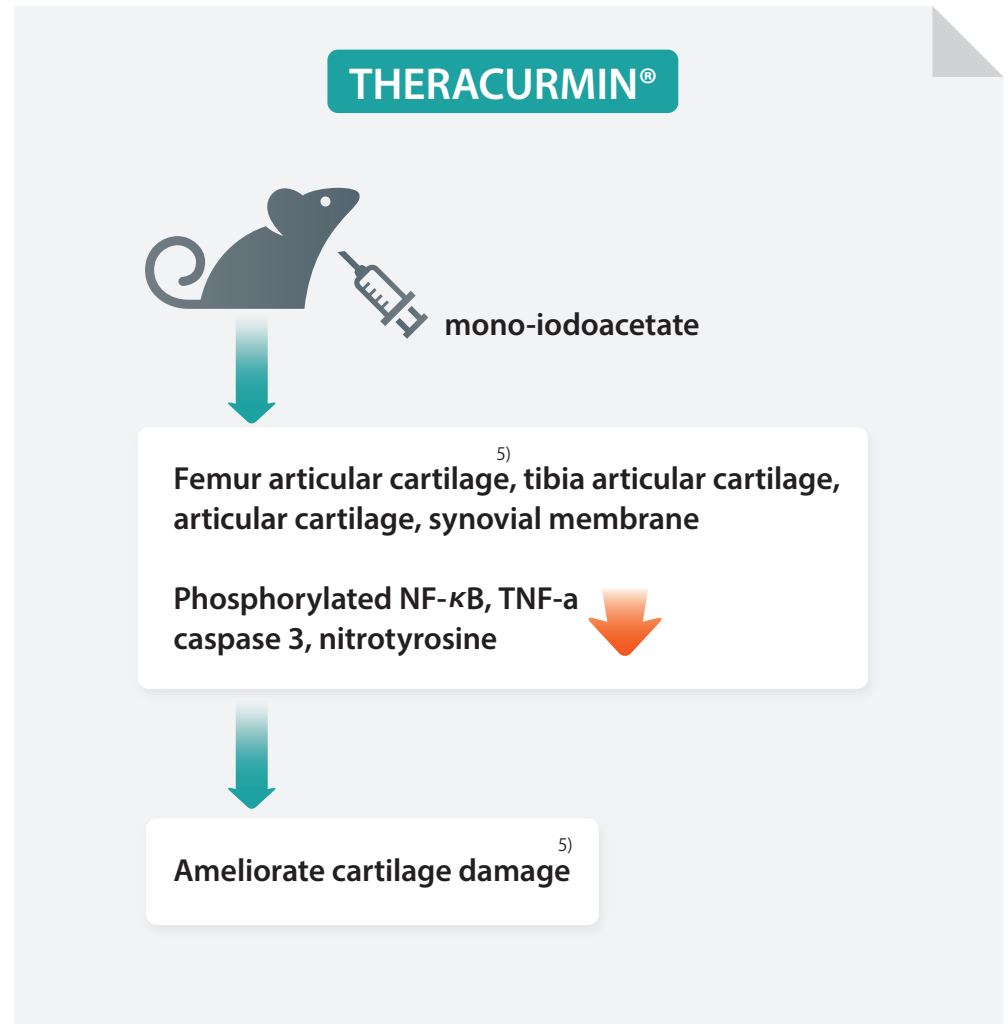
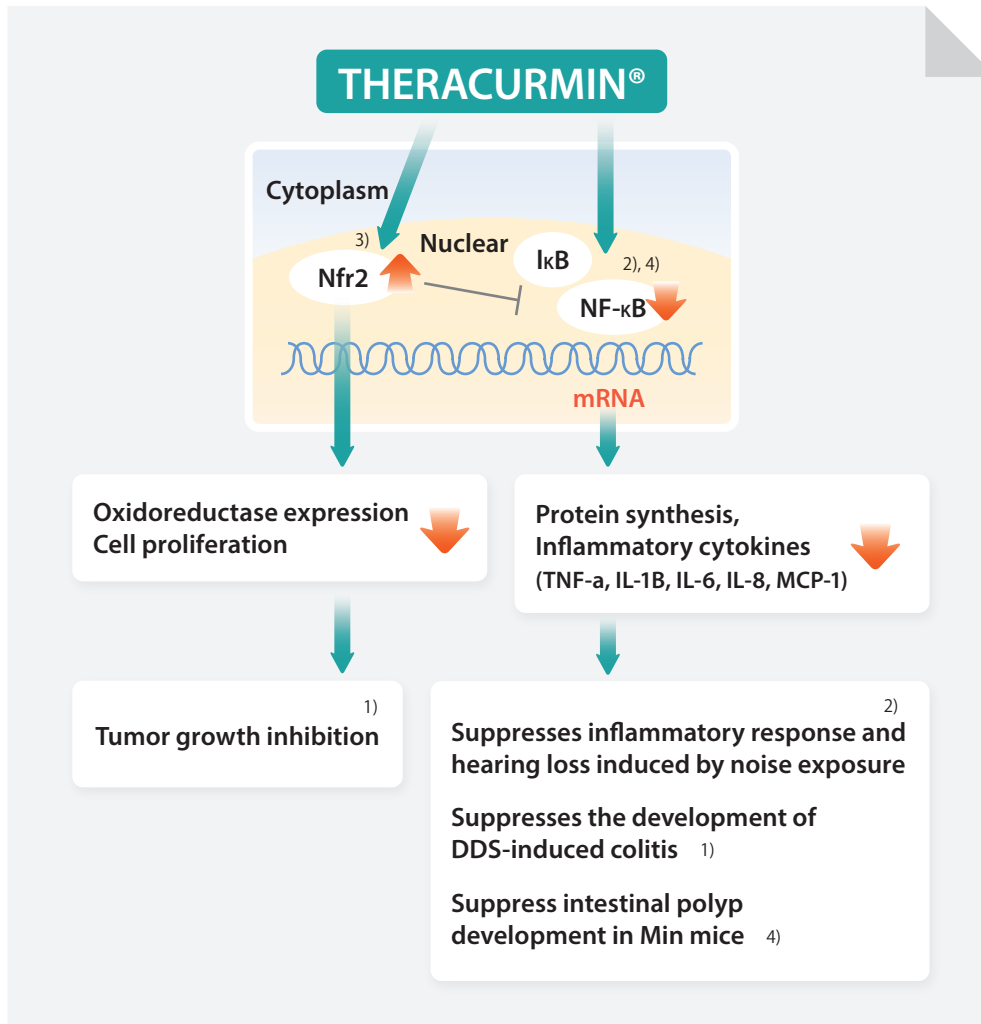


Anti-inflammatory effects

It is well known that chronic inflammation is caused by the continuous activation of NF- κ B* and curcumin is one of the natural ingredients to inhibit the activation of NF- κ B. By this anti-inflammatory efficacy through diminishing the activated NF- κ B, curcumin is thought to prevent lifestyle-related diseases and bring a healthy aging life to the people. Because of these potential benefits, it has been studied further by many research institutes all over the world even now.



- NF- κ B (nuclear factor-kappa B): plays a key role in regulating the immune response to infection
- Nrf2 (Nuclear factor erythroid 2-related factor 2): regulates the expression of antioxidant proteins
- TNF- α (Tumor Necrosis Factor- alpha): cytokine involved in systemic inflammation.
- IL-1 β (Interleukin 1 beta): cytokine protein
- IL-8: increased production of chemokines
- IL-6: one of inflammatory cytokine
- DDS (dextran sulfate sodium): induced colitis.
- MCP-1 (monocyte chemoattractant protein 1): increased production of chemokines

- 1) Yamaguchi T et al., J Pharmacol Sci. 2017 Aug; 134 (4): 225-233.
- 2) Ohno M et al., PLoS One. 2017 Oct 6; 12 (10): e0185999.
- 3) Mizumoto A et al., J Gastroenterol. 2019 Feb 8. doi: 10.1007/s00535-019-01549-x
- 4) Adachi S et al., Cancer Sci. 2020 Jan 28. doi: 10.1111/cas.14329.
- 5) Lee CK et al., Food Sci Biotechnol. Online 05 October 2019

Anti-oxidant effect

Pre-clinical

THERACURMIN®

Oxidative stress

(60% high fat diet or combined streptozotocin, exercise)^{1), 2), 3)}

SD rat, C57BL/6N mice



Reactive oxygen species-free radical



Target molecule damage
(lipid, protein, cell)

GSH²⁾ ↑

Tissue damage (Hepatic Steatosis²⁾ ↓
Muscle damage³⁾ ↓)

Clinical

THERACURMIN®

90mg once or twice

VO₂max 65% exercise 60min⁴⁾



BAP⁴⁾ ↑

Reactive oxygen species-free radical

Neutrophil reactive oxygen⁵⁾ ↓
d-ROMS ↓

GSH⁴⁾ ↑

- SOD (Superoxide dismutase): inhibit ROS.
- TAC (Total antioxidant capacity): Measure total antioxidant activity.
- BAP (Biological Antioxidant Potential): estimate antioxidant capacity.
- d-ROMS (Reactive Oxygen Metabolites-derived compounds): evaluate the level of reactive oxygen metabolites.
- TRX-1 (Thioredoxin): redox proteins

- NADPH oxidase : product ROS.
- GSH (Glutathione): protect cell from ROS.
- Neutrophil reactive oxygen : associate with NADPH oxidase.

- 1) Paik JK, et al. Korean J. Food Nutr. 2019; 32 (2): 133-137.
- 2) Yang JW, et al. Toxicol. Res. 2019; 35 (4): 403-410.
- 3) Kawanishi N, et al. B. B.R. C. 2013 Nov 22; 441 (3): 573-578.
- 4) Takahashi M, et al. Int J Sports Med. 2014 Jun; 35 (6): 469-475.
- 5) Suzuki K, et al. 臨床化学 2012 ;41 (4): 343-348.

THERACURMIN®
90mg once or twice

Study Protocol

Study design: Three arms, randomized double-blind placebo-controlled counterbalanced crossover trial

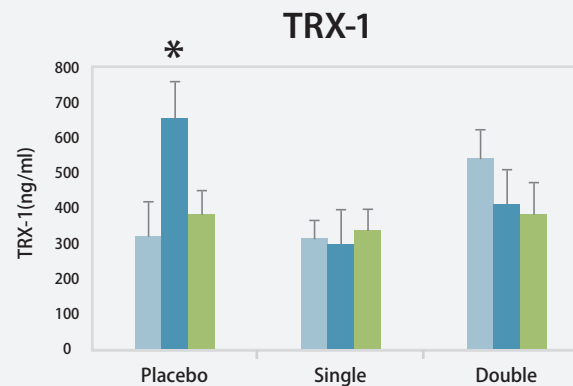
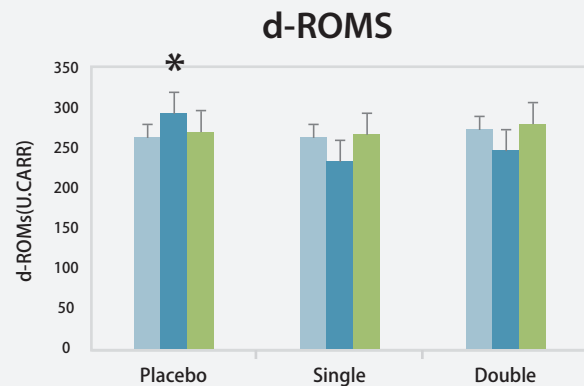
Subjects: 10 healthy men(age: 26.8 ± 2.0 years old)

Exercise: 65% VO₂max on a treadmill for 60min.

Intake: Single: THERACURMIN® 90mg, 2 h before exercise

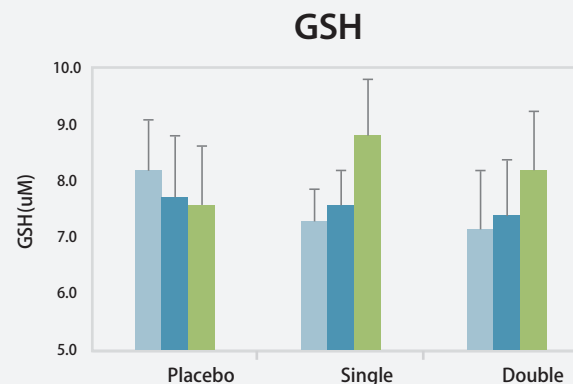
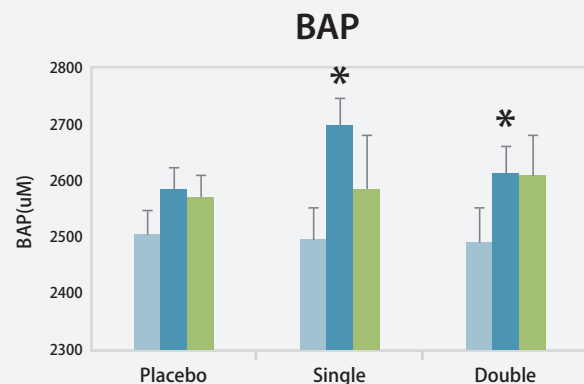
Double: THERACURMIN® 90mg, 2 h before exercise and immediately after exercise

THERACURMIN® ingestion attenuated the exercise-induced serum concentrations of d-ROMs and TRX-1, and concentrations of serum BAP and plasma GSH after exercise were increased by THERACURMIN® ingestion.



● Before exercise
● Right after exercise
● 2 hour later

*: $p < 0.05$ vs. before exercise



- d-ROMs : evaluate the level of reactive oxygen metabolites.
- TRX-1(Thioredoxin): redox proteins
- BAP(Biological Antioxidant Potential): estimate antioxidant capacity.
- GSH (Glutathione): protect cell from ROS.