



What is salmon ovary peptide ?

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It is a peptide generated by enzyme-decomposing the outer coat of waste ovary from Salmon to produce salmon roes.

This peptide is expected to provide antiaging effects and will be applied to cosmetics, Health foods and other types of foods.

The salmon used is a chum salmon, i.e. non-cultured salmon that mainly goes back to Shibetsu Town.





Manufacturing process for salmon ovary peptide (1)

The outer coat of salmon ovary generated during salmon roe production was treated as waste, but it will be reused as a raw Material(resource) for salmon ovary peptide.



Production of salted salmon roe



Unloading of salmon



Salmon ovary extracted



Outer coat of salmon ovary



Manufacturing process for salmon ovary peptide (2)

The outer coat of frozen salmon ovary collected is Defrosted, washed and dehydrated. Afterward, and it is enzyme-decomposed for condensation. After These processes, it is shipped as an SOP freeze-dried product, healthy food or raw material for cosmetics.



Outer coat of frozen ovary



Outer coat of washed ovary



Enzyme-decomposition of outer coat of salmon ovary



Salmon ovary peptide

Patent number 3691497 (Fuji Bio)



Physical properties of salmon ovary peptide

Origin and production: This product is a freeze-dried product obtained by enzyme-decomposing the outer coat of salmon (Salmonidae) ovary.

Property: Powder in citrine or yellow-brown color, with a distinctive odor

Molecular weight distribution:

850 to 1800

Average molecular weight:
1026





Analysis data for salmon ovary peptide (in 100g product)

	Item to be analyzed	Result
Food data	Moisture	5.2g
	Total nitrogen	14.9g
	Fat	0.1g
	Ash content	5.5g
	Sodium	1.7g
	Dietary fiber	0.5g
Residual pesticides	BHC	N.D
	DDT	N.D
	Aldrin and dieldrin	N.D
	Endrin	N.D
Heavy metals	Arsenic (As ₂ O ₃)	N.D
	Lead	0.09ppm
	Cadmium	ND
	Total mercury	ND
	Tin	ND
	Total Chromium	ND
	Cyanogen	ND
Hormones	Progesterone	ND
	Estradiol	ND
Metals	Iron	3.37mg
	Calcium	497mg
	Magnesium	39.4mg
	Copper	127mg
	Zinc	0.09mg
	Manganese	0.51mg
	Selenium	172 μg
Vitamins	Riboflavin(B ₂)	0.61mg
	Vitamin B ₆	0.31mg
	Vitamin B ₁₂	2.4mg
	Biotin	26.4 μg
	Weight equivalent to niacin	11.2mg
	Niacin	0.16mg
Other Amino acid	Trytophan	660mg



Comparison of Amino acid contents between salmon ovary peptide and animal placenta extract

Amino acids	Salmon ovary peptide	Pig placenta extract	Human placenta extract	Salmon collagen
Asparagine acid	5.90	5.29	4.91	5.03
Threonine	3.87	3.73	3.39	1.99
Serine	4.79	5.20	4.09	5.18
Glutamine acid	9.12	9.93	5.84	6.45
Proline	6.93	3.22	4.58	10.18
Glycine	21.40	8.16	9.34	35.75
Alanine	10.50	9.47	5.18	10.81
Cystine	0.36	0.76	0.55	0.18
Valine	3.30	4.50	3.00	1.30
Methionine	1.62	1.47	1.16	1.60
Isoleucine	2.42	1.45	None	0.84
Leucine	4.71	2.76	4.23	1.80
Tylosine	1.14	0.58	1.19	0.70
Phenylalanine	1.97	None	1.52	1.30
Histidine	1.09	1.38	1.3	0.91
Lysine	4.13	5.49	3.61	2.56
Arginine	3.73	2.66	2.88	4.80
Hydroxyproline	3.01	None	None	5.57

(in mol%)



Safety of Salmon ovary peptide

LD₅₀ is 2,500mg/kg or more

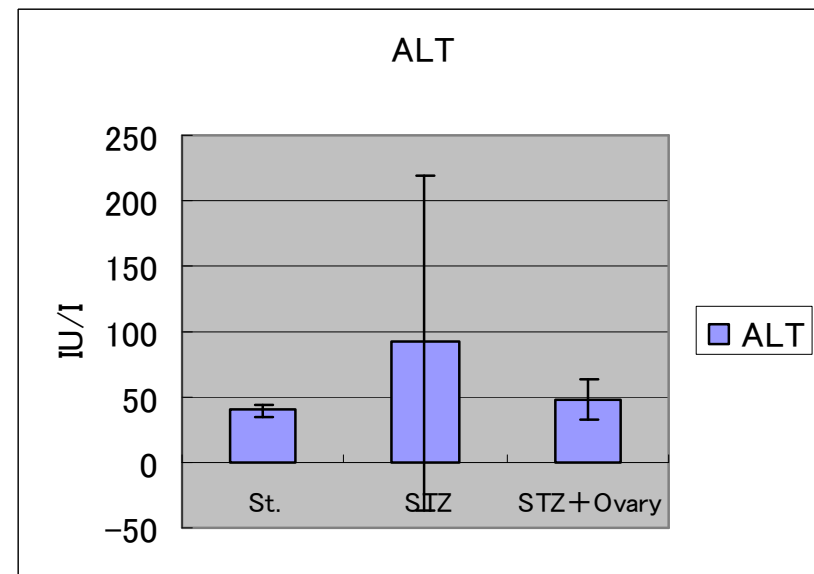
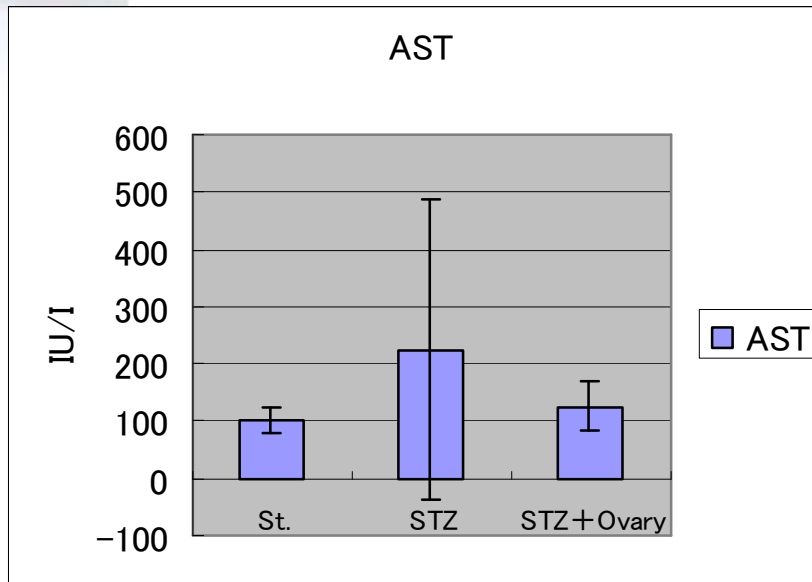
No abnormality is found in view performance status, Weight and autopsy.

In a biochemical examination of blood using the blood Collected in an autopsy as well, no abnormality is Found.

No residual pesticides or heavy metals are contained.



Effect of protecting the liver using salmon ovary peptide



Wistar SPF rat (8 weeks of age) n=8
STZ (35mg/kg) Ovary (0.75g/day) 3weeks
Orally administered.

Rheology Functional
Supplement Institute Co., Ltd



Assessment of the effect of protecting hepatocytes in cultured hepatocytes of human origin (HepG2) using salmon ovary peptide on a genetic level

Genes with increased expression

NM_014793	Hs.200596	Leucine carboxyl methyltransferase 2
NM_006121	Hs.80828	Keratin 1 (epidermolytic hyperkeratosis)
BE778706	Hs.530381	Pim-3 oncogene
NM_000201	Hs.643447	Intercellular adhesion molecule 1 (CD54), human rhinovirus receptor
NM_001227	Hs.9216	Caspase 7, apoptosis-related cysteine peptidase
NM_015675	Hs.110571	Growth arrest and DNA-damage-inducible, beta
NM_005627	Hs.510078	Serum/glucocorticoid regulated kinase
NM_004045	Hs.125213	ATX1 antioxidant protein 1 homolog (yeast)
NM_000581	Hs.76686	Glutathione peroxidase 1
AI078167	Hs.81328	Nuclear factor of kappa light polypeptide gene enhancer in B-cells inhibitor, alpha
NM_004583	Hs.127764	RAB5C, member RAS oncogene family
NM_002162	Hs.75516	Intercellular adhesion molecule 3
NM_005410	Hs.643494	Selenoprotein P, plasma, 1
AW194730	Hs.268887	Serine/threonine kinase 17a (apoptosis-inducing)

Genes with decreased expression

NM_134268	Hs.95120	Cytoglobin
BF438173	Hs.9914	Follistatin
AA164751	Hs.244139	Fas (TNF receptor superfamily, member 6)
M55643	Hs.431926	Nuclear factor of kappa light polypeptide gene enhancer in B-cells 1 (p105)
BC021222	Hs.643509	Cyclin M2
U25804	Hs.138378	Caspase 4, apoptosis-related cysteine peptidase
BE878463	Hs.488293	Epidermal growth factor receptor (erythroblastic leukemia viral (v-erb-b) oncogene homolog, avian)
NM_004417	Hs.171695	Dual specificity phosphatase 1
NM_001186	Hs.154276	BTB and CNC homology 1, basic leucine zipper transcription factor 1
NM_002133	Hs.517581	Heme oxygenase (decycling) 1
BF676980	Hs.271264	Glutamate-cysteine ligase, catalytic subunit
AW341649	Hs.492261	Tumor protein p53 inducible nuclear protein 1
NM_004364	Hs.643434	CCAAT/enhancer binding protein (C/EBP), alpha
NM_012289	Hs.465870	Kelch-like ECH-associated protein 1
BU683415	Hs.4055	Kruppel-like factor 6
AF102988	Hs.170479	Phospholipase A2, group VI (cytosolic, calcium-independent)
NM_004834	Hs.431550	Mitogen-activated protein kinase kinase kinase 4
NM_000389	Hs.370771	Cyclin-dependent kinase inhibitor 1A (p21, Cip1)



Result

We assessed the effect of protecting hepatocytes in cultured hepatocytes of human origin (HepG2) using salmon ovary peptide on a level of gene expression.

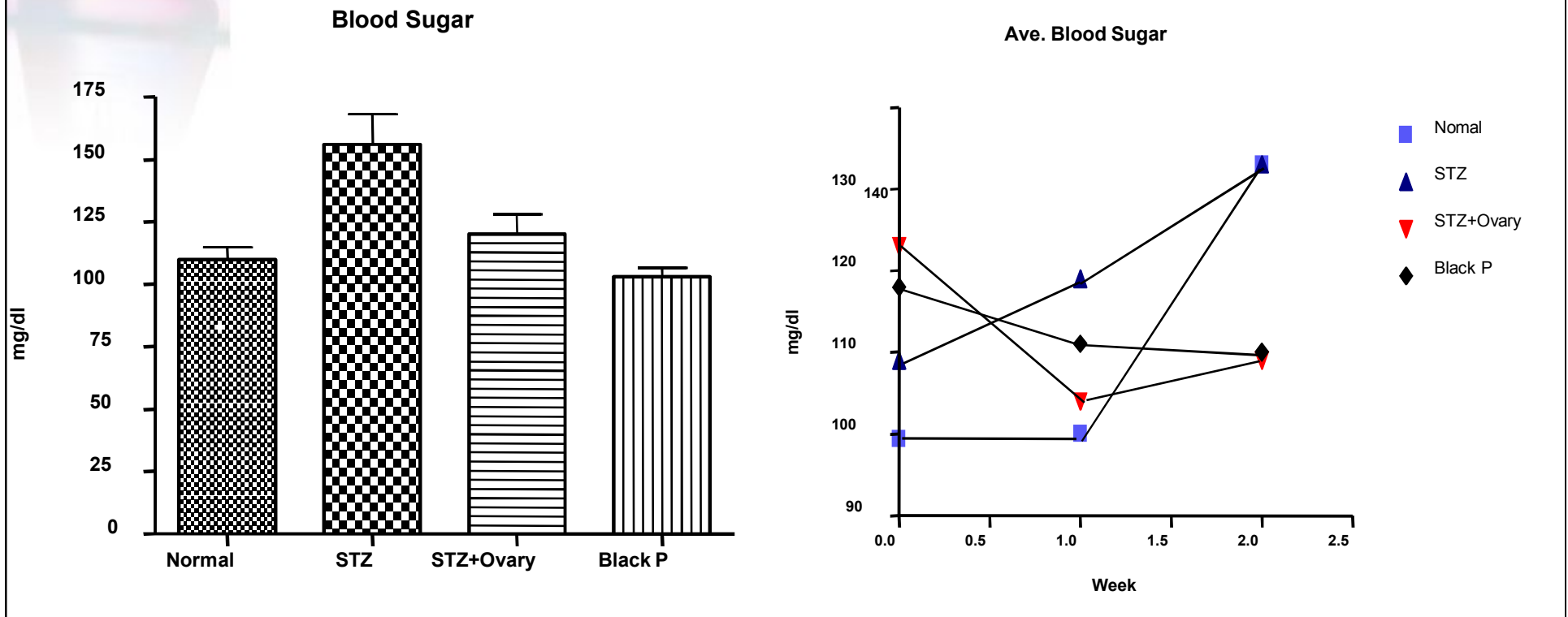
As a result, 6 types of genes, GADD45, SGK, NFκB, glutathion oeroxide 1, selenoprotein P, and Rab5C, showed increased expression. The expression of Fas genes decreased.

Consequently, It is suggested that the salmon ovary peptide has the following effect.

- (1) Further increase in biological defense mechanism originally found in cells (enhanced expression in antioxidant enzymes and antioxidants)**
- (2) Cytoprotective effect by repressing the expression of cytopathy agent in oxidant-incentive lymphotoxin**
- (3) Function of newly inducing the expression of cell survival agents**



Effect of salmon ovary peptide on blood sugar



Wister SPF rat (8 weeks of age). n=8

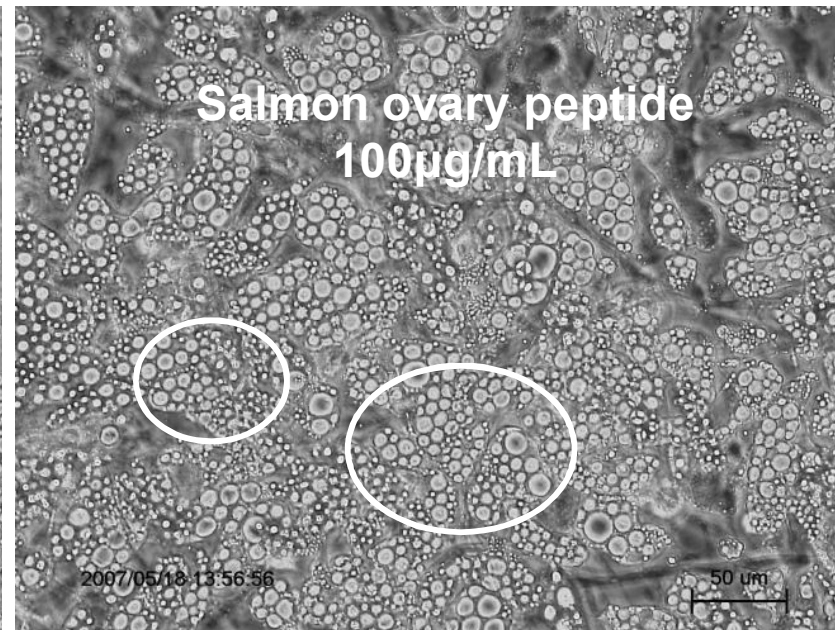
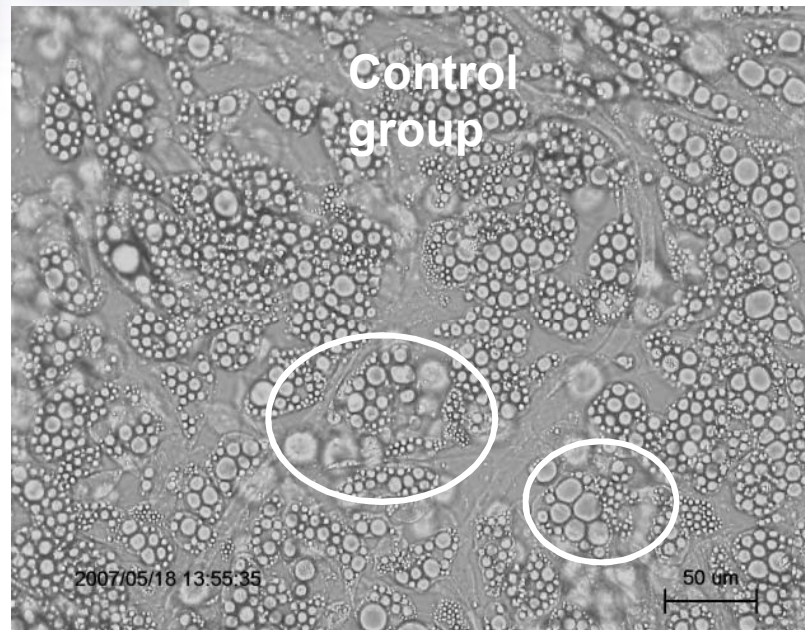
STZ(35mg/Kg) Ovary(o.75g/day) 3Week Orally administered

Rheology Functional Supplement
Institute Co., Ltd



Discussion on the effect of controlling fat accumulation in rat's primary visceral adipocytes (VAC) using salmon ovary peptide

4 days after test substances were administered

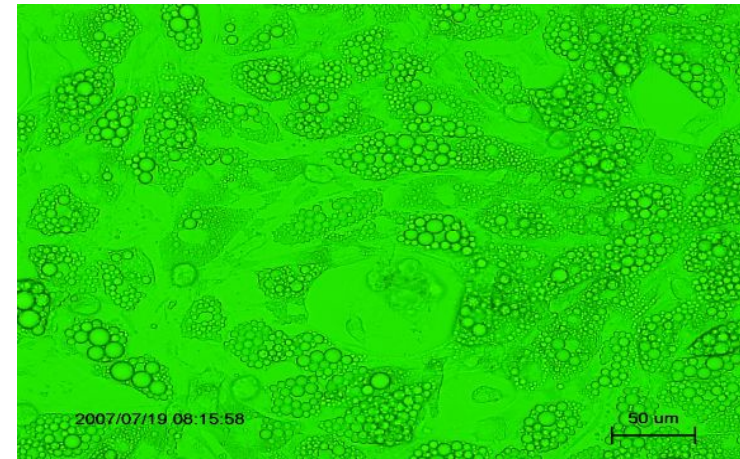
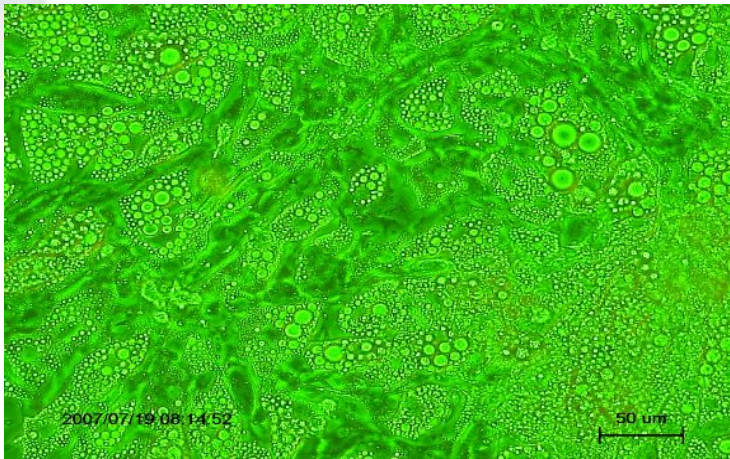


In the negative control group most adipocytes became mature and bloated. In the group with 100 μ g/mL of salmon ovary peptide added, more adipocytes with smaller fat droplets were found than in the group with 50 μ g/mL of Salmon ovary peptide added, and mature adipocytes were scarcely found. Also, there were few bloated adipocytes in the 100 μ g/mL group.

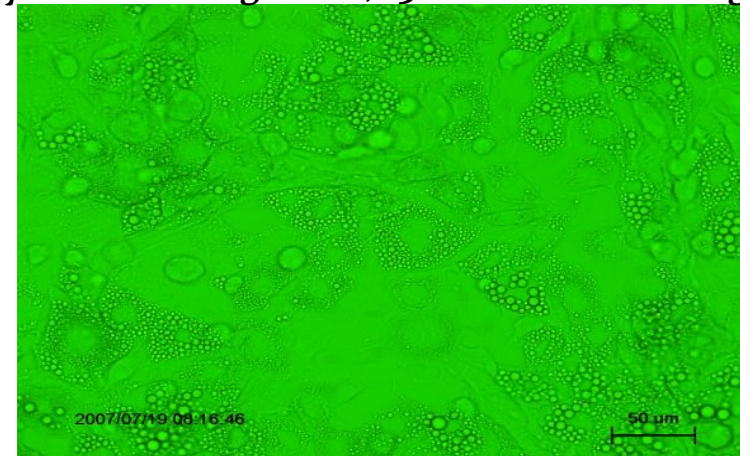
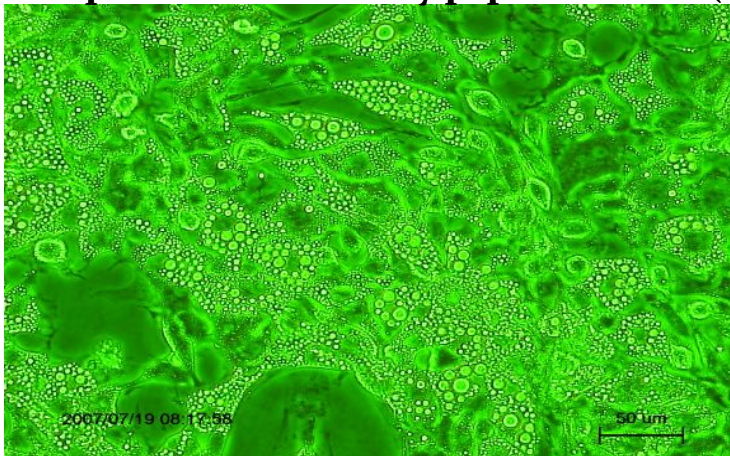


Effect of controlling the bloating of visceral adipocytes using salmon ovary peptide

Negative control group (9 days after sowing seeds, 15 hours after adding NE)

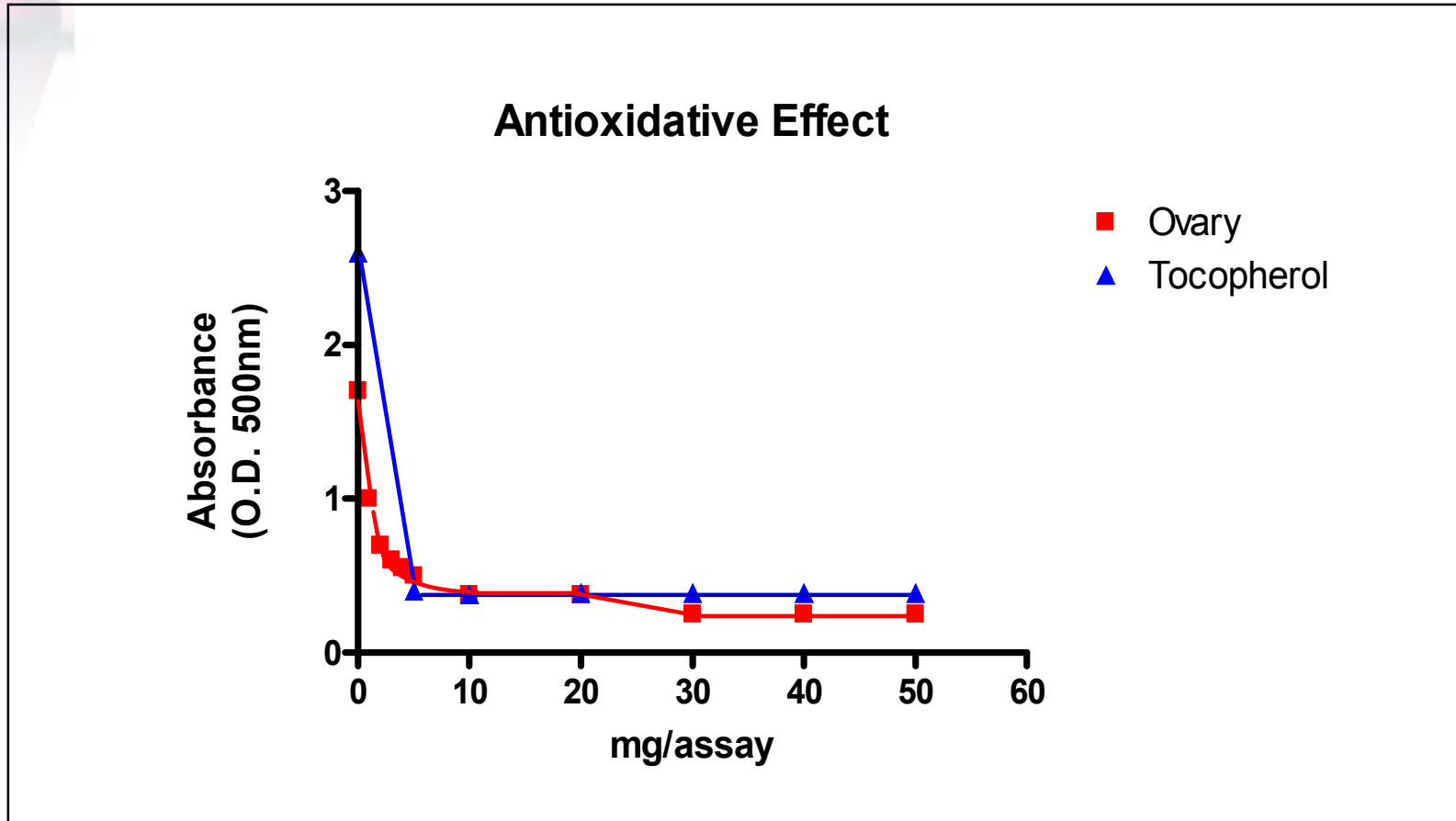


Group with salmon ovary peptide added (9 days after sowing seeds, 15 hours after adding NE)





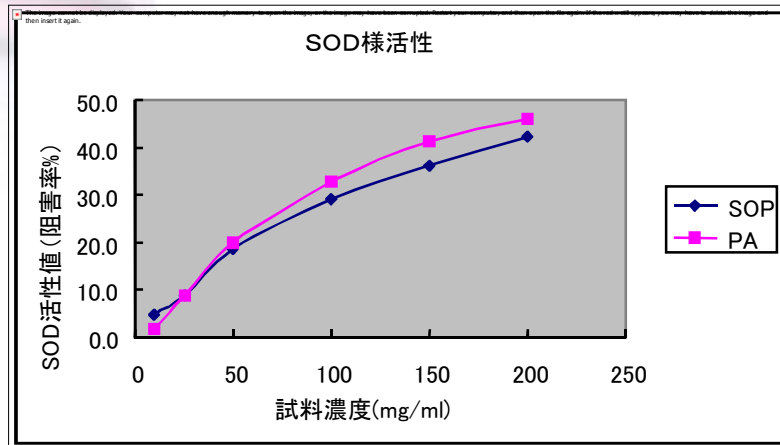
Antioxidant effect of salmon ovary peptide



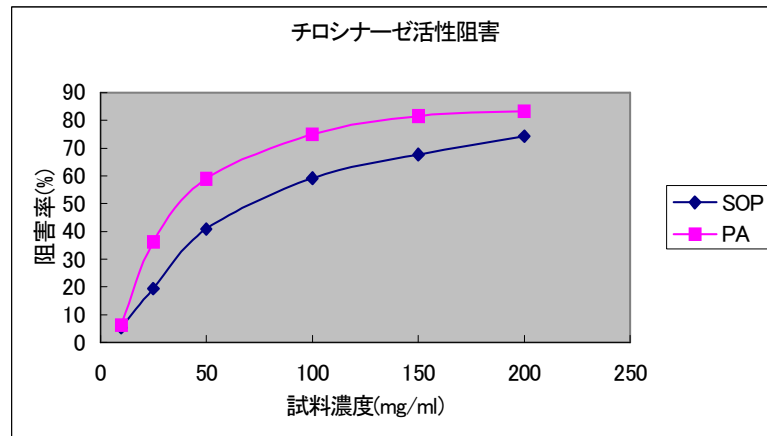
Control of the production of ferri-thiocyanate by linoleic peroxide



SOD-like activity and inhibition of tyrosinase activity



This graph shows SOD-like activity in salmon ovary Peptide and pig placenta extract. In the low concentration zone, the salmon ovary peptide Obviously demonstrated a higher activity than the pig Placenta extract. Meanwhile, the high concentration Zone Showed a slightly higher activity of pig placenta extract by several percentage points, but it was almost equivalent to that of the salmon ovary peptide.



This graph shows the inhibition of tyrosinase activity in salmon ovary peptide and pig placenta extract. The salmon ovary peptide, with a slightly weaker activity than the pig placenta extract, showed the inhibition of tyrosinase activity.