Discovery of Visceral Fat Loss by Specific (NARL) Ultrasound

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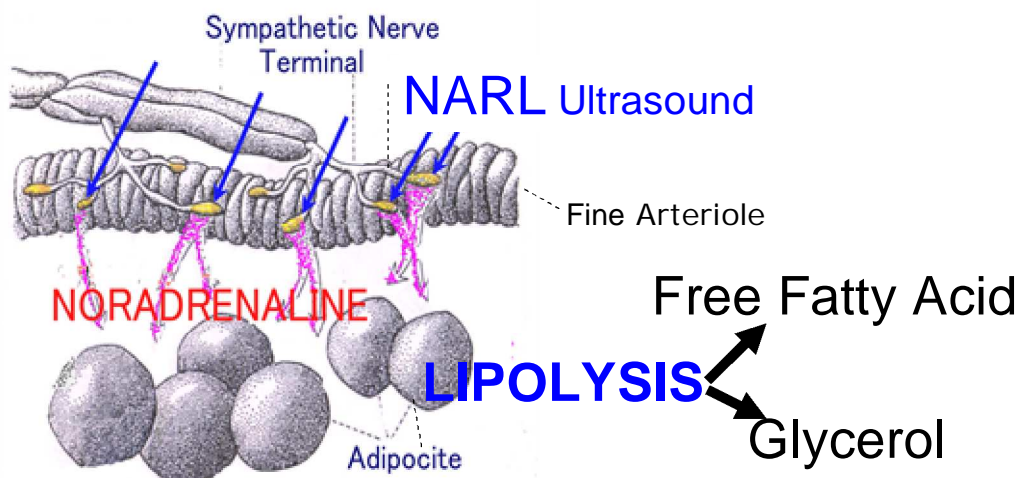   *Kawasak-shii, kanagawa-ken, Japan*
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1.Background
1-1. What is NARL Ultrasound

Releases Nroepinephline (NorAdrenaline)
at the Sonicated Site, without Brain Involvement


For More Details, See SUPPLEMENT Attached

1-2 Discovery of FFA Doubling in 10min.
by Specific (517kHz-110mW/cm2, NARL) ultrasound

\# Whole Rat body was sonicated
in 10min in 36 water

\# FFA was
increased.
\# Effective
frequency was
specific; 517kHz
\# FFA was 2
folded in 110~5
mW/cm2,
independntly
with sound
energy &
independently
with Before FFA.
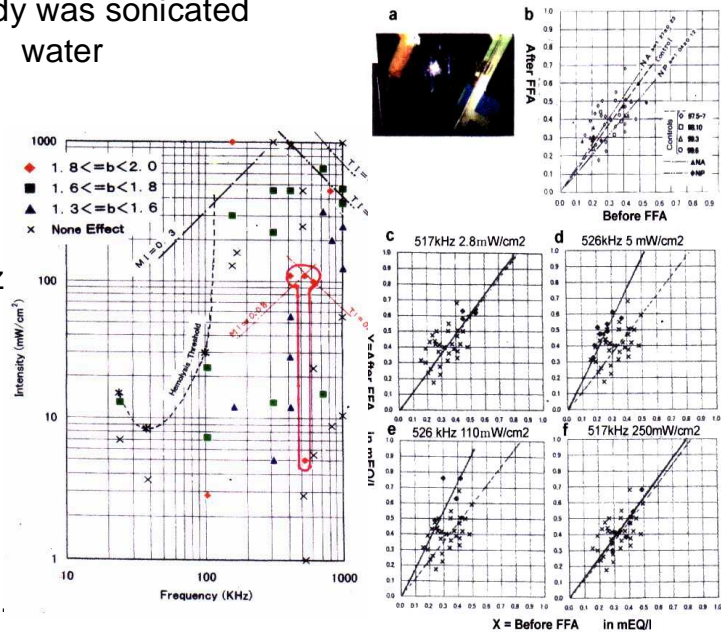
1-3 NA contribution was comfirmed at locally sonicated WAT mass
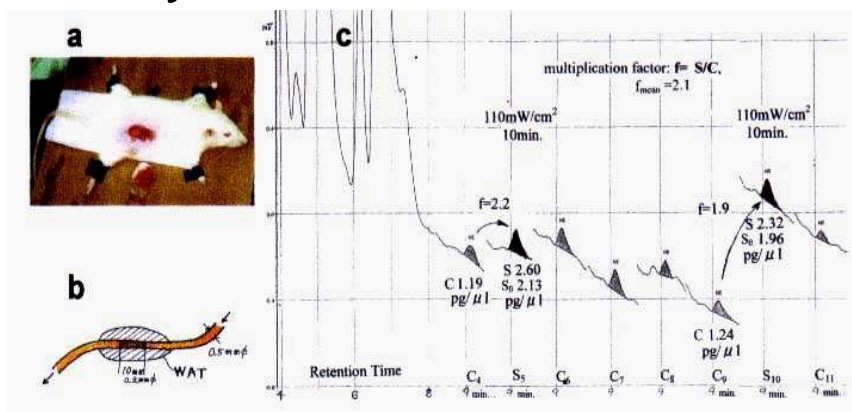
\# The released NA in intercellular liquid of Rat WAT mass was
measured with micro dialysis and liquid chromatograph
technology under anesthesia.
\# Every 15min, dialysis liquid were sampled. Within a certain
period ,the WAT was 10min-sonicated and compared with the just
before sample.
\# The NA was 2 folded at the sonicated period.
\# The released NA triggers lipolysis at nearby adipocytes.

1-4 NA release was visualized at Human Salivery Grands

Radio labeled NA* was injected ,
The NA* concentrates at Sympathetic Nerve Endings of Salivery Glands
Left Salivey Gland was NARL sonicated, and Right one was not.
The NA* distribution was visualized with Single Photon Emission Computer Tomography.

The Sonicated Left Side lost NA* by release, On the contrary, the non sonicated right side shows strong NA* concentration.
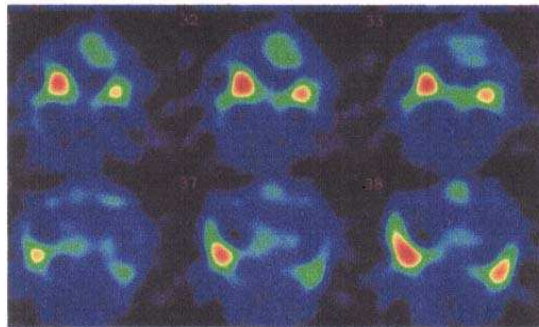
1-5 Insight of NA release at sympathetic nerve endings

NA is made from Tyrosin and stored in the vesicles in the endings.
Large amount of NA is released out from the endings. But almost 90% is uptaken back..The difference 10% is really released out and consumed and newly born NA restores the expenditure. There is a great NA circulation.
#; If the uptaken ratio changes to 80%, the Release out amount is doubled .
NARL never generates NA, but modifys the uptaken ratio parametrically
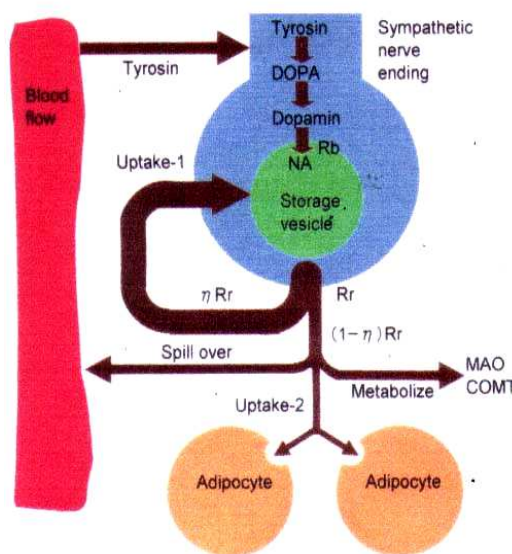
2. Out Line

- NARL Ultrasound has been used widely for local fat loss in beauty and health world after 5 years basic resarches.

- More than 30,000 peoples were treated in 3 years

- 42 Cases having X-CT images have been accumulated and revealed significant visceral fat loss unforeseen initially.

- Here we present the case of n=18 group.

3. Me hod

- **Subjects**; Healthy 13 females and 5 males, 27~48 years, BMI= 18.5~29.9,

- **Protocol**; NARL small area(4.5x 9.5cm) two pads were applied at abdominal 6 sites, each site in10min Morning and evening sessions a day.

- Every day for 4 weeks for 11 subjects and 5 weeks for 7 subjects.

Before and after the course, body weight, abdominal circumference, subcutaneous and visceral fat areas of CT images were measured.

3-ap Individual protocol F=front,S=side, B=back

Group -ID	Gender-Age	BMI Kg/m²	Abdom.Site /cession	Diet N=normal	Additional Cal Expenditure Beside Daily Life Work M=morning, E=evenong
4-OH	f-38	20.9	F-3,S/B-~4	N	Light stepping 2w=every day, 2w=3~4/w
4-IY	f-42	22.9	F-3 B-3	N	Walk 10min.
4-FR	f-31	22.2	F-3,S1	N	M- non E-Bathing
4-FM	f-10	23.0	F-3, S-1~2	N	Walking, Bath
4--Wms	m-41	22.2	F-3, S-1	N	Walking, Bath
4-KY	m-42	22.1	F-3	N	20min walk, 3 times/week
4-SY	f-27	19.0	F-3	N	Hot Shower after each session.
4-JM	f-30	21.9	F2. S-2	LCD1200Kcal	M-30~40min.walk, E-50~60min,walk
4-Ohd	f-34	18.9	F-2,S-1	N	Walk, Exercise of abdomen
4-KM	f-43	18.9	F-3	N	non
4-HS	m-35	26.3	F-3	N	Walk, Exercise of abdomen ,
5-KS	f-38	29.9	F-3	Vegitable	Walk , Bath, Light exercise
5-KJ	f-28	18.5	F-3, S-2	N	Bath
5-UK	f-33	20.1	F-3, S-0~1	N	walk
5-TH	m-44	23.2	F4 3	N	30~40min.walk at week end
5-SY	m-48	27.1	F-3~5,S-0~1	N	M-non E-walk+ Shower
5-Wmi	f-30	18.4	F-3,S-1, B-1	N	Bath after sonic., Jogging 2 times /week
5-EY	f-31	19.1	F-4,S-2	N	Bath after, Abdom.exercse-3 times/week

4. Results

4-1 Loss ratio (LR) the Efficacy Index

- Loss Ratio = loss amount / iniutial amount (%)
- NARL has same effect from skin(110mW/cm2) to the 30cm depth(5mW/cm2.)
- Loss is proportional to the initial Fat thickness.

4-2 Averaged Loss Ratio   for 4week/5week group

Group	Body Weight	Abdominal Circumference	Subcutaneous CT-Area	Visceral CT-Area
4 week n=11	-2.8 % P<0.03	-5.6% P<0.001	-8.9 % P<0.03	-18.6 P<0.05
5 week n=7	-2.5% P<0.04	-6.5% P<0.001	-11.3% P<0.001	-14.7% P<0.05
4w+5w n=18	-2.7% P<0.001	-5.9% P<0.001	-9.8% P<0.001	-170% P<0.001

4-3 and Statistics (paired student t test)

Statistical table ICO2006 Red BG DATA shows No or Less effect 2006.06.18

Group 4w/5w name	body weight			abdomen circumference			Total FAT Area(CT)			Subcutaneous FAT area			Visceral FAT area		
	before	loss	loss ratio	before	loss	loss ratio	before	loss	loss ratio	before	loss	loss ratio	before	loss	loss ratio
	kg	kg	%	cm	cm	%	cm2	cm2	%	cm2	cm2	%	cm2	cm2	%
4-OH	57.0	5.4	7.5	85.0	6.0	7.1	133.3	NA	NA	108.4	13.3	12.3	24.9	NA	NA
4-IY	53.5	2.1	4.1	90.0	5.0	5.6	221.9	9.0	4.1	200.9	5.3	2.6	21	3.7	17.6
4-FR	54.0	2.0	3.8	76.5	6.0	7.8	246.3	6.2	2.5	215.9	3.1	1.4	30.4	3.1	10.2
4-FM	69.0	0.0	0.0	90.0	3.0	3.3	601.3	45.4	7.6	475	22.8	4.8	126.3	22.6	17.9
4-WMs	65.0	4.0	6.6	85.0	2.5	2.9	207.1	44.3	21.4	138.5	12.3	8.9	68.6	32	46.6
4-KY	64.7	0.7	1.1	85.5	3.5	4.1	241.1	39.7	16.5	154.2	17.8	11.8	86.9	21.9	25.2
4-SY	51.0	0.0	0.0	78.5	1.5	1.9	121.1	16.3	13.5	96.4	8.7	9.0	24.7	7.6	30.8
4-JM	54.0	1.6	3.1	83	7.0	8.4	172.5	31.1	18.0	154.1	29.7	19.3	18.4	1.4	7.6
4-Ohd	49.7	-0.9	-1.8	71.4	3.4	4.8	168.6	23.7	14.1	136.2	20.4	15.0	32.4	3.3	10.2
4-KM	46.0	-0.1	-0.2	86.0	3.4	4.0	241.0	3.0	1.2	157.7	0.3	0.2	83.3	2.7	3.2
4-HS	85.3	5.1	6.4	99.0	11.8	11.9	297.9	42.8	14.4	180	23.4	13.0	117.9	19.4	16.5
5-KS	70.0	2.0	2.9	112.0	13.0	11.6	616.0	80.8	13.1	529.7	76.8	14.5	86.3	4	4.6
5-KJ	45.5	2.0	4.6	76.0	7.0	9.2	147.1	24.8	16.9	135.4	23.5	17.4	11.7	1.3	11.1
5-UK	49.0	1.0	2.1	84.0	4.0	4.8	192.2	-5.7	-3.0	157.3	-7.0	-4.5	34.9	1.3	3.7
5-TH	67.0	2.0	3.1	88.0	4.0	4.5	183.5	12.8	7.0	117.1	3.4	2.9	66.4	9.4	14.2
5-SY	84.0	-2.0	-2.3	99.0	2.5	2.5	408.4	36.6	9.0	313.9	38.5	12.3	94.5	-2.2	-2.3
5-Wmi	49.0	1.5	3.2	78.0	4.0	5.1	129.9	29.1	22.4	90.4	13.1	14.5	39.5	16	40.5
5-EY	52.0	2.0	4.0	80.0	6.0	7.5	125.9	30.2	24.0	96.9	21.2	21.9	29.0	9	31.0
mean	59.2	1.6	2.7	85.9	5.2	5.9	247.5	27.7	11.9	192.1	18.1	9.8	55.4	9.21	17.0
σ (SD)	12.1	1.9	2.8	9.8	3.1	3.0	149.2	20.6	7.8	124.9	18.5	7.2	36.3	9.7	10
σ m	2.86	0.45	0.66	2.31	0.72	0.70	35.19	5.00	1.90	29.46	4.36	1.7	8.55	2.35	2
t		3.51	4.06		7.19	8.53		5.53	6.27		4.16	5.8		3.92	7
p		0.003	<0.001		<0.001	<0.001		<0.001	<0.001		0.0007	<0.001		0.001	<0.001

4-4 Typical CT Images
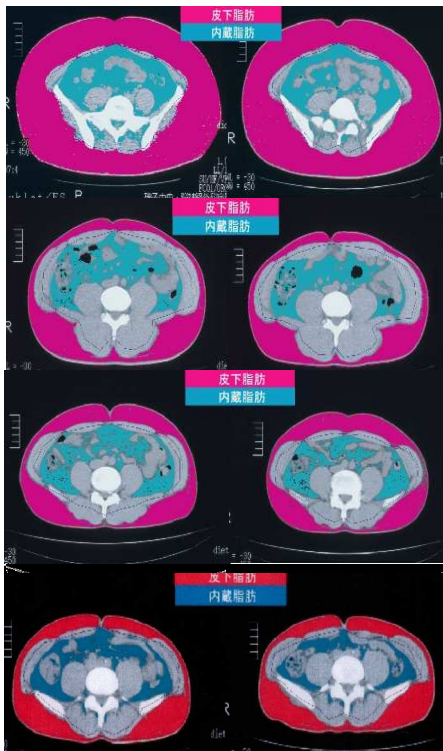
4-FM 40y   F 69Kg 1.63m   BMI=26.0
SF: 475.0 → 452.2 = -22.8 cm² = - 4.8 %
VF: 126.3 → 103.7 = -22.6 cm² = -17.9 %
Circumf.: 90.0 → 87.0 = -3.0 cm = - 3.3 %
WEIGHT: 69.0 → 69.0 = -0.0 kg = - 0.0 %

4-HS 35y   M 85.3Kg   1.80m   BMI=26.3
SF: 157.7 → 157.4 = -0.3 cm² = -13.0%
VF: 117.9 → 98.5 = -19.4 cm² = - 6.5%
Circumf.: 86.0 → 82.6 = -3.4 cm = - 12%
Weight: 46.0 → 46.1 = +0.1 kg = - 6.4%

4-kY 42y   M 60.7Kg   1.70m BMI=22.4
SF: 154.2 → 136.4 = -17.8 cm² = -11.3%
VF: 86.9 → 65.0 = -21.9 cm² = -25.2%
Circumf.: 85.5 → 82.0 = -3.5cm = -4.0%
Weight: 64.7   64.0 = -0.7 kg = - 1.0%

4-SY 27y   F   51Kg 1.64m   BMI=19.0
SF: 96.4 → 87.7 = -8.7cm2 = -9.0%
VF: 24.7 → 17.1 = -7.6cm2 = -30.8%
Circumf.: 78.5 → 77.0 = -1.5cm = -1.9%
Weight: 51.0 → 51.0 = -0.0 kg = -0.0 %

Before   After

5. Conclusion

- Greater loss ratio for visceral fat than for subcutaneous fat was significant.

  aginst so diverged protocoles

- The 83% subjects in abdominal circumference and 78% subjects in visceral fat area were well effected.

- Whole weight loss was recognized beside sonicated sites

- NARL Ultrasound could be used for the treatment or prevention of Metabolic Syndrome, Life Style diseases,