

What is Pandoradiet™?

Pandoradiet™ is a proprietary extract powder of *Boesenbergia pandurata**, an edible plant with efficacies related to weight management and anti-skin aging. These effects have been proven in animal tests as well as human clinical studies, and its mechanism of action has been elucidated. Pandoradiet™ is 100% safe for consumption, and it is highly water-soluble, heat-stable, and acid-stable, enabling its versatile application in various formulations: drink, tablet, capsule, granule, etc.

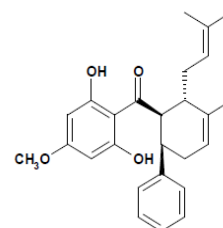
Boesenbergia pandurata is an edible plant and member of the Zingiberaceae family, and it is found either in the wild or cultivated in the South Asia region. Our R&D team has discovered that *Boesenbergia pandurata* extract shows simultaneous efficacies related to weight management and anti-skin aging via extensive screening of over 1,000 medicinal plants over a period of 10 years.



Boesenbergia Pandurata

Standardization of Pandoradiet™

Pandoradiet™ is standardized to Panduratin A, an active component.



Panduratin A

Safety of Pandoradiet™

- ✓ Acute Oral Toxicity: LD₅₀ was found to be >2,000 mg/kg b.w. in male and female rats.
- ✓ No mutagenicity or genotoxicity.
 - Chromosomal aberration test: Negative
 - Ames Bacterial Reverse Mutation Assay: No mutagenic potential was observed.
 - Micronucleus Test: Negative.
- ✓ Human Clinical Studies: No adverse effects reported.
- ✓ Well-established safety of *Boesenbergia pandurata*.
 - Root or rhizome of *Boesenbergia pandurata*: listed as food in CODEX (34th Session, Geneva, Switzerland, 4-9 JULY 2011, HS 3322).
 - *Boesenbergia pandurata*: listed as edible in USDA plant database (PI 260833, PI 262357).

Efficacies of Pandoradiet™

1. Weight management : reduction of body weight and body fat; works exercise mimetic.
2. Anti-skin aging: reduction of wrinkling and improvement of skin moisture and glossiness.
 - * Efficacies were shown to be statistically significant in five animal studies and two randomized, double-blind, placebo-controlled human clinical studies on total 203 participants.

Journal Publications on Pandoradiet™

Weight management

- *Boesenbergia pandurata* attenuates diet-induced obesity by activating AMP-activated protein kinase and regulating lipid metabolism (*Int. J. Mol. Sci.*, 2012, 13:994-1005).
- Therapeutic potential of panduratin A, LKB1-dependent AMP-activated protein kinase stimulator, with activation of PPAR α/δ for the treatment of obesity (*Diabetes, Obesity, and Metabolism*, 2011, 13:584-593).

Anti-skin-aging

- Matrix Metalloproteinase-1 inhibitory activity of *Kaempferia pandurata* Roxb. (*Journal of Medicinal Food*, 2009, 12, 601-607).
- Oral administration of fingerroot (*Boesenbergia pandurata*) extract reduces ultraviolet b-induced skin aging in hairless mice (*Food Science and Biotechnology*, 2012, 21(6);1753-1760).

Clinical Study: Weight Management

Test material: Pandoradiet™ 600 mg.

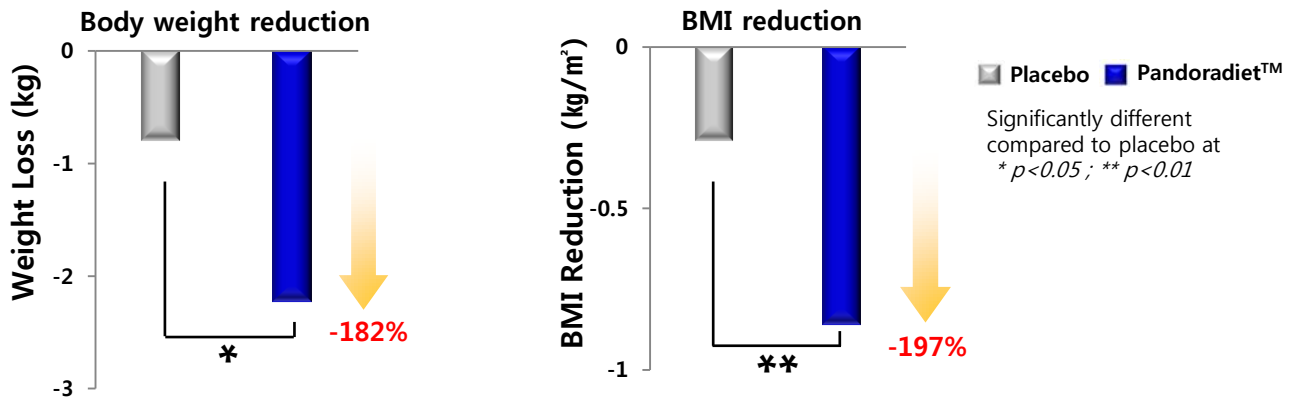
Design: randomized, double-blind, placebo-controlled; 12 weeks.

Subjects: n=150 (39 men, 111 women): Weight (kg) 71.9; BMI (kg/m²) 27.4.

Analysis: ITT (intention to treat analysis)/ANCOVA.

Body weight & BMI reduction

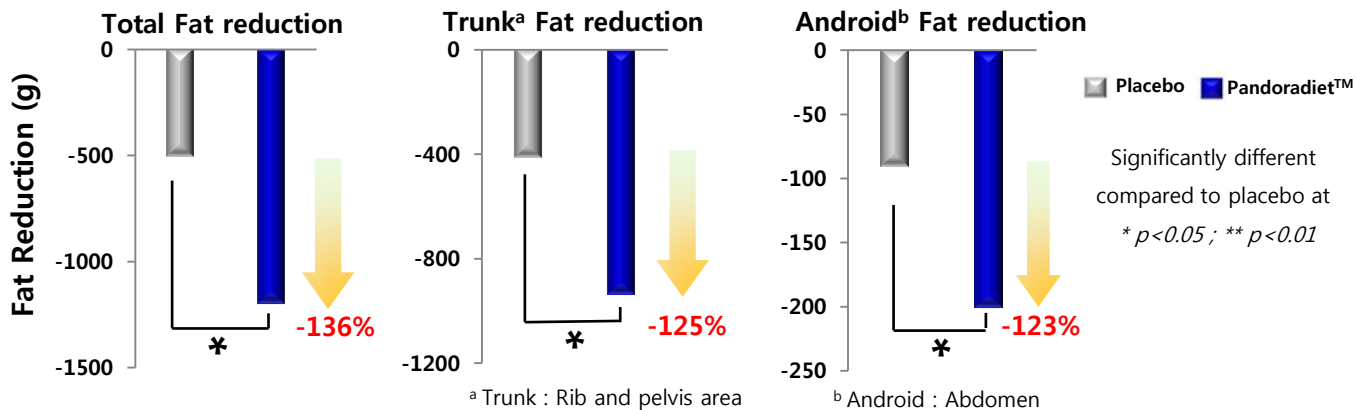
Weight 182% and BMI 197% were reduced in Pandoradiet™ group in comparison with the control group after 12 weeks.



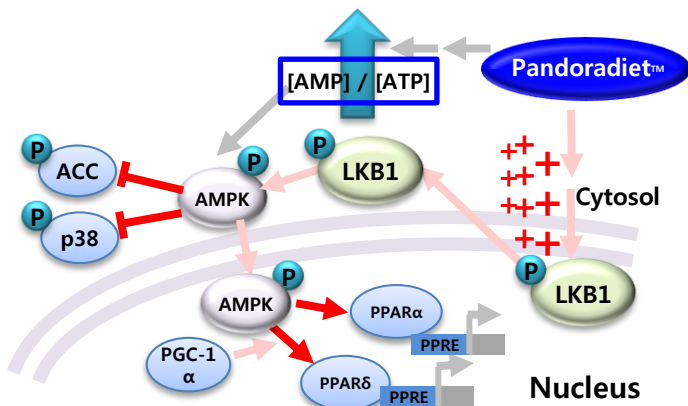
Reduction of total fat and body fat in body parts as measured by DEXA⁺ scanning

Total fat, trunk fat, and android fat contents were reduced by 136%, 125%, and 123%, respectively, in the Pandoradiet™ group in comparison to fat contents of the control group.

⁺DEXA: Dual-energy X-ray absorptiometry



Mechanism of action of Pandoradiet™ on weight management



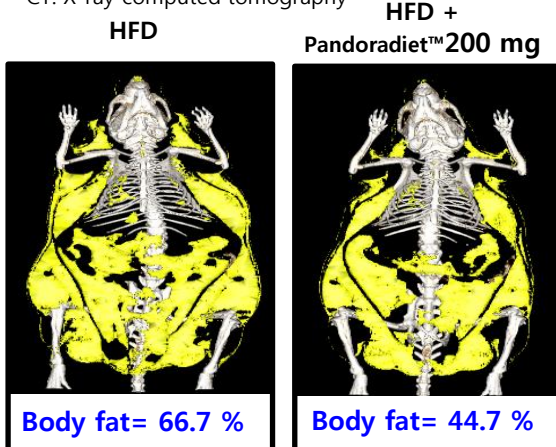
Pandoradiet™ activates LKB1-mediated AMPK (AMP-activated protein kinase) and PPAR (peroxisome proliferator-activated receptors) α/δ signalling pathway for its weight management effect. Activation of AMPK results in ACC inactivation, which then reduces the malonyl-CoA concentration, and inhibits lipid utilization. Reduction of malonyl-CoA concentration leads to activation of carnitine palmitoyltransferase (CPT)-1 to promote β -oxidation of fatty acids. Increased expression of PPAR α and PGC-1 α also promotes β -oxidation of fatty acids.

Animal Study of Weight Management

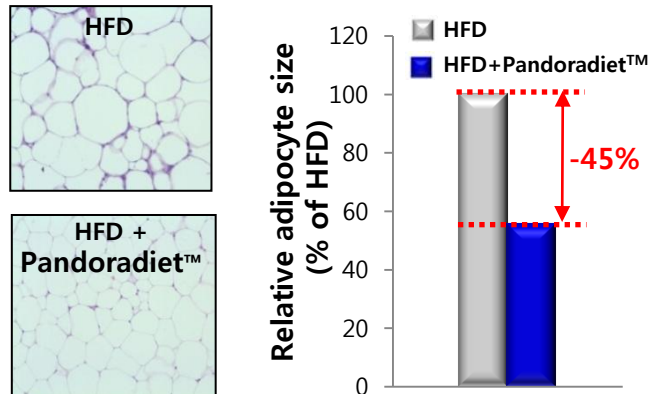
In an obese mouse model induced by high fat diet (HFD), when Pandoradiet™ was administered, body fat % decreased considerably by up to 32.9% while adipocyte size decreased by 45% compared to HFD only-fed mice.

Comparison: whole body fat by CT * scan

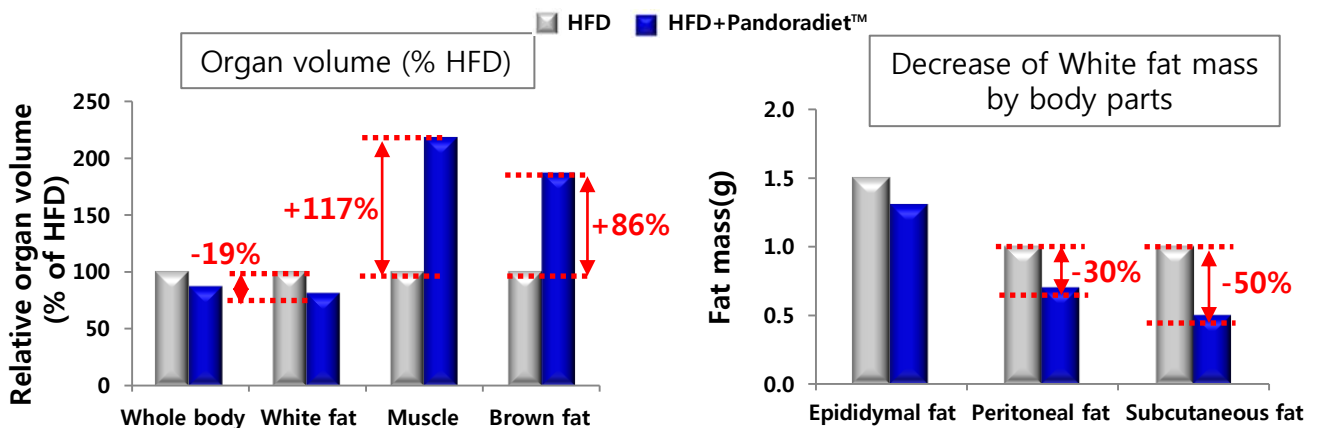
* CT: X-ray computed tomography



Change in Adipocyte Size



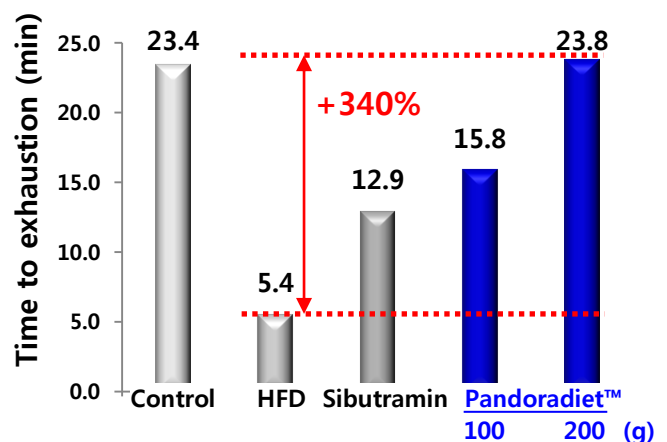
Especially, white fat, known as bad fat, decreased by 19% while brown fat, known as good fat, increased by as much as 86% by Pandoradiet™ feeding.



Exercise Mimetic Effect of Pandoradiet™ :

In the mouse treadmill test, Pandoradiet™ feeding increased running endurance of HFD mice as indicated by a dose-dependent increase in time to exhaustion of 340%, implying its exercise mimetic effect.

Time to exhaustion (Treadmill test)



Clinical Study of Anti-Skin aging

Test material: Pandoradiet™ 600 mg.

Design: randomized, double-blind, placebo-controlled; 12 weeks.

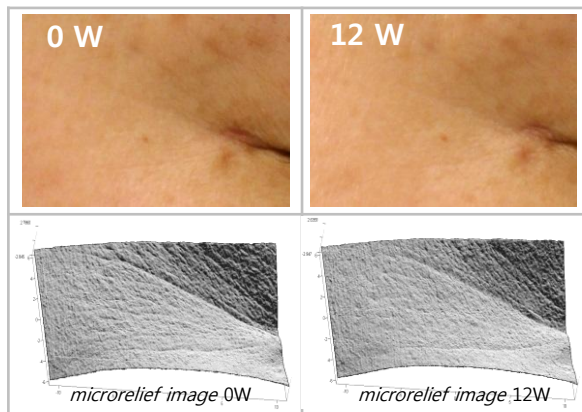
Subjects: n=92 (92 women): less than 48 A.U. in moisture; higher than 4th grade eye wrinkle score.

Statistical analysis: PP(per-protocol analysis), ANCOVA.

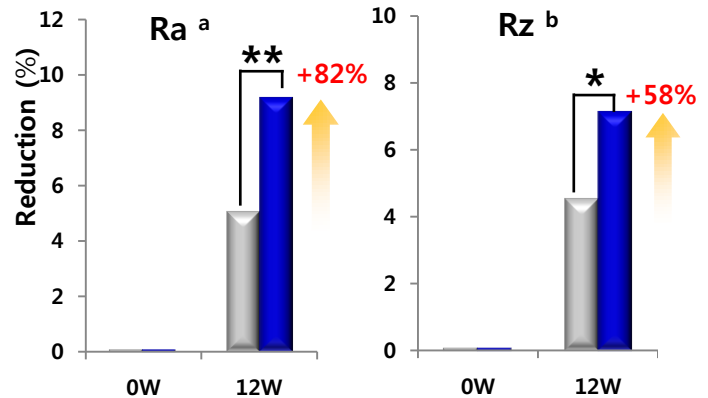
Skin wrinkle improvement

Pandoradiet™ helps improve skin wrinkling. Visual assessment showed the skin-improving effect of Pandoradiet™ compared to baseline. Skin wrinkle parameters also showed improvement with statistical significance: Ra and Rz improved by 82% and 58%, respectively, compared to the control group.

Visual and microrelief images



Skin wrinkle parameters measured



^a Ra : Arithmetic average value of profile peaks within the total measuring length

^b Rz : Average maximum height of the profile

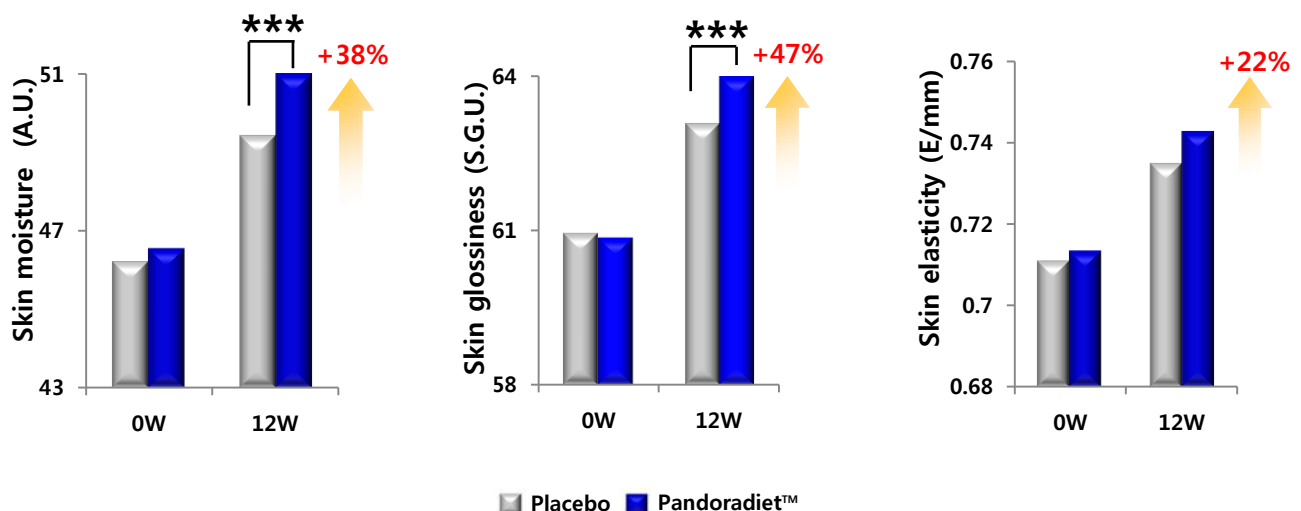
■ Placebo ■ Pandoradiet™

Significantly different compared to placebo at * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Pandoradiet™ exhibited wrinkle-improving effect at every time point.

Improvement in skin moisture, skin glossiness, and skin elasticity

Pandoradiet™ group showed statistically significant improvement in skin parameters. Skin moisture and skin glossiness increased by 38% and 47%, respectively, compared to the control group. Skin elasticity was also improved by 22%.

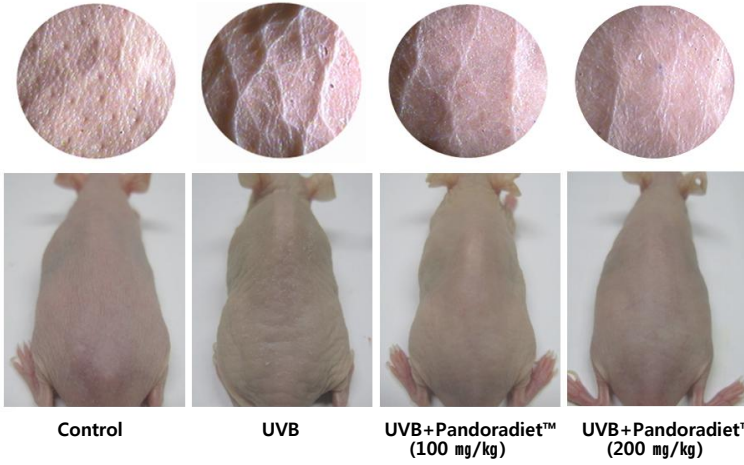


■ Placebo ■ Pandoradiet™

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Animal Study of Anti-skin aging

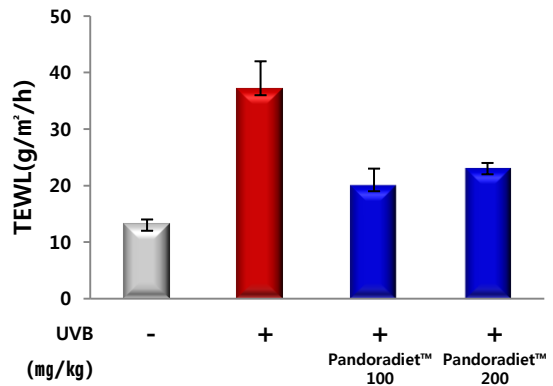
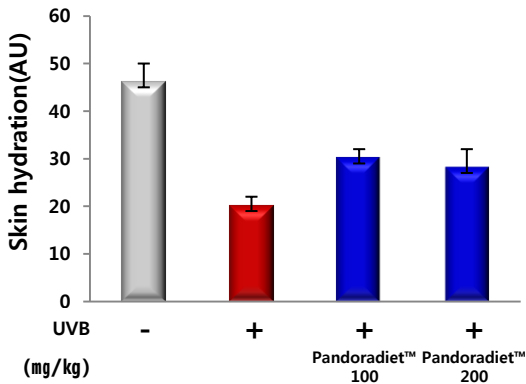
Effects of Pandoradiet™ on UVB-induced wrinkle formation in the dorsal skin of hairless mice



Pandoradiet™ intake significantly improved skin wrinkling caused by UVB exposure as determined by visual assessment. Instrumental measurement found that Pandoradiet™ intake effectively prevented water loss from skin and improved skin hydration.

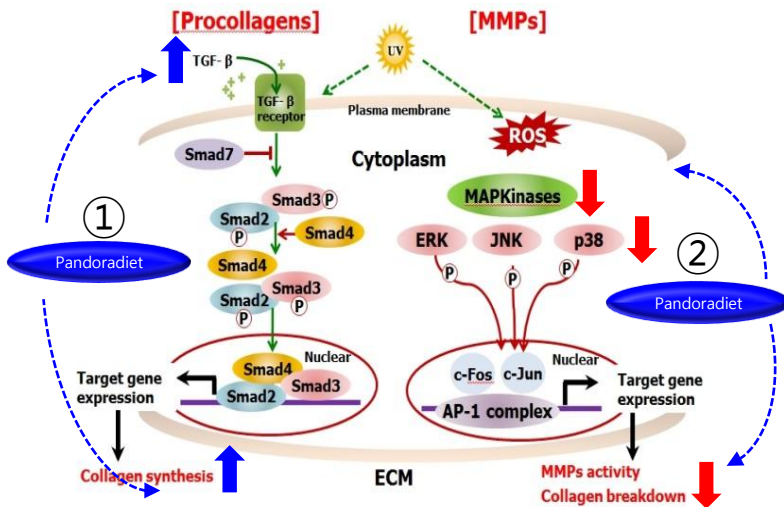
Improvement of skin hydration

Reduction of skin water loss



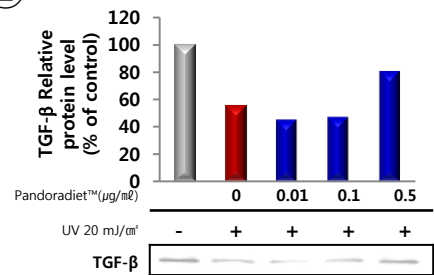
Mechanism of Action of Anti-skin aging

Pandoradiet™ activates TGF-β impaired by UV exposure, resulting in increased collagen synthesis. At the same time, Pandoradiet™ inactivates MAPKinases activated by UV or reactive oxidation substances, resulting in reduction of MMPs, a group of collagen-breaking enzymes, leading to inhibition of collagen breakdown. As a result of these effects of Pandoradiet™, collagen synthesis increases in the skin.

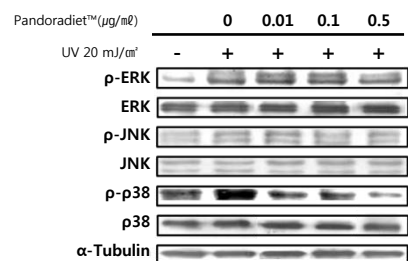


Cytokine Growth Factor Rev, 2000; 11:23-35

① Pandoradiet™ increases TGF-β activity



② Pandoradiet™ inactivates MAPKinases as confirmed by decreased expression of ERK, JNK and p38.



Pandoradiet™ is highly water soluble and can be used in the form of a tablet, capsule, granule, etc. We presently hold US patents for the exclusive use of *Boesenbergia Pandurata* (Slim: US 13/123,519, Skin: US 12/738,591, Exercise Mimetics: US 13/682,216, China, EU, Japan) as a functional food.

Product	Pandoradiet™
Ingredient	<i>Boesenbergia Pandurata</i> Extract 50%, Sodium caseinate, Dextrin

Specification

Determination	Specification
Appearance	Yellow brown powder
Foreign material	Not detected
Moisture(%)	≤10
Panduratin A(mg/g)	32-49
Total Plate Count	<3,000
Yeast & Mold	<100
E. coli	Negative
Salmonella	Absence
Staphylococcus aureus	Absence
Lead(mg/kg)	<2
Arsenic(mg/kg)	<2
Cadmium(mg/kg)	<1
Mercury(mg/kg)	<1

Storage	Store at room temperature and avoid hot and humid place
Shelf life	36 months (Sealed)
Package size	5 kg
Packaging material	Inner packaging: Polyethylene(PE)

This information has not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure or prevent any disease.