

1.)
)

3

(1).

가

(2).

2~3

2

(6).

가

(3).

, Saal Saal(4)

(7).

48

20~35

(5).

가

(NonSteroidal Anti - Inflammatory Drug,

NSAID),

4~6

NSAID

가 (9). COX - 2 Cytokine, Growth factor, Endotoxin (10), NSAID

NSAID 가

NSAID 가 (8). NSAID Miyamoto (11)

1. (NonSteroidal Anti - Inflammatory Drug, NSAID) COX - 2 (induction) PGE2 가, COX - 2 PGE2 phospholipase A, cyclooxygenase(COX - 2), prostaglandin E2, tumor necrosis factor, interleukin(IL) - 1, IL - 1,7 IL - 6, IL - 8 IL - 6

1) opioid NSAID NSAID 1

dorphin system , NSAID En- "Discogenic pain" (12). NSAID, (Corticosteroid)

. PG(prostaglandin) 가 bradykinin, histamine NSAID 가 38 piroxi- cam 1 24 , NSAID cyclooxygenase(COX) 6 (13). PG NSAID COX PG , COX 가 5 . COX - 1 PG NSAID

1.

(Chemical Class) Drug	Dose (mg/day)	Frequency (Times/Day)	Onset (hr)	Half - Life (hr)	Major Toxicity
(Salicylates)					
Aspirin	UP to 5200	4~6	1~2	4	G, R
(Substituted Salicylates)					
Diflunisal	500~1,500	2~3	1	11	G, R
Salsalate	3,000	2	2	4	G, R
(Propionic Acid Derivatives)					
Ibuprofen	1,200~3,600	4~6	1~2	1~3	G, R
Naproxen	500~1,500	2~3	3	13	G, R
Fenoprofen calcium	300~3,000	3~4	3	2~3	G, R
Ketoprofen	150~300	3~4	2	3~4	G, R
(Pyrrole Acetic Acid Derivatives)					
Sulindac	300~450	2~3	2	18	G
Indomethacin	75~225	1~3	2	1~4	G, R, CNS, BM
(Benzeneacetic Acid Derivative)					
Diclofenac sodium	75~225	2~3	2~3	2	G, R
Diclofenac potassium	100~150	2~3	1	2	G, R
(Oxicam)					
Piroxican	20	1	5	38~45	G, R
Meloxicam	7.5~15	1	3	15~20	G, R
(Pyranocarboxylic acid)					
Etodolac	800~1,600	2~4	2	6	G, R
(Fenamate)					
Mefenamic acid	1,000	4	3	4	G, R
(Naphthylalkanone)					
Nabumetone	1,000~2,000	1~2	4	26	G, R
(COX - 2)					
Coxibs					
Celecoxib	200~800	1~2	3	11	R
Rofecoxib	12.5~50	1	1	18	R
Valdecoxib	10~40	1	1	11	R

BM : bone marrow, CNS : central nervous system, COX : cyclooxygenase, G : gastrointestinal, R : renal

aspirin 2,600 mg, NSAID PG , (17).
 ibuprofen 1,600 mg, naproxen 500 mg, etodolac 900 가
 mg, diclofenac potassium 100 mg, celecoxib 400 mg, (8). Sulindac (가
 rofecoxib 25 mg, valdecoxib 20 mg NSAID 4~6 (17). (가
 , 가 NSAID(diflunisal, pi- 2.0 mg/dl) 가
 roxicam, naproxen sodium) COX - 2 65 ,
 12~24 . diflunisal ,
 12 2 . NSAIDs
 Piroxicam 가 6 , 가 COX - 2
 1
 . Naproxen sodium 8 .
 , rofecoxib 1 (1). COX - 2

2) NSAID COX - 2 가 . NSAIDs
 NSAID COX - 2 specific inhibitor 2 COX - 2
 , 가
 .
 NSAID , 10% warfarin .
 COX - 2
 (14). NSAID
 Nabumetone , NSAID ,
 (15). misoprostol 200 µg, 3~4
 , NSAID 65 , omeprazole(20~40 mg/d) famoti-
 , dine(40 mg bid) . Famotidine
 , omeprazole 20 mg/d
 , (8). COX - 2 40 mg/d (18).
 , , NSAID
 50% (16). 가
 NSAID 가 .

NSAID

NSAID 가 . 가

가 가 , 1 .

가 NSAID 가

2) Tramadol

NSAID tramadol

2. (Oral Corticosteroids) , opioid agonist norepi-

nephrine serotonin

7

가 (19). Dexam-

thasone 가 , 40~60 mg 1~2

5~6 가 tors(COX - 2) NSAID

(20). (5~30 mg) . 6 100 mg

가, , (8).

(21) tra-

3. madol 가

(20.7% 51.3%), 가

1) (8) NSAID

(22).

가 Paraphenol 가 Tramadol(37.5 mg) acetaminophen(325 mg)

가 ,

codein/actaminophen(30 mg/300 mg)

4 500~650 mg , 1 (23).

4 g . Asprin

가

4.

가

2.

Drug	Route	Frequency	Half - Life	Duration
Morphine	Oral	q4h	2~3 hr	3~6 hr
Morphine CR	Oral	q12h	2~3 hr	8~12 hr
Morphine SR	Oral	q24h	2~3 hr	24 hr
Oxycodone	Oral	q24h	2~3 hr	24 hr
	Oral	q12h	2~3 hr	8~12 hr
Fentanyl	Transdermal	q48~72h	13~22 hr	48~72 hr
	Transmucosal	q6h	7 hr	6~12 hr

NSAID

(25, 26).

GABA

가 , NSAID

(Gamma - aminobutyric acid)

(27).

Codeine 60 mg
ibuprofen
oxycodone)
patch

(2).

cyclobenzaprine(Flexeril),
chlorphenesin(Maolate), orphenadrine citrate(Nor-
flex), chlorzoxazone(Paraflex, parafone forte DSC),
methocarbamol(Robaxin), Diazepam(Valium)

(Cyclobenzaprine) ,
(Orphenadrine)

(24)

가

(28).

가

가

36

1

,

2

(8).

5.

가

6.

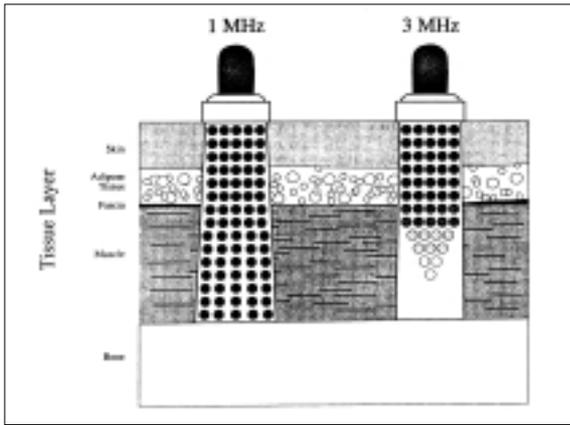
가

(glutamate)

가

가

(GABA)



2.

3. 가

Intensity(W/cm ²)	1 MHz	3 MHz
Tissue depth	5 cm	1.2 cm
0.5	0.04 °C	0.3 °C
1.0	0.2 °C	0.6 °C
1.5	0.3 °C	0.9 °C
2.0	0.4 °C	1.4 °C

2)

20,000 Hz

0.8~1 MHz

5~8 cm

(1)

(reverse piezoelectric effect)

가

1)

가

가

8

70~80

cm

4~5

20~30

가

46

가

(31).

(atten-

,가

uation)

30~60 cm

가

가

2 cm

1.3

가

(whirl-

0.8 °C,

가

pool), Hubbard

가

(31).

1.5 w/cm²

4.

U/S thermal effect	Temperature increased	Used for
Mild 0.1 to 1 watt per cm ² with a total output of 1 to 10 watts	1 °C	Mild inflammation Accelerating metabolic rate
Moderate 2 watts per cm ² with total output of 10 to 20 watts	2~3 °C	Decrease muscle spasm, pain Increase blood flow Reducing chronic inflammation
Vigorous up to 4 watts per cm ² with a total output of 40 watts	>3 °C	Tissue elongation Scar tissue reduction Inhibition of sympathetic activity

2.5 cm 4.9 °C 10

(2)

가 가

가

1 MHz 5 cm, 3 MHz 2 cm

(2).

20 , 3 , 2~3

가 가 3 MHz가

1 MHz 4 가 (

3)(30).

0.5 watt/cm²

1~2

(1.5 watt/cm²)

2~3

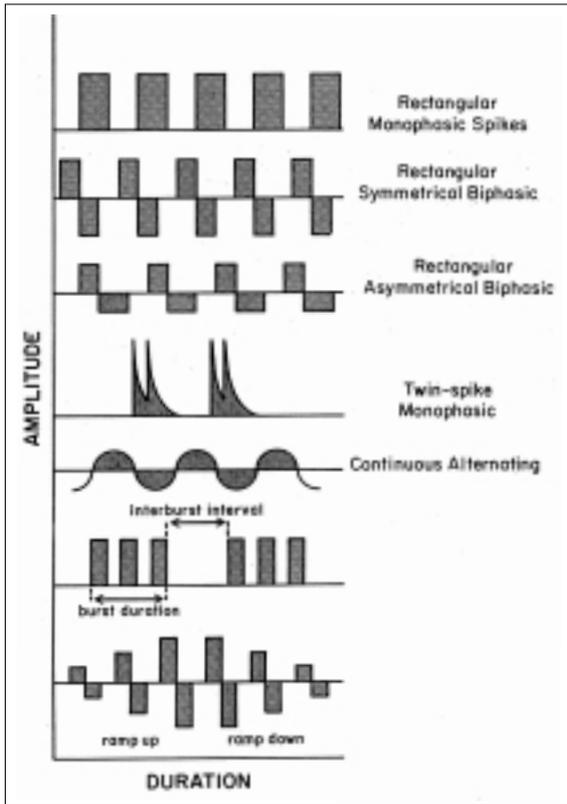
가 .

(4).

5.

- General heat precautions
 - Near brain, eyes, reproductive organs
 - Gravid or menstruating uterus
 - Near pacemaker
 - Near spine, laminectomy sites
 - Malignancy
 - Skeletal immaturity
 - Arthroplasties, Methyl methacrylate
- 가
- , 30 가
- 가 가 (5).

2.



3.

(

),

(

),

(

stiffness 가)

가

(30).

가

2/3

33%

가 (32),

3. (Electrotherapy)

3).

가 , burst - modulated

alternating current

(asym-

metrical biphasic pulsed current)가

(gate control

theory)(33, 34),

가

1) (Transcutaneous Electrical Nerve Stimulation, TENS)

6.

- Cardiac disability : stimulation of the thorax or neck, Pacemaker
- Pregnancy : abdominal, lumbar, or pelvic region
- Menstruation
- Cancerous lesions
- Site of infections
- Exposed metal implants
- Areas of particular nerve sensitive : carotid sinus, esophagus, larynx, pharynx, eye, upper thorax, temporal region
- Skin irritation : from the gel, adhesive, or current flow
- Severe obesity : adipose tissue † insulation against effective stimulation



4.

()

(4).

가

가

가

TENS

(amplitude), (pulse duration) 2~200 Hz, 50~250 sec, 가 TENS (80~100 Hz) (100 sec)

(gate control mechanism)

endorphin enkephalins

(7)(35). TENS

7. TENS

Parameter	High TENS	Low TENS
Intensity	Sensory	Motor
Pulse frequency(Hz)	60~100	2~4
Pulse duration(sec)	60~100	150~250
Mode	Modulated rate	Modulated burst
Treatment duration	As need	30 min
Onset of relief	<10min	20~40 min
Duration of relief	Min to Hrs	Hrs
Mechanism	Gate control Theory - Selective stimulation of Large Dia N(A - delta) - Presynaptic inhibition of A - beta and C in substantial gelatinosa	Norcoticlike pain reduction - Activation of small dia. Nociceptor and motor fiber - Release of beta endorphin - Delayed onset of effect, but longer duration
Indication	Acute soft tissue injury - Postop, pain, inflammatory pain, MF pain	Chronic pain - Damage to deep tissue, MFPS, muscle spasm

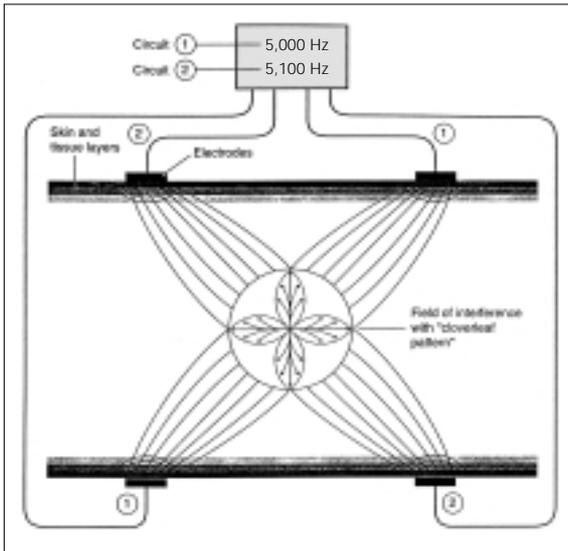
20 , 가 (40).
, 가
(36). 30
가 (37).
TENS . TENS 가
가 ,
(38, 39).

2) (High Voltage Galvanic Stimulation)

TENS , 150 V
, ,
.
가 .
,

3) (Interferential Current Therapy, ICT)

TENS
가
2
, 4,000~5,000 Hz
.
(1,000~10,000 Hz) 1,000 Hz



5.

(5) 가 가

TENS

(41).

(Lumbosacral corset),

(42).

1/4 ~ 1/3

가

가 .

가 .

가

가

(42).

가

가

가

5 ~ 1

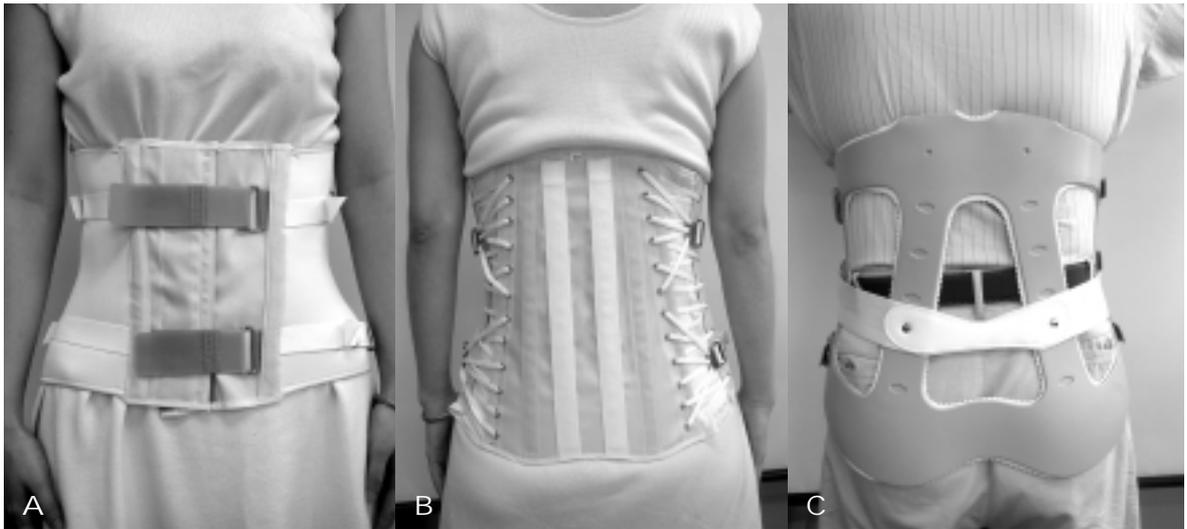
(discogenic pain),

가

8

가

(6A, 6B).



A, B)
C)

6.

(Lumbosacral orthosis, LSO)

(6C) , ,

가 .

, , .

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