat Free Mass (=lean body mass) and Fat Mass are measured.



→ High frequency current : information of inside and outside the cell

→ Low frequency current: Extracellular information
Can't cross the cell membrane

Water content = Intracellular fluid + Extracellular fluid
BIA can measure body water content and intracellular , external fluid

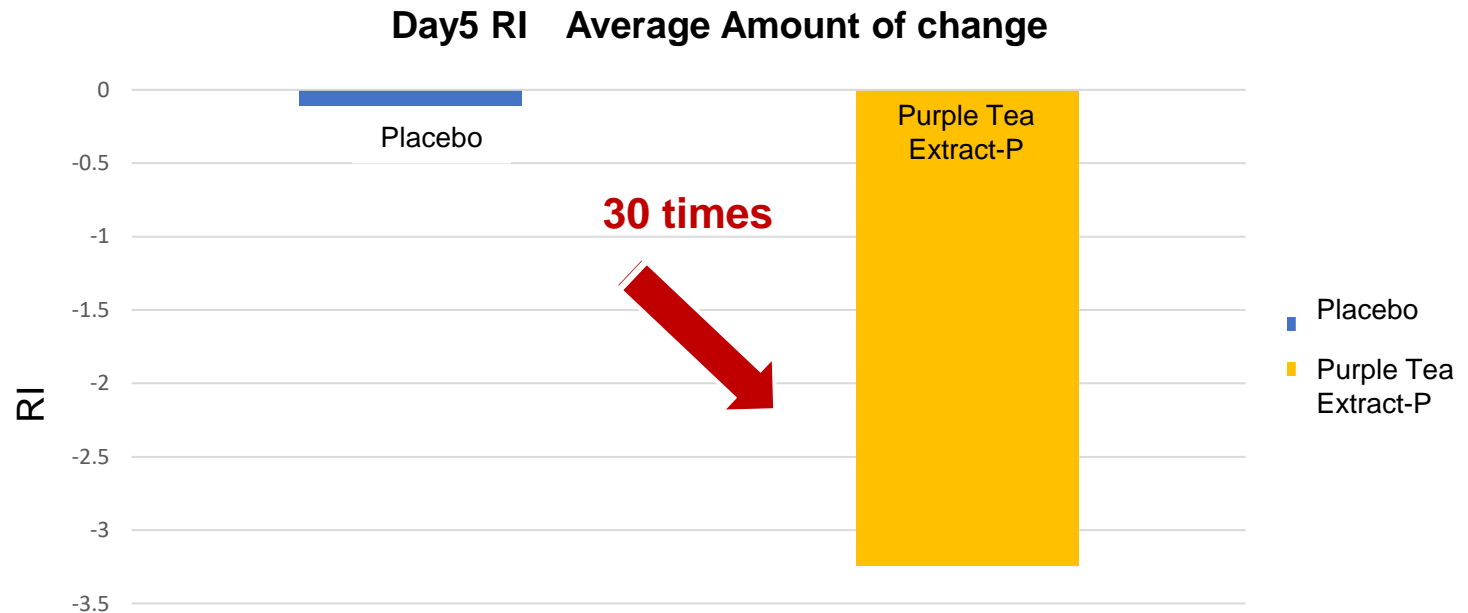
“Resistance of intracellular fluid decreased” = Extracellular fluid has moved into the cell

➡ PUMP-UP effect is expected.

Body Composition & Bioimpedance

Evaluation of the resistance of intracellular and extracellular fluids in the right leg
Day5 and Day8 by Bioimpedance

RI : resistance index



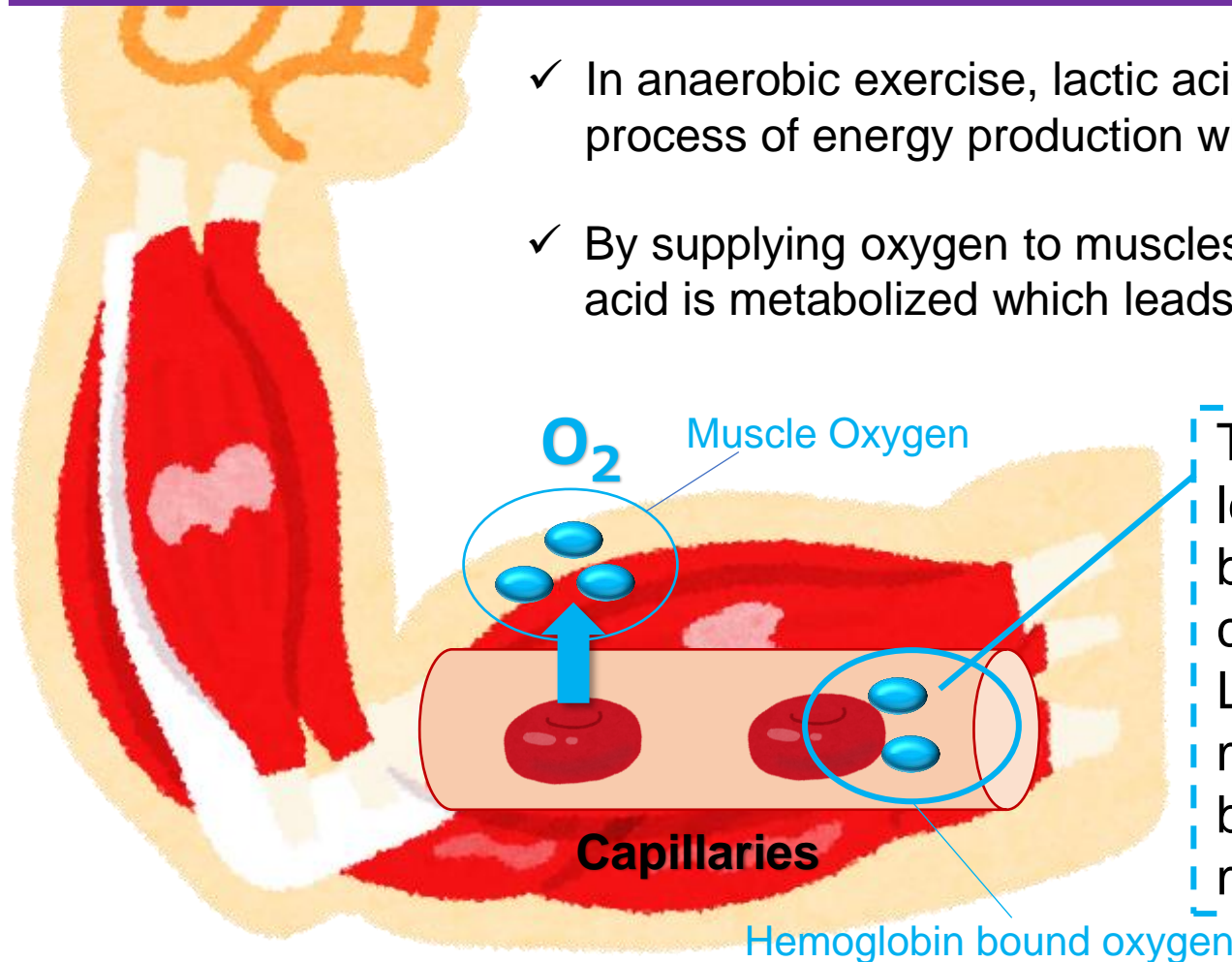
- ✓ Purple Tea Group obtained significant difference in RI of intracellular & extracellular fluids on Day 5.
- ✓ The decrease in intracellular fluid resistance means that a large amount of water was transferred to the intracellular fluid and it is expected to induce a pump.

3. Muscle Recovery Effect

Measurement of muscle oxygenation level

Infrared measurement of oxygen level (oxygen saturation) in muscle capillaries

- ✓ In anaerobic exercise, lactic acid is produced in the process of energy production which causes fatigue.
- ✓ By supplying oxygen to muscles after exercise, lactic acid is metabolized which leads to muscle recovery.

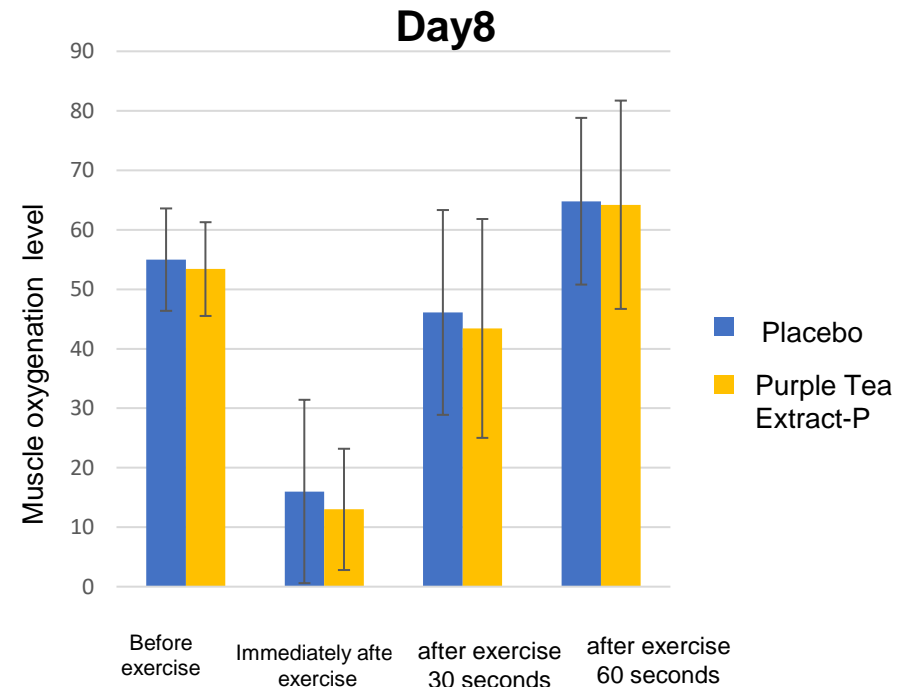
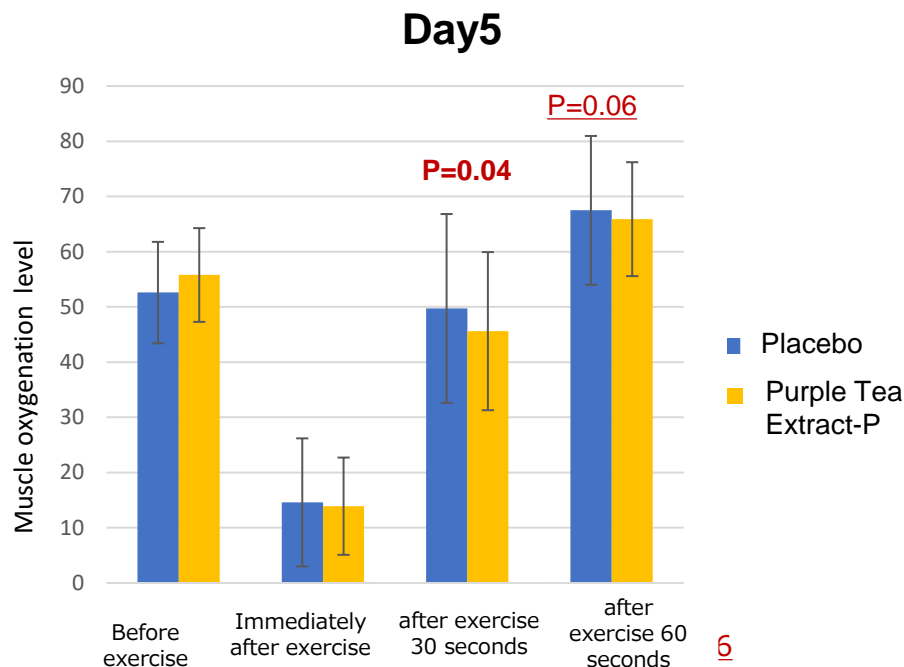


The test measures the level of hemoglobin-bound-oxygen in capillaries. Lowering oxygen level means that oxygen is being supplied to the muscle.

Muscle Oxygenation

Muscle oxygenation level (Leg extension)

Evaluation of muscle oxygen saturation after leg extension on Day 5 and Day 8
(Before exercise and immediately after exercise - after exercise 30 seconds & 60 seconds)



Purple Tea may enhance effective Oxygen extraction from blood to help improve matching between blood/oxygenation supply & demand. This represents a more efficient metabolic turnover and oxygen delivery to working muscle.

3.PurpleForce™ - Sports Performance Study

L-lactate dehydrogenase

L-lactate dehydrogenase (LDH)

- ✓ One of the enzymes that works when glucose is turned into energy
- ✓ L-lactate dehydrogenase is increased by exercise
- ✓ L-lactate dehydrogenase is an enzyme index for muscle damage

Intense exercise



Muscle damage



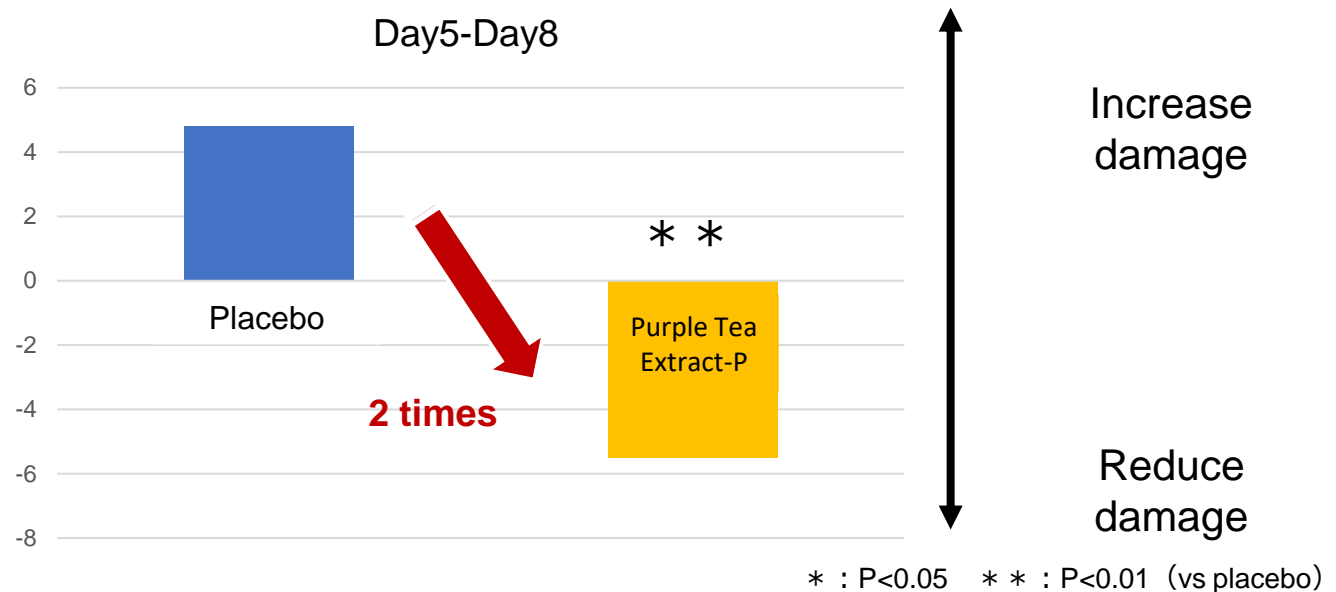
LDH Increased



Suppressing elevation of LDH suggests less "muscle cell leakage", decreased muscle damage and enhanced recovery with return of function.

Muscle Damage and Inflammation

Evaluated with an enzyme (Lactate Dehydrogenase) known as index of muscle damage



- ✓ Significant difference between groups $p=0.01$
- ✓ The enzyme decreased in the treatment group from Day 5~Day 8 whereas the enzyme increased in the control group.

4.Exercise Habit – Statistic Data

Exercise habits (30MIN/time for twice a week, continue more than 1 year)

	Male	Female
2000	28.6%	24.6%
2010 (Est)	39%	35%
2008	33.3%	27.5%

Reference 「健康日本21」 (2000)

General Gym Exit Rate

After 6 months 70%

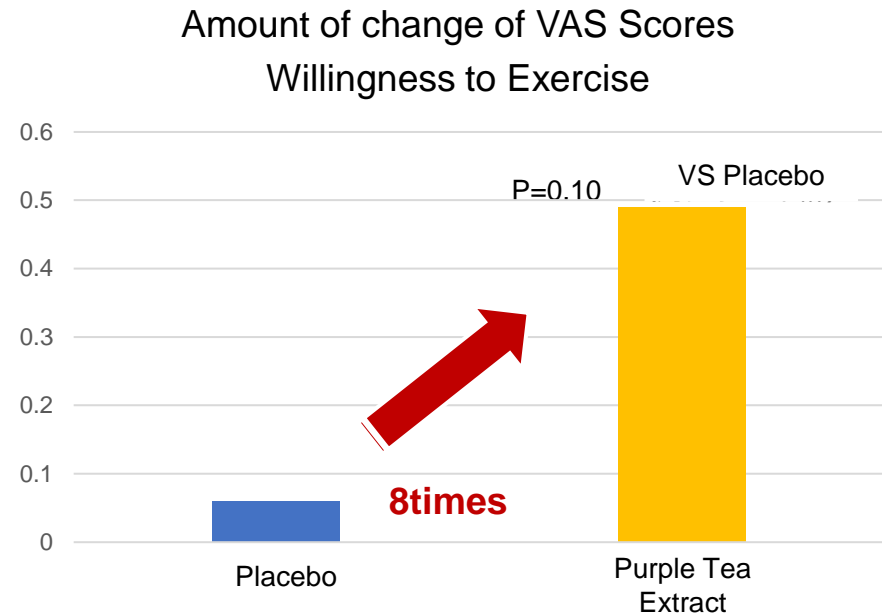
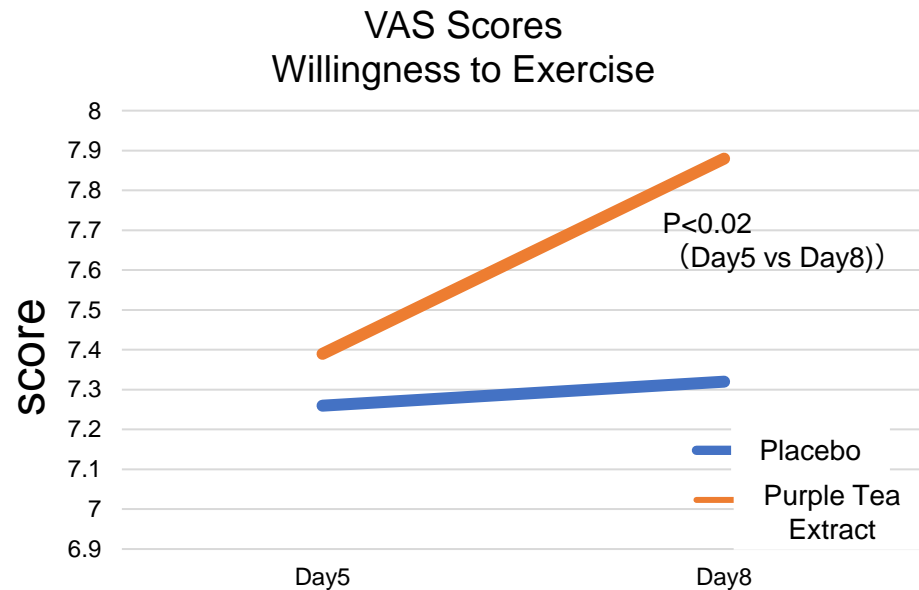
After 1 year 90%

Source: <https://www.sankei.com/economy/news/180723/prl1807230114-n1.html>

It's important to exercise constantly!

Willingness to Exercise

Evaluate VAS Scores Day5 and Day8



- ✓ Purple Tea Extract increased willingness score (Day5 vs Day8) ($P < 0.02$)
- ✓ Willingness score increased in the Purple Tea extract group ($p = 0.10$)

With acute muscle training with Purple Tea extract 100mg...



☐ Enhance Performance

- ✓ Increase reps of leg extension
- ✓ More overall bench press repetition

☐ Efficient PUMP-UP!

- ✓ Decrease in RI value of extracellular fluid

☐ Muscle damage suppression

- ✓ LDH suppression



☐ Exercise Motivation UP

- ✓ Willingness to More Exercise



Purple Tea Extract increased performance for lower limb exercise and effect on willingness to exercise

**Great fit for anaerobic exercise such as;
Weight training, Track & Field, Middle-distance running
"Improvement of Exercise Performance" and
"Fatigue Reduction" are expected!**



★ *This research was conducted under the supervision of Hector Lopez, a well-known American doctor in Sports Nutrition area. The data is being analyzed for journal publication. We plan to publish the study by Autumn 2020.*

The Sustainable Development Goals

PurpleForce™ is compatible with SDGs

Oryza Oil & Fat Chemical Co., Ltd donates part of sales of Purple Tea Extract to the international NGO plan which works to promote children's rights and create a society free from poverty and discrimination.

Purple Tea is...
Eco-friendly, No-pesticide, Gently hand-picked.
Purple Tea extract is a sustainable ingredient .



Part of the sales of Purple Tea Extract is used to support
the health and education of children and women in Africa .

You are one of those persons who give hope to the children and women in Africa!

Introduction Video



<https://www.youtube.com/watch?v= JbtA6zdnEw>



Supplemental Supporting Evidence

Effect on Weight-loss

① Inhibition of Lipid Absorption

(pancreatic lipase inhibition by GHG®)

② Inhibition of Fat Accumulation

(Visceral & Neutral Fat Reduction)



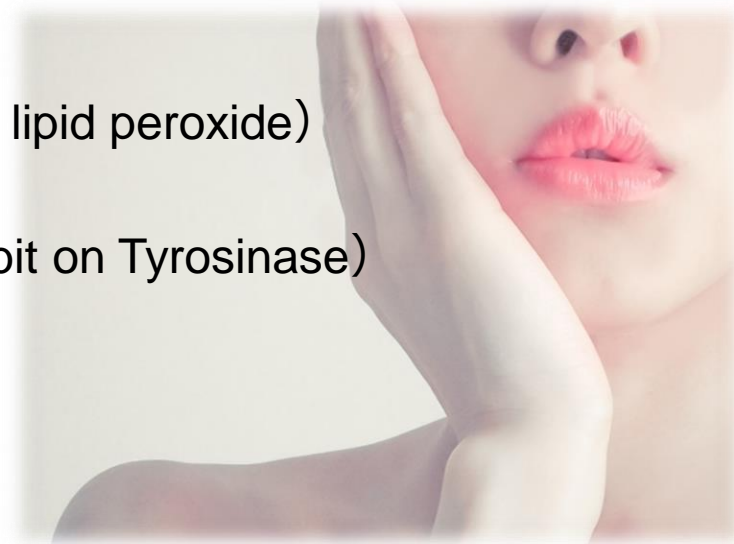
③ Improvement on Fat Metabolism

(increase palmitoyl transferase : Transporting fatty acids into mitochondria for burning)

Potential Natural Anti-obesity agent promotes healthy lifestyle and well-being

Effect on Beauty

- ① Effect on antioxidant
- ② Effect on antiaging (Suppress on lipid peroxide)
- ③ Effect on Skin-whitening (Inhibit on Tyrosinase)
- ④ Collagen Production
- ⑤ Effect on anti-Glycosylation
(AGEs production suppression, AGEs degradation promotion)

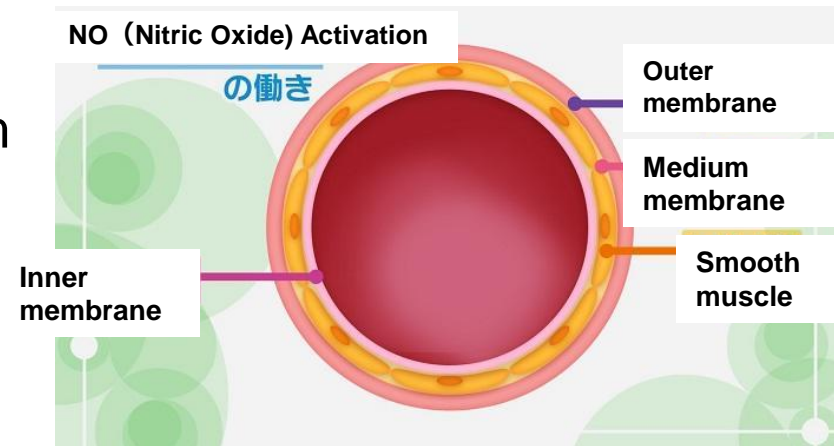


Confirmed the effect on locomotive function

NO (Nitric oxide)

- ❑ Vasodilator
- ❑ Platelet aggregation inhibitor

1. NO secreted from vascular endothelium acts on vascular smooth-muscle
2. Relaxes vascular smooth-muscle by promoting cGMP

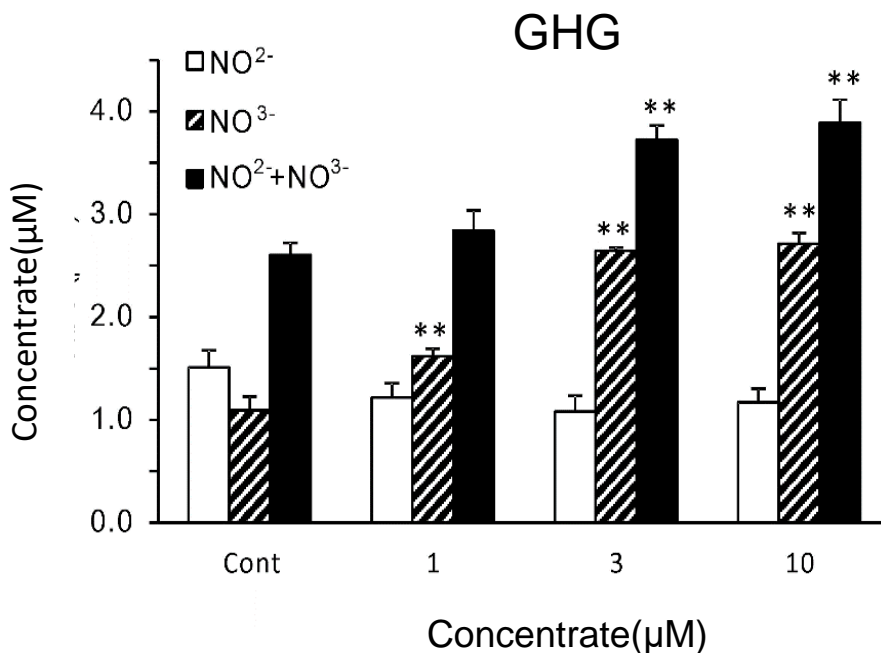
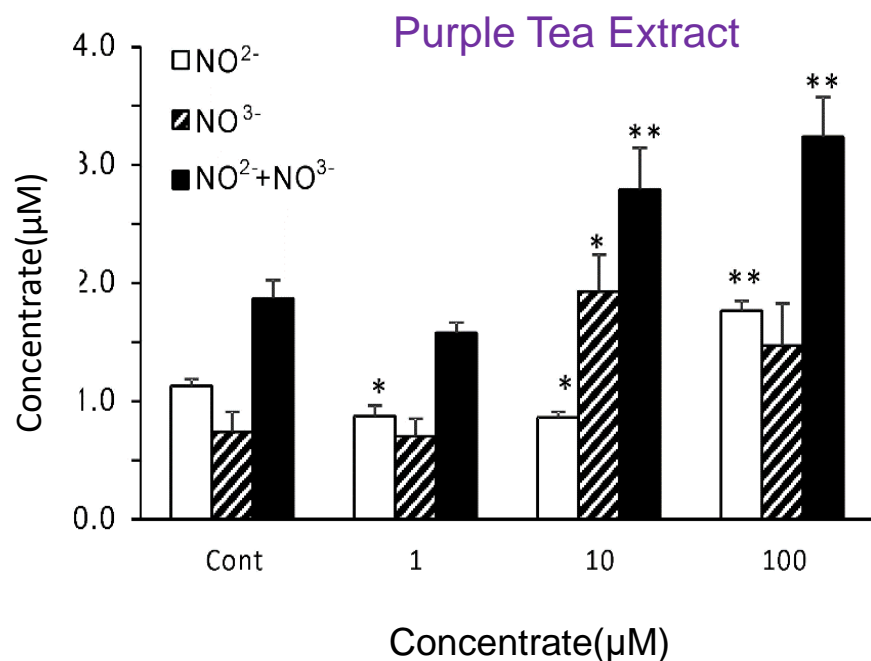


Vasodilatory effect contributes to restoring post-exercise muscle to pre-exercise condition

PurpleForce™ - Vasodilator action

Patent Pending

- ✓ Purple Tea Extract promotes production of NO^{2-} , NO^{3-} and NO .
- ✓ GHG® has the effect of promoting the production of NO^{3-} and NO .



*Added Purple Tea Extract to human umbilical vein endothelial cells (HUVEC). Measure the amount of NO production after for 24hours cultured

▶ Purple Tea Extract may have muscle recovery effect after exercise!

What is AMPK(5' adenosine monophosphate-activated protein kinase)

An enzyme involved in the homeostasis of the energy cell.

AMPK is an energy center

By activating AMPK...

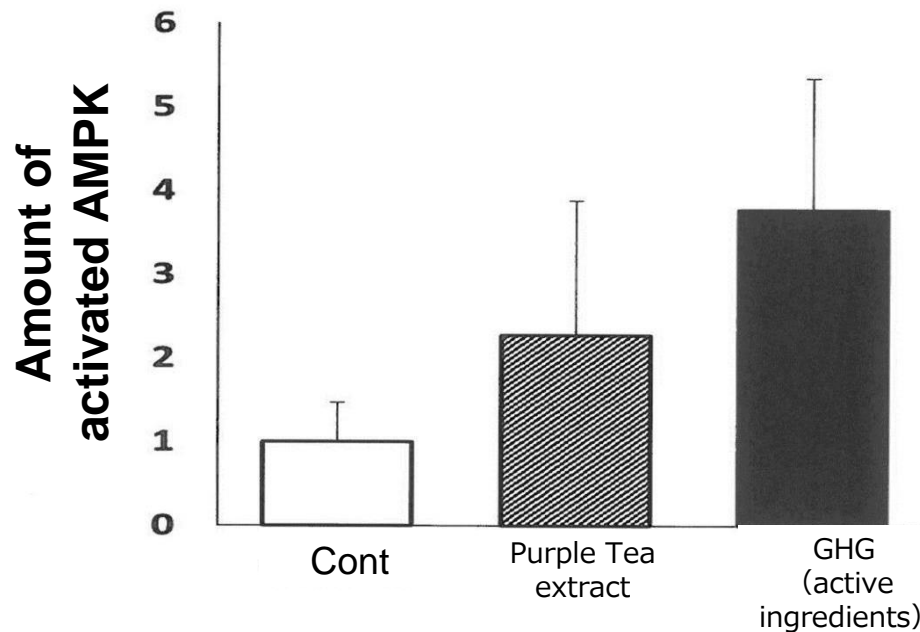
- Inhibits synthesis of fatty acids, cholesterol and triglycerides, also take in fatty acid and active β oxidation.
- Promotion of glucose uptake in skeletal muscle etc...

When energy level is low (during and after exercise),

- ✓ **AMPK activates and promoted energy metabolism.**
- ✓ **AMPK contributes to endurance, recovery from muscle fatigue and reduction fatigue.**

AMPK activation

- ✓ **Purple Tea Extract activated AMPK Production**
- ✓ **GHG® also activated AMPK Production**



After adding Purple Tea Extract and GHG®(active ingredients) to mouse myoblasts (C2C12) and culturing for 7days.

The chemiluminescence reaction was confirmed using a chemiluminescence detection kit and the phosphorylation amount of AMPK v

Purple Tea Extract may improve endurance and reduce fatigue!