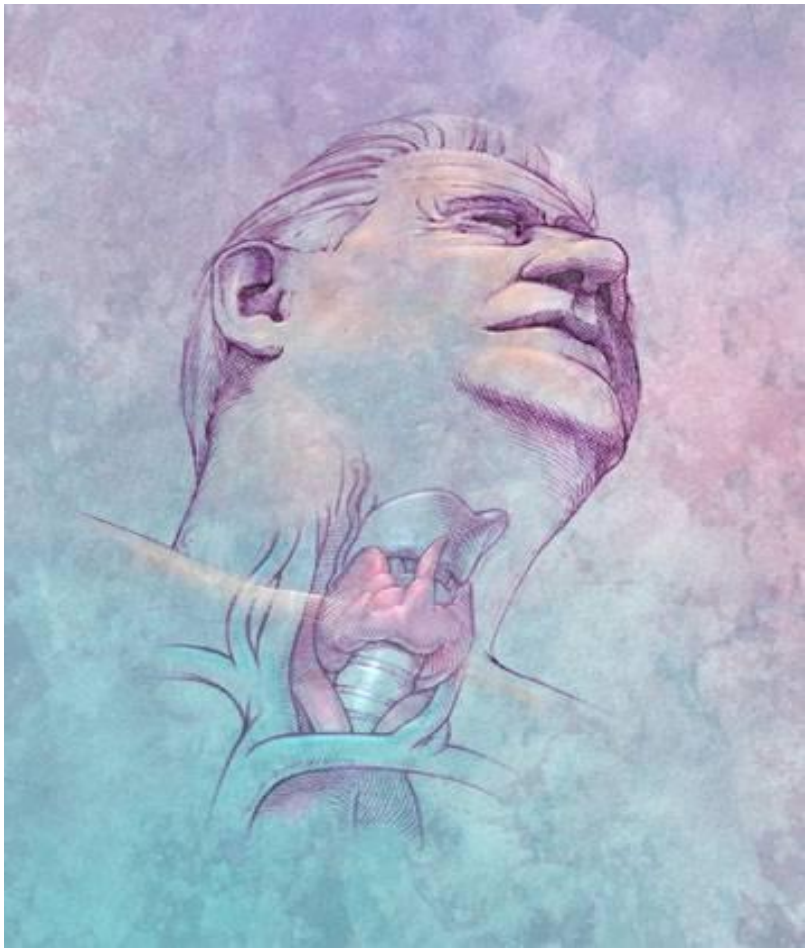
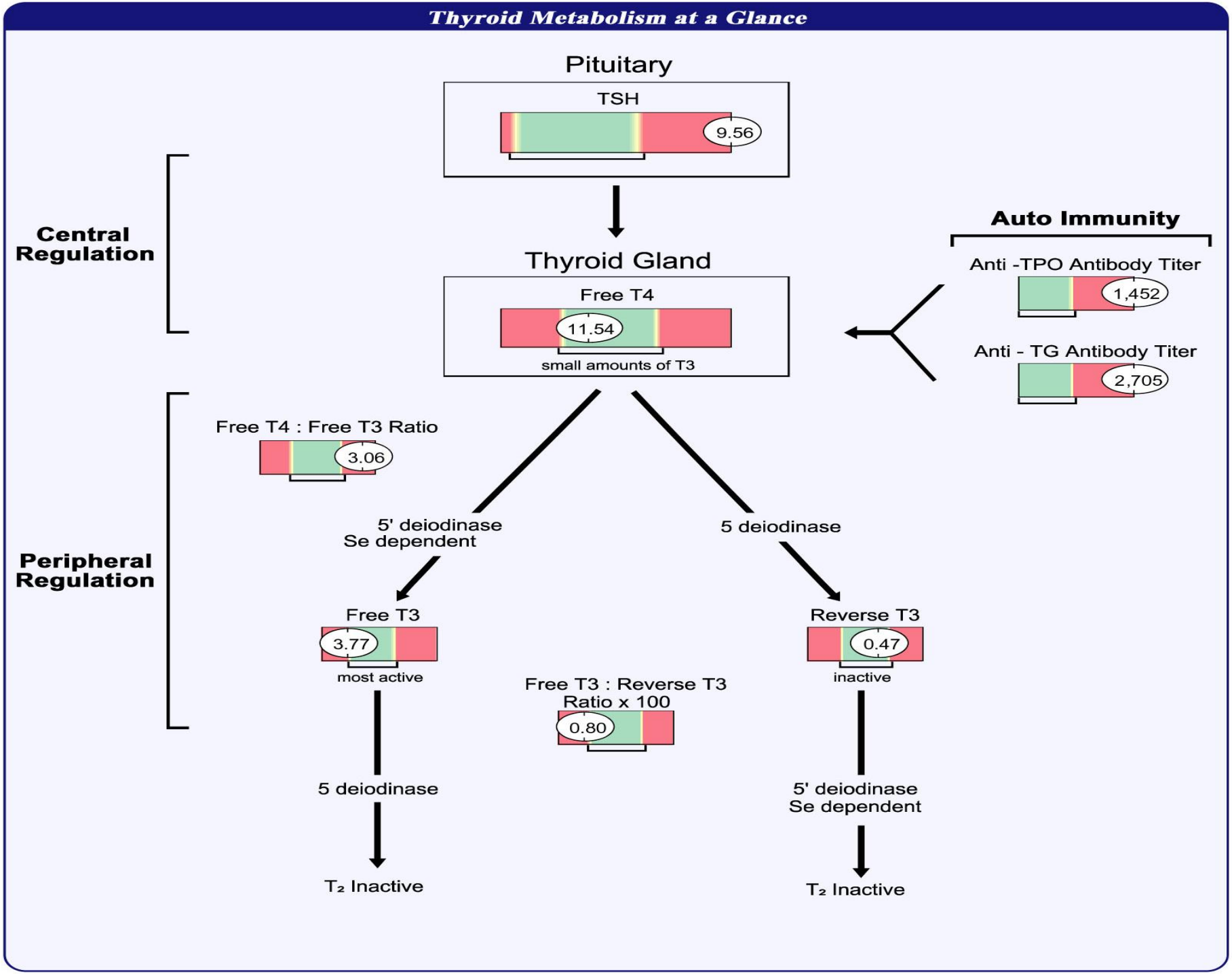
Thyroid Disorders




Thyroid Metabolism at a Glance
Pituitary
TSH
9.56
Central Regulation
Thyroid Gland
Free T4
11.54
small amounts of T3
Auto Immunity
Anti -TPO Antibody Titer
1,452
Anti - TG Antibody Titer
2,705
Free T4 : Free T3 Ratio
3.06
Peripheral Regulation
5' deiodinase
Se dependent
5 deiodinase
Free T3
3.77
most active
Reverse T3
0.47
inactive
Free T3 : Reverse T3
Ratio x 100
0.80
5 deiodinase
5' deiodinase
Se dependent
T₂ Inactive
T₂ Inactive

T3, T4 thyroid hormone과 brain

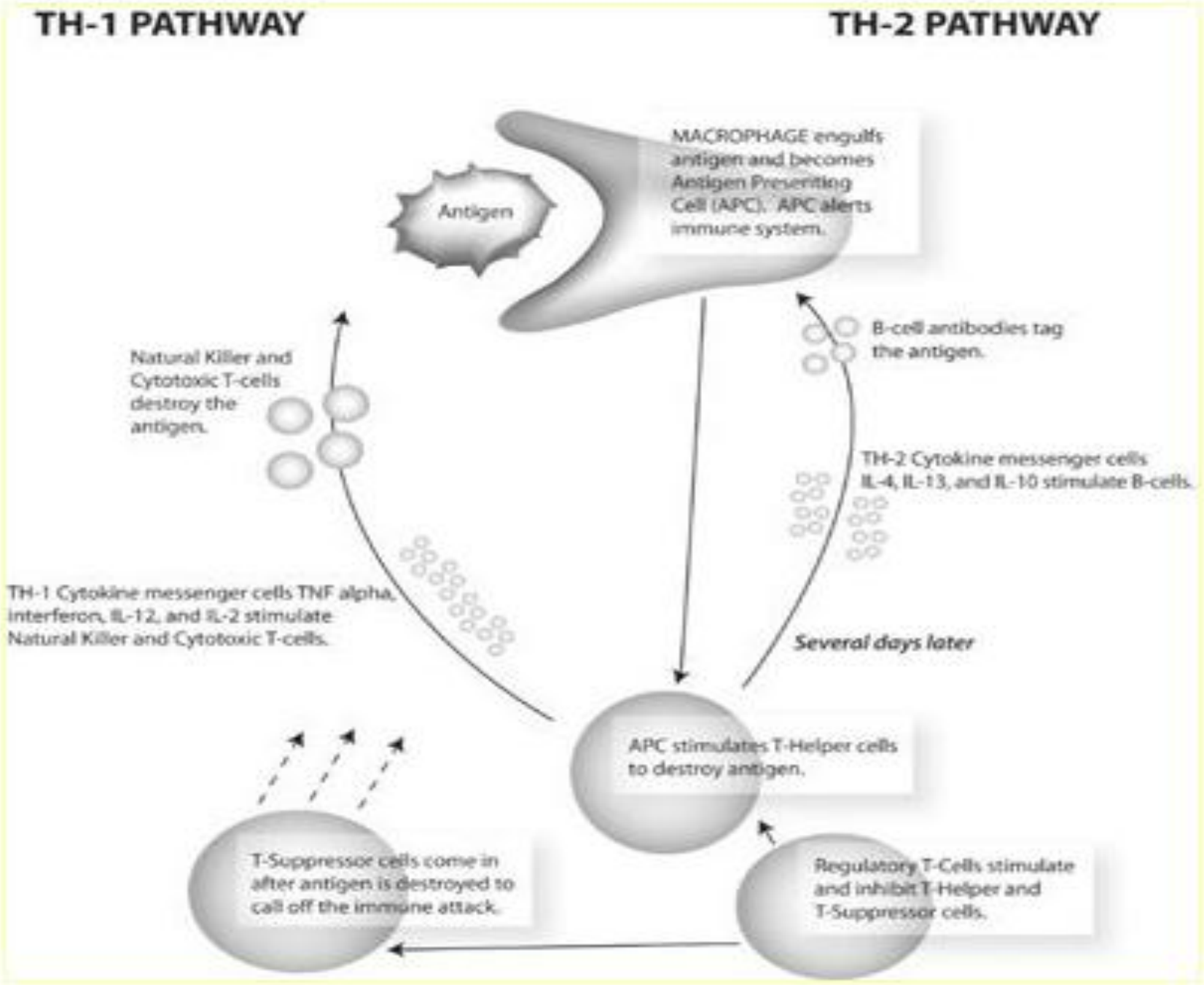
- Basic process of neurogenesis
  - Precursor cell proliferation
  - Neuronal migration
  - Dendritic, axonal growth
  - Myelination
  - Synaptogenesis
- Adult
  - Promote plasticity
  - Healthy brain aging
- Influence micoglial reaction for neuroDJD

Low thyroid=low dopamin, serotonin

- Dopamin stimulate Hypothalamus→TSH→T3
- Thyroid hormones stimulate dopamine in brain and kidney
- Tyrosin→adrenal fire—inhibit TPO: 티로신 쓰는 것 조심해야 한다
- Serotonin 부족은 항상 혈당조절문제와 관련된다-insulin resistance

Hashimoto's

- ◉스트레스
  - -immune imbalance
  - thymus weaken
  - Thin the barrier of gut, lung, brain
- ◉Gluten intolorence
- ◉Estrogen fluctuation
- ◉인슐린 저항증-다낭성난포증후군PCOS
- ◉비타민D 결핍증-하쉬모토 90%가 D receptor genetic defect
- ◉Chronic inflammation, infection, viruses
- ◉중금속 toxin-autoimmune


TH-1 PATHWAY
TH-2 PATHWAY
Antigen
MACROPHAGE engulfs antigen and becomes Antigen Presenting Cell (APC). APC alerts immune system.
B-cell antibodies tag the antigen.
Natural Killer and Cytotoxic T-cells destroy the antigen.
TH-2 Cytokine messenger cells IL-4, IL-13, and IL-10 stimulate B-cells.
TH-1 Cytokine messenger cells TNF alpha, interferon, IL-12, and IL-2 stimulate Natural Killer and Cytotoxic T-cells.
Several days later
APC stimulates T-Helper cells to destroy antigen.
T-Suppressor cells come in after antigen is destroyed to call off the immune attack.
Regulatory T-Cells stimulate and inhibit T-Helper and T-Suppressor cells.

TH-1 or TH-2 dominant?

- Too much natural killer and cytotoxic T cell activity: TH-1 dominant
  - TH-1 cytokines include: IL2, 12, TNFalpha, interferon
- Too much B cell activity: TH-2 dominant
  - TH-2 cytokines include: IL4, 13, 10
- 90% Hashimoto's are TH-1 dominant
  - Natural killer and cytotoxic T cell are overactive-attacking Thyroid

- Chronic viral infection, Type1 DM, MS—TH-1 dominant
- Asthma, dermatitis, chemical sensitivity, LUPUS-TH-1 dominant

하쉬모토 치료법

- Support T-regulatory cell-emulsi D3, DHA glutathione IV or cream
- TH-1 and TH-2 balance

- Remove antigen
- Restore immune barrier

COMPOUNDS THAT STIMULATE TH-1[143] [144]

(These dampen a TH-2 dominance and will worsen the autoimmune condition of a TH-1 dominant person):

- Astragalus[145]
- Echinacea[146]
- Beta-glucan mushroom[147]
- Maitake mushroom[148]
- Glycyrrhiza (from licorice)[149]
- *Melissa officinalis* (lemon balm)[150]

COMPOUNDS THAT STIMULATE TH-2[151]

(These dampen a TH-1 dominance and will worsen the autoimmune condition of a TH-2 dominant person):

- Caffeine[152]
- Green tea extract[153]
- Grape seed extract[154]
- Pine bark extract[155]
- White willow bark[156]
- Lycopene[157]
- Resveratrol[158]
- Pycnogenol[159]

COMPOUNDS THAT MODULATE BOTH TH-1 AND TH-2[160]

- Probiotics[161] [162] [163] [164]
- Vitamin A[165] [166]
- Vitamin E[167] [168]
- Colostrum[169] [170] [171] [172] [173]

COMPOUNDS THAT DAMPEN IL-1 ACTIVATING TH-1 OR TH-2[174]

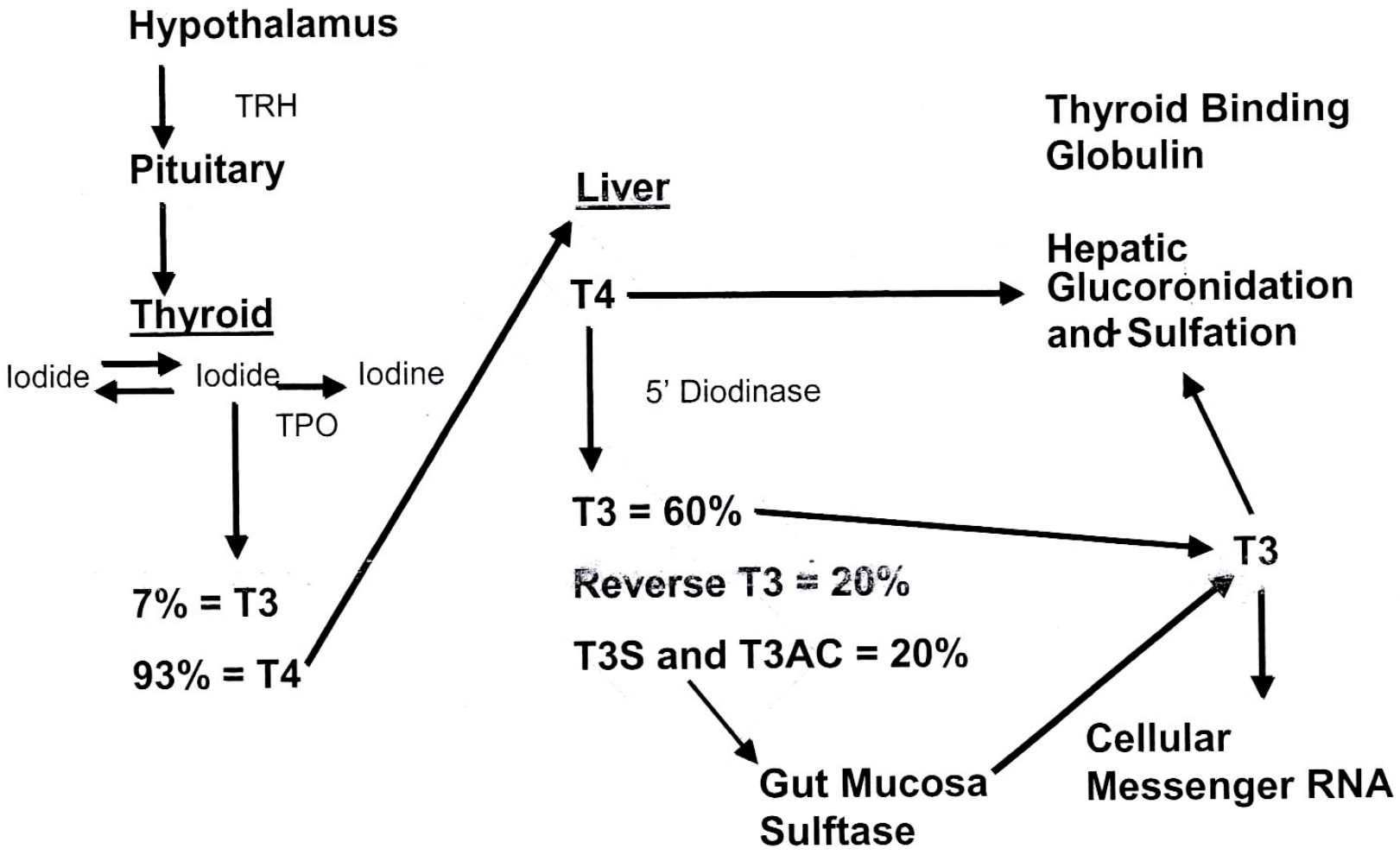
- Boswellia[175] [176] [177] [178]
- Pancreatic enzymes
- Turmeric/Curcumin[179] [180] [181]

갑상선의 생리학

- TSH from pituitary produce thyroxine(T4) and triiodothyronine(T3) by transporting iodine into the thyroid and by stimulating Thyroid Peroxidase Activity(TPO)
- TPO is involved in the formation of T4 and T3 as it catalyze the oxidation of iodine using hydrogen peroxide
- Thyroid produce 94% available T4 and 7% T3
- T4 is metabolized to T3 by 5'deiodinase at liver
- 40% T4 converted to T3, 20% converted to rT3(irreversibly inactive), 20% converted to T3 sulfate(T3S), triiodothyroacetic acid(T3AC)

- T3S and T3AC are inactive thyroid hormones until they circulate into the GI tract and are acted upon by intestinal sulfatase into active T3
- GI sulfatase activity depends on healthy gut microflora

THYROID METABOLISM



갑상선 저하증상

- Fatigue, chronic digestive problem(low HCL)
- Increase in weight gain even with low-calorie diet
- Morning headaches that wear off as the day progress
- Depression. Constipation
- Hypersensitivity to cold whether

- Poor circulation and numbness in hands,feet
- Muscle cramps while at rest
- Catch colds and other viral/bacterial problems easily and has difficulty recovering
- Wounds heal slowly, itchy dry skin
- Excessive amount of sleep required to fxn proper

Low thyroid sign

Dry or brittle hair

Hair falls out easily

Dry skin

Low axillary temperature(this may also be caused by any endocrine imbalance)

Edema, especially facial(myxedema)

Loss of outside portion of eyebrows

Thyroid Hormones have two functions

1. Regulation of metabolic rate

2. Stimulation of growth in children

The major symptoms of low thyroid are so common today as to be considered normal –

Low energy, marginal health and overweight.

THYROXINE and T3 SYNTHESIS

Most T4 and T3 in the body is extra-thyroidal and most circulates bound to Thyroid Binding Globulin (TBG) or to Thyroxine Binding Pre-albumin (TBPa).

Thyroid Binding Globulin is produced in the liver and its synthesis is increased by estrogens (pregnancy and the birth control pills).

Decreased production occurs following androgen or gluco-corticoid therapy.

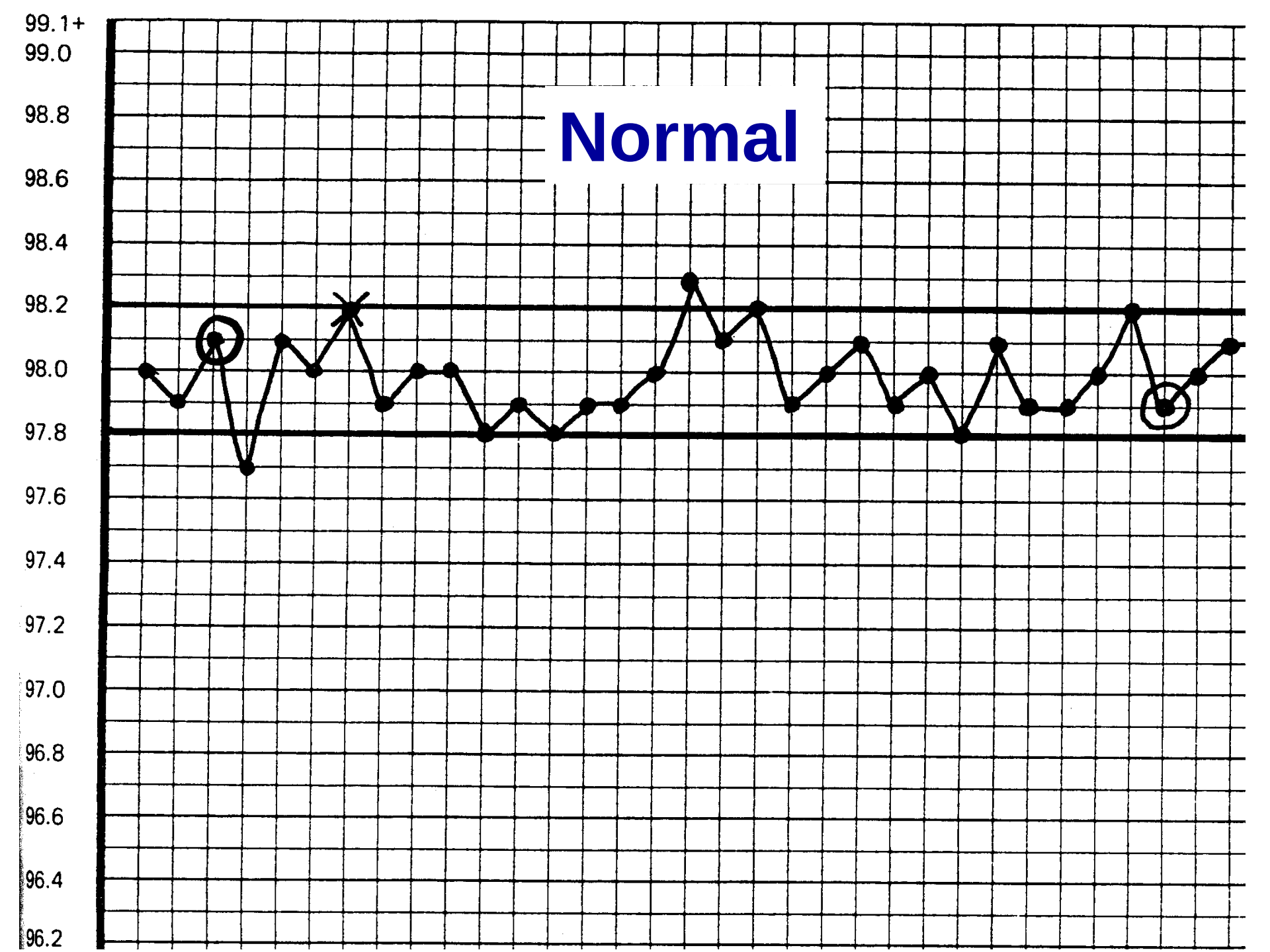
Goiters are benign (not cancerous) enlargements of the gland. They may occur as a result of iodine deficiency, autoimmune disease or quite normally during pregnancy.

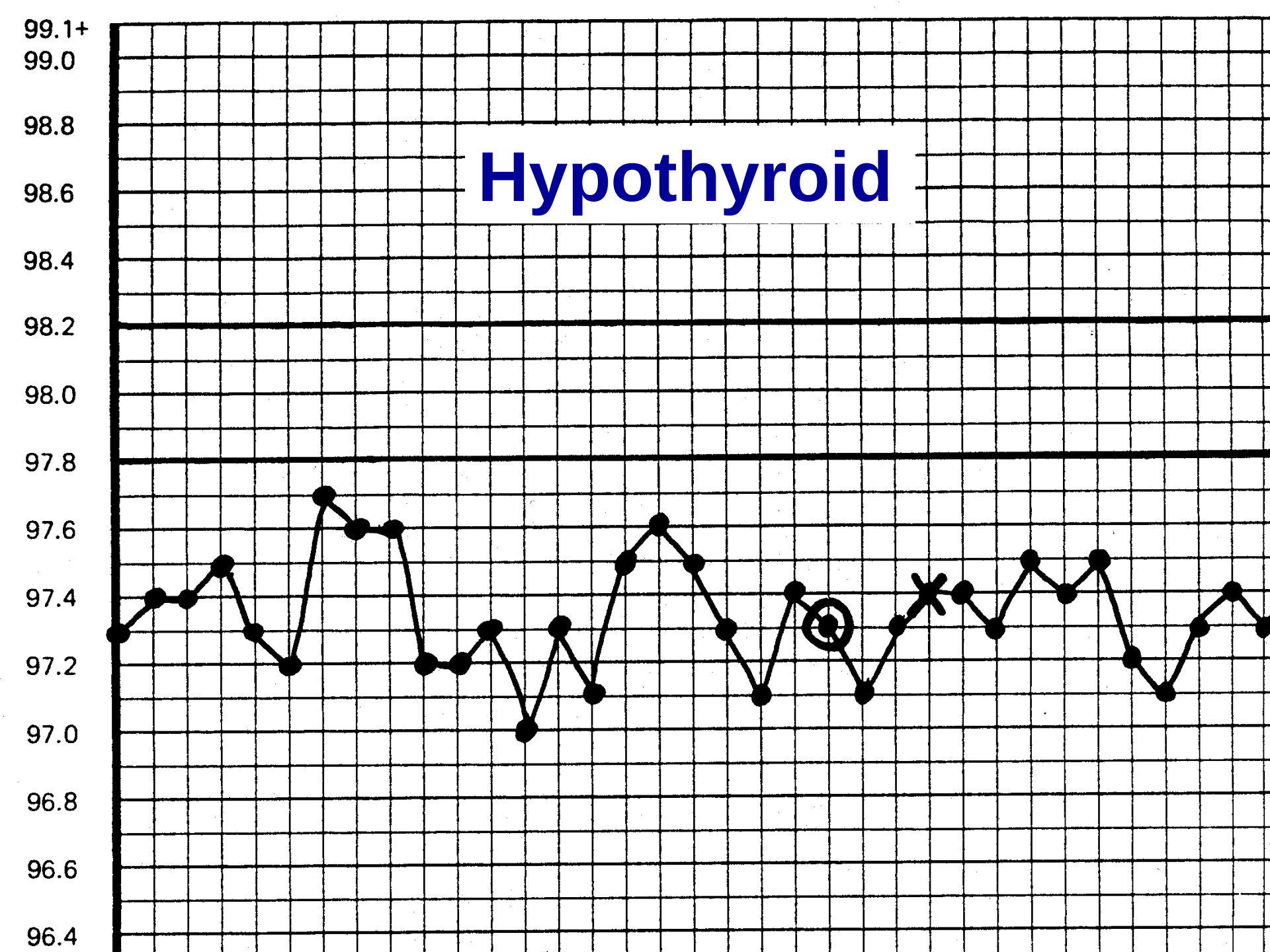
Symptoms of hyperthyroidism

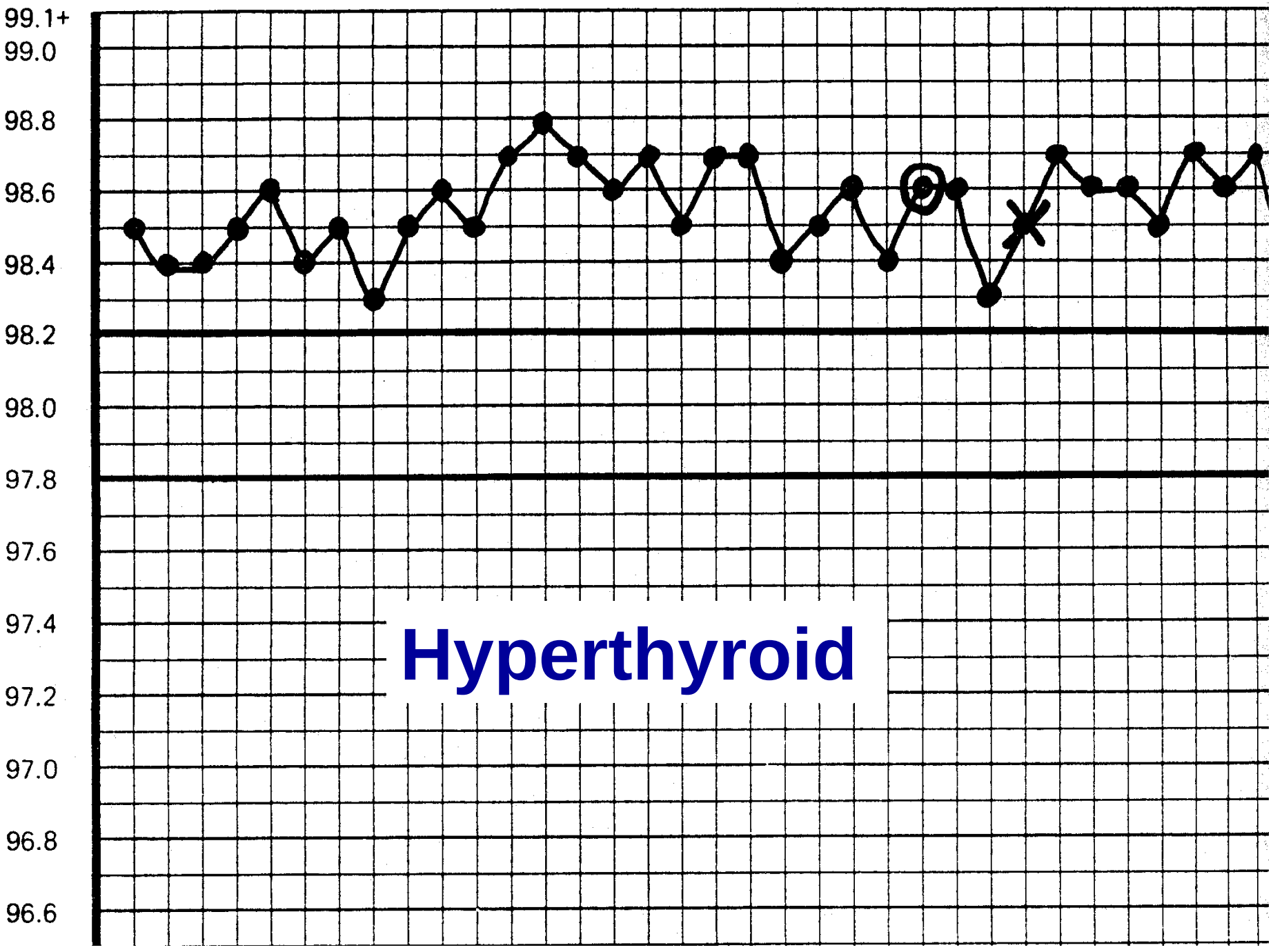
1. Racing of the pulse
2. Tremor of the hands
3. Weight loss despite an increased appetite
4. Diarrhea
5. Intolerance of heat
6. Excessive sweating
7. Decreased need for sleep
8. Anxiety becoming increasingly emotional
9. Protrusion of the eyes is a striking feature
10. The elevated pulse may be severe enough to progress into an arrhythmia (abnormal rhythm of the heart).

BASAL AXILLARY TEMPERATURE

36.5(97.8)-36.7(98.2)


Normal
99.1+
99.0
98.8
98.6
98.4
98.2
98.0
97.8
97.6
97.4
97.2
97.0
96.8
96.6
96.4
96.2


Hypothyroid
99.1+
99.0
98.8
98.6
98.4
98.2
98.0
97.8
97.6
97.4
97.2
97.0
96.8
96.6
96.4


99.1+
99.0
98.8
98.6
98.4
98.2
98.0
97.8
97.6
97.4
97.2
97.0
96.8
96.6
Hyperthyroid

The most common causes of thyroid malfunction are as follows:

1) **Per ton of phosphate, 1 to 1.2 percent will be fluoride. A couple of tons per field is not an unusual fix. Fluoride is a halogen and is thyrotoxic. It dominates iodine. This is the Law of Halogen Displacement.**

2) Various strong emotional states can affect TSH and thus cause thyroid hormone output to change. Failure to treat an emotional state properly may result in thyroid dysfunction. Other causes of pituitary dysfunction can cause thyroid disturbances secondary to pituitary malfunction.

3) Nerve pressure at the mid cervical spine can cause thyroid dysfunction. Many times patients involved in car accidents with resultant whiplash and cervical nerve dysfunction, go into a state of hypothyroidism and put on 5-12Kg (10-30 pounds) over the following 3-4 months.

4) In hypoadrenia, the thyroid may become inhibited to decrease the metabolic rate and give the adrenals a chance to rest.

5) Because of the thyroid's effect on insulin secretion, prolonged intake of refined carbohydrates and sugars can cause the over stimulation of the thyroid gland and lead to dysfunction.

6) Because of the resultant change in endocrine feedback taking birth control pills, adrenalin, amphetamines, cortisone, can lead to thyroid dysfunction.

7) Taking synthetic thyroid hormone for an inactive thyroid gland will tend to make the thyroid rely more on exogenous thyroxin and will thus lead to further inactivity.

8) Overeating, especially fats and sugars over prolonged periods will make the body produce more thyroid hormones (to increase fat burning and glucose uptake) than it can comfortably produce. This can lead to hypothyroidism.

9) X-rays striking the thyroid (including dental x-rays) can damage the thyroid.
There is one more terrible problem: the atomic age. Since 1945 every human has been repeatedly dusted with radioactive Iodine 131.

10) Prolonged intake of Vitamin A supplements can lead to hypothyroidism.

11) A lack of iodine in the diet can lead to dysfunction.

12) An imbalance in the amount of estrogen in the body (be it due to pituitary, liver, ovary, or adrenal malfunction) can alter thyroid function.

Thyroid Stimulating Hormone / Serum thyrotropin 0.4 to 6 Under 0.4 can indicate possible hyperthyroidism. Over 6 is considered indicative of hypothyroidism. Note: increasing numbers of doctors are finding that a TSH of around 1 - 2 is optimal for most people to feel well and avoid having hypothyroid or hyperthyroid symptoms. There is now research out that provides some scientific basis for this, saying that values above TSH of 2 may in fact represent *abnormal* levels.

Total T4 / Serum thyroxine 4.5 to 12.5 Less than 4.5 can be indicative of an underfunctioning thyroid when TSH is also elevated. Over 12.5 can indicate hyperthyroidism.

Low T4 with low TSH can sometimes indicate a pituitary problem.

Free T4 / Free Thyroxine - FT4 0.7 to 2.0 Less than 0.7 is considered indicative of possible hypothyroidism.

T3 / Serum triiodothyronine 80 to 220 Less than 80 can indicate hypothyroidism.

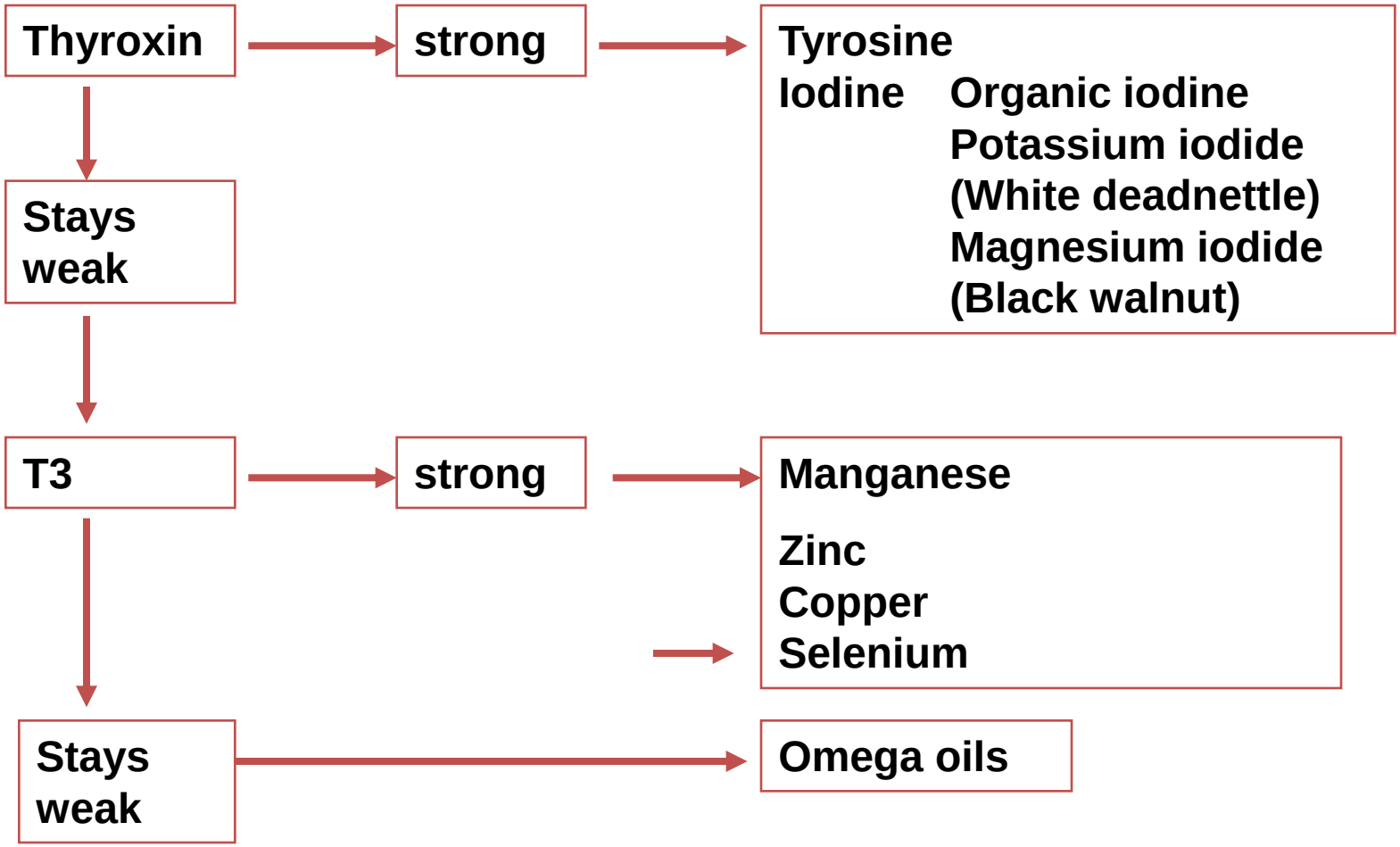
갑상선호르몬	기능적 수치	일반 랩수치
TSH	1.8-3	0.5-5.5
TT4	6-12	5.4-11.5
FTI	1.2-4.9	4.6-10.9
FT4	1-1.5	0.7-1.53
FT3	3-4.5	2.6-4.8
RESIN T3 UPTAKE	28-38	24-39
TBG	18-27	15-30
TPO Ab		

How to test for hypothyroid

- **Hair analysis-cellular level. Ca/K-hjgh ratio=hypothyroid**
- **STP(short thyroid panel): free t3,t4,tsh, TPO(elevated levels=hashimoto's thyroiditis-autoimmune hypothyroidism**
- **Thyroid questionares**
- **Basal metabolic temperature testing**
  - **Ddx-adrenal fatigue, low progesterone, hypothalamus problems**
- **Iodine patch test**
- **Achilles reflex speed**
- **AK**

Metabolics Testways Thyroid

Positive TL TW23 or TL Thyroid or weak left Teres minor



Wally and christ ak test for autoimmune

- Thymus gland(sternum)-punching-I weak
- Bilateral weakness of Deltoid-hyperactive TH-1
- Bilateral weakness of infraspinatus-hyperactive TH-2

Code	Test Name	Values	Provisional Ranges
STP	**Saliva Thyroid Research Study**		
fTSH	Thyroid stimulating hormone	30 Normal	*Borderline Low: 20-25 nIU/ml* *Normal: 26-85 nIU/ml* *Borderline High: 86-120 nIU/ml*
fT4	L-Thyroxine	0.17 Normal	*Normal: 0.17-0.42 ng/dl*
fT3	Triiodo-thyronine	0.27 Borderline Low	*Borderline Low: 0.21-0.27 pg/ml* *Normal: 0.28-1.10 pg/ml*
TPO	Thyroid Microsomal Ab, SIgA	Positive	*Normal: Negative*

The Saliva Thyroid tests are intended for research use only and not as stand alone diagnostic tests. Additional tests may be required. Results should be contextualized into the over all clinical picture. These values reflect unbound "Tissue-Delivery" concentrations which may not neccessarily correlate with serum hormone levels.

Diagnosis Code: Not Provided To The Lab.

Please use this report in context of the clinical picture before initiating hormone or other therapies.

COURTESY INTERPRETATION of test and technical support are available upon request, to Physician Only

Code	Test Name	Values	Provisional Ranges
STP	**Saliva Thyroid Research Study**		
fTSH	Thyroid stimulating hormone	23 Borderline Low	*Borderline Low: 20-25 nIU/ml* *Normal: 26-85 nIU/ml* *Borderline High: 86-120 nIU/ml*
fT4	L-Thyroxine	0.39 Normal	*Normal: 0.17-0.42 ng/dl*
fT3	Triiodo-thyronine	1.25 High	*Borderline Low: 0.21-0.27 pg/ml* *Normal: 0.28-1.10 pg/ml*
TPO	Thyroid Microsomal Ab, SIgA	Negative	*Normal: Negative*

==========

The Saliva Thyroid tests are intended for research use only and not as stand alone diagnostic tests. Additional tests may be required. Results should be contextualized into the over all clinical picture. These values reflect unbound "Tissue-Delivery" concentrations which may not neccessarily correlate with serum hormone levels.

Diagnosis Code: Not Provided To The Lab.

Please Note: All examples of patient treatment or therapy are for illustrative and/or educational purpose. Use this report in context of the clinical picture before initiating hormone or other therapies.

COURTESY INTERPRETATION of test and technical support are available upon request, to Physician Only

Thyroid synergy

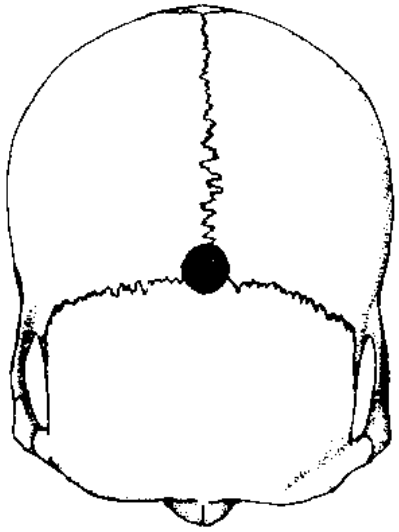
- Vitamin A (as Palmitate) 2000 IU
- Vitamin B2 (as Riboflavin-5-Phosphate) 5 mg
- Iodine (as Potassium Iodide) 100 mcg
- Zinc (Zinc Glycinate Chelate) 25 mg
- Selenium (as Selenomethionine) 50 mcg
- Copper (Copper Glycinate Chelate) 500 mcg
  Manganese (Manganese Glycinate Chelate) 5 mg
- Chromium (Chromium Nicotinate Glycinate Chelate) 50 mcg
- N-Acetyl L-Tyrosine 200 mg
- American Ginseng Extract (Panax quinquefolius) 200 mg
- ForsLean® Extract 100 mg

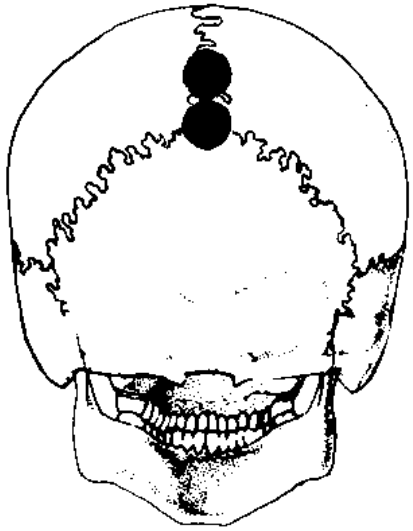
Diaphragm

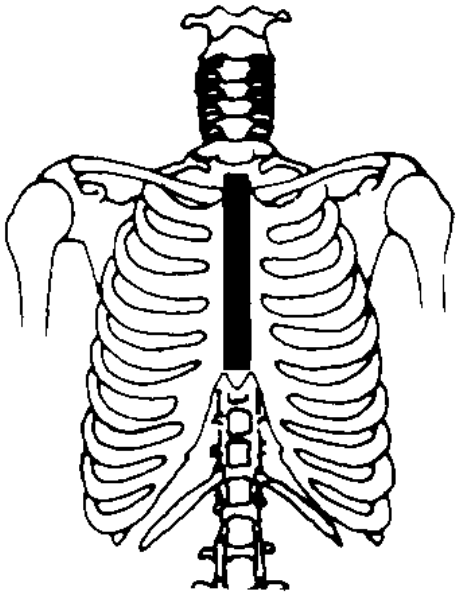
- Create systemic and local problems.
- Diaphragm is 2nd important m in the body (heart is the most)

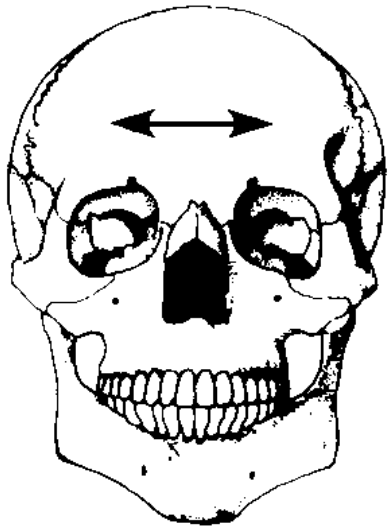
Anatomy

- The sternal part arises from the xiphoid process.
- The costal part arises from the cartilages of the last six ribs.
- The lumbar part arises from the crura which are attached to the lumbar vertebrae.
- The right, or larger crus arises from the bodies of the first three lumbars. The left arises from only the top two lumbar bodies.



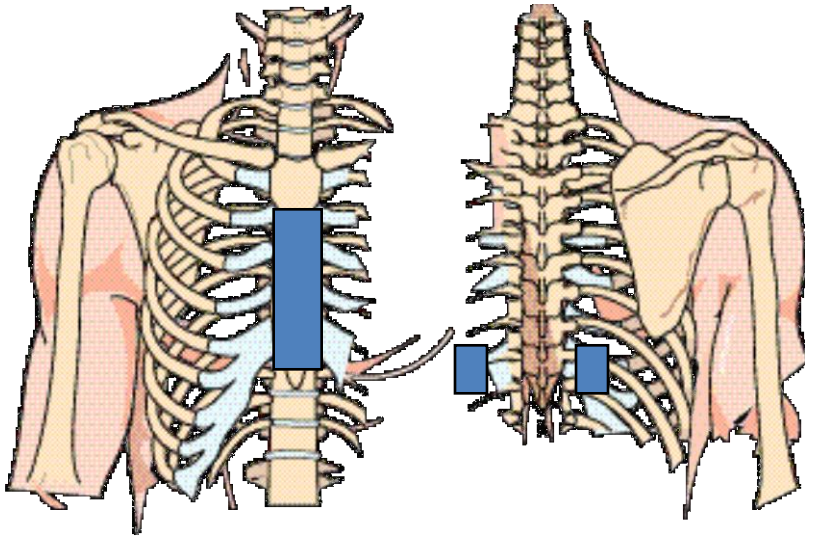






Reflexes - Lymphatic

- Located over the entire surface of the diaphragm
- 10th rib lateral to the spine



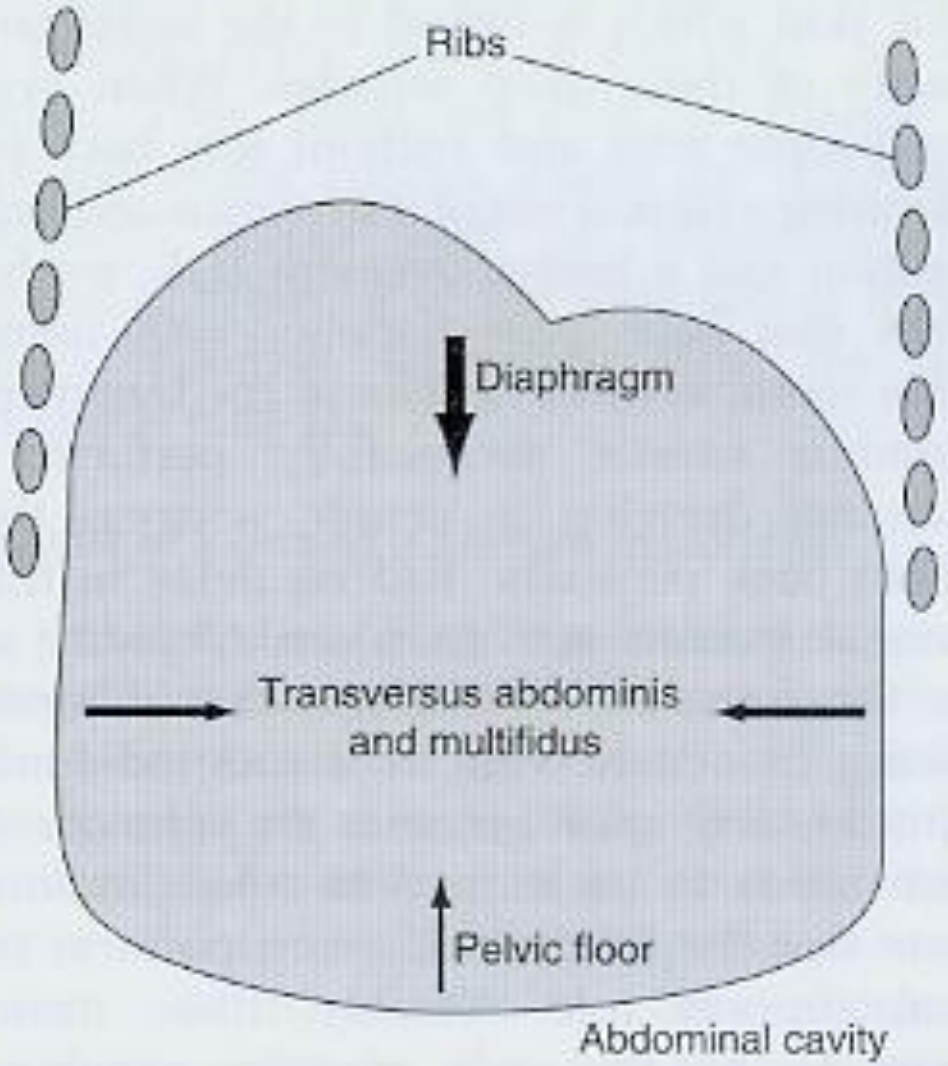


Figure 7.2 The functional unit of local stabilization: a stylized drawing of the transversus abdominis, diaphragm and lumbar multifidus and pelvic floor.

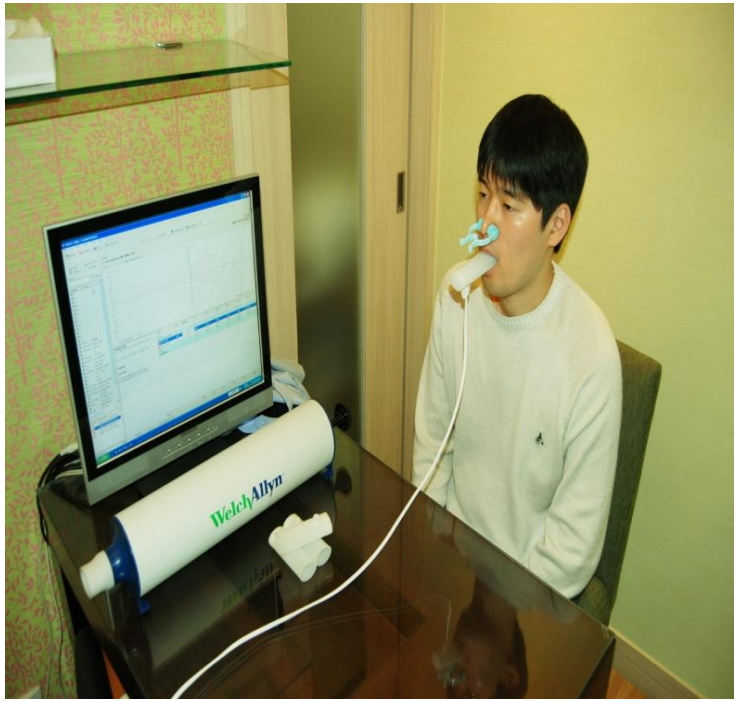
Symptoms

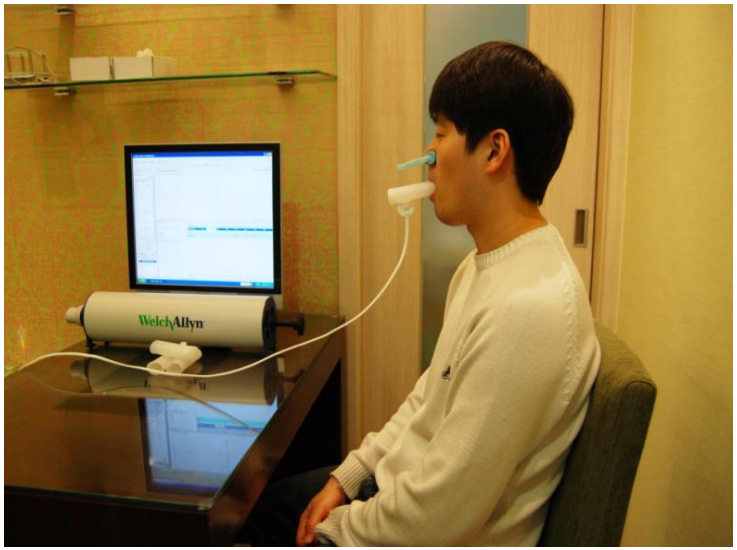
- Decreased vital capacity.
- Decreased breath holding time
- Unilateral decrease in lateral rib motion on force inspiration when the psoas is over contracted.
- Weakness of a strong muscle after placing a lead square over CV-24 and GV-27.

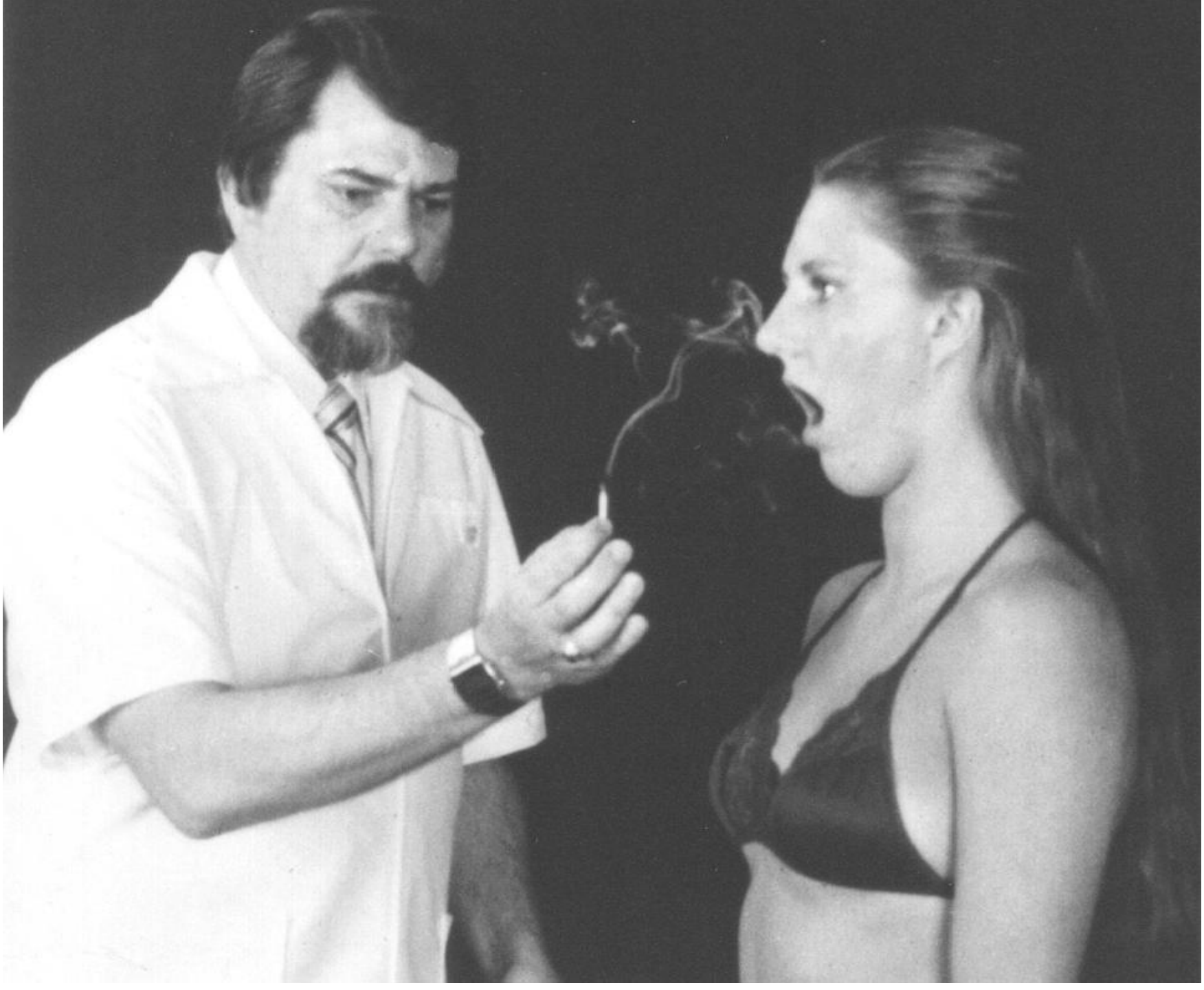
Testing

- Spirometer
  - Or other device to measure vital capacity and/or maximum expiratory flow rate
- Snider's test
  - Blow out a match 6 inches from mouth with mouth open


WelchAllyn


WelchAllyn


WelchAllyn



Function

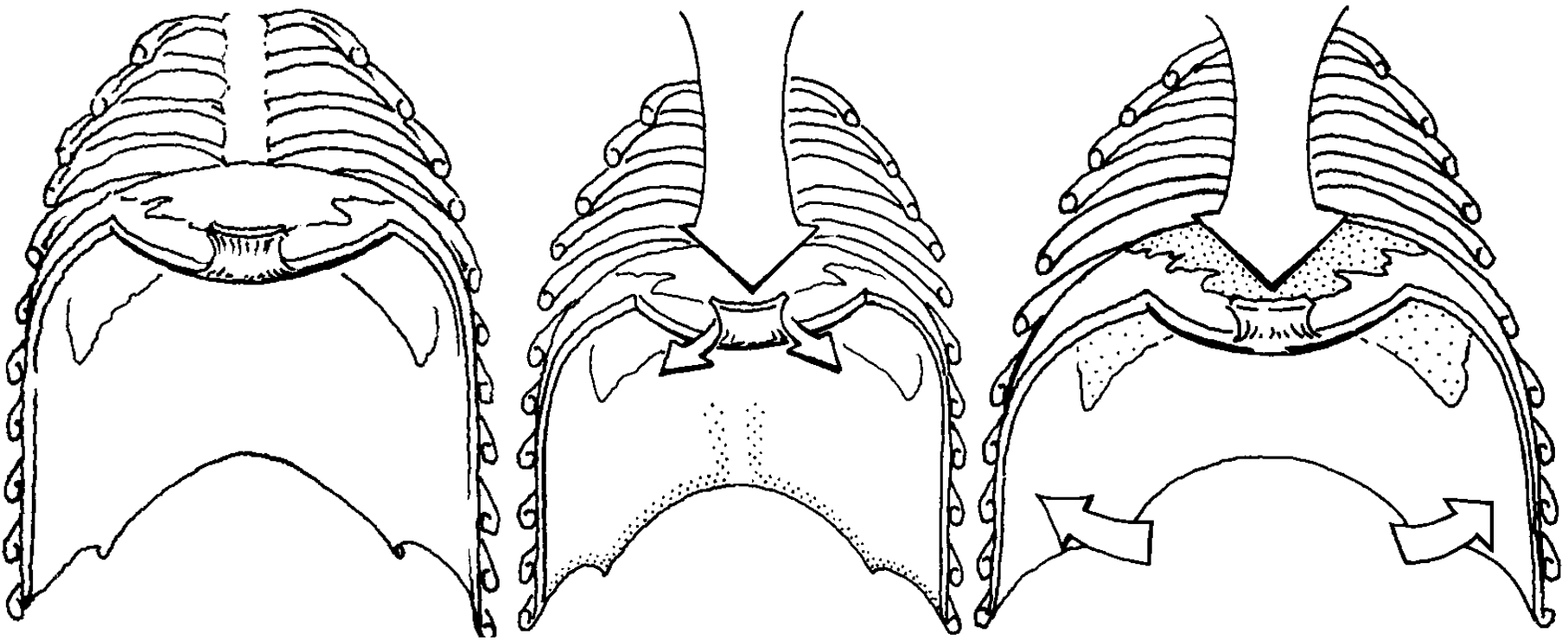
1. oxygenation
2. pump acupuncture system throughout the body corrected by fixing diaphgram.

- Strength of tone and power is important.
- **Esophageal hernia due to decreased tone of diaphragm**

Diaphragm evaluation

- Chest expansion
- Measurement
- Vital capacity
- Snider's test
- **Spirometer**

- Breath holding
- Lead over CV24-GV27
- TL under xyphoid
- Dia. Reactive to psoas
- Phrenic nerve(c345)
- D-L fixation
- **NL-NV-SR**



Breathing pattern에 중요한 것은
chest excursion : 10센티미터, 4인치
는 되어야 한다.
–nipple level.

횡격막 근육검사

- Left lumbar division
  - Origin: lower 6 ribs, L1-3, xiphoid proc.안쪽
  - Insertion: central tendon
  - Test: flex the trunk 20, rotate obliquely to the left . Take deep breath and hold test I ms.
  - NL-K27, B12(C7-T1)
  - Deep manipulation of K27 and BL12 bilaterally
- Right lumbar division

Diaphragm

- 흡입기능
- 호흡시 한쪽 흉곽의 기능저하-같은 쪽 tight Psoas와 관련
- Tight Psoas쪽 발의 turn-in작용 저하
- Bilateral lower trapezius 약함
  - Dorso-lumbar fixation
- TL C3 negative in the clear but positive on expiration
  - Phrenic nerve-Subluxation of C3
- Hiatal Hernia/reflux(GERD)
- Neurolymphatic; sternum

Diaphragm; Sx & correction

- ◉증상
  - 견비통, 위산과다, 구토
  - 만성피로, 현훈
  - 심흉통, 호흡촉박, 협심증과 유사
  - 딱꾹질
  - TMJ
- ◉ Correction
  - Correct reactive psoas
  - Challenge C3
  - Adjust thoraco-lumbar fixation
  - Rub neurolymphatic(sternum)
  - Respiraton exercise

Treatment

- Check for a hypertonic psoas on the side of decreased rib motion.
  - The leg/ foot will turn in less with hypertonicity.
  - Correct hypertonic psoas by spindle cell correction and check the opposite psoas for hypotonicity.
- Test Quadratus Lumborum for weakness and reactive pattern
  - Locks 12th rib from mid inspiration - full inspiration

Treatment

- Check for subluxation of the third cervical
  - Phrenic nerve - C 3, 4 & 5
  - TL with the patient inspiring maximally
  - Test for Lovet subluxation of lumbar spine (L3)
- Check for subluxation of T 6 - 12
  - Sensory fibers to the diaphragm
- Check for a dorso-lumbar fixation.
- Check for pelvic subluxations
  - Internal and external rotation types

Treatment

- Palpate ribs laterally for tenderness. Correct by giving resistance against inspiration.
- Have patient contract neck muscles and test for weakening
  - Treat with percussion over C - 5 on inspiration
- Test for involvement of the sternalis muscle
  - Percussion
  - Strain counterstrain

sternalis: 문제가 있으면 rib expand되지 않는다

Poor diaphragmatic function

- tight psoas
- short abdominal wall—배꼽과 xiphoid사이의 압통이 심하다.
- short QLs, 예 rib belt는 아래를 고정 –이것을 고정하면 모든 늑골의 움직임을 제한한다.
- rib subluxation
- phrenic nerve C345,
- clavicle problem –phrenic nerve가 이곳 바로 아래로 내려간다.

Hiatal Hernia

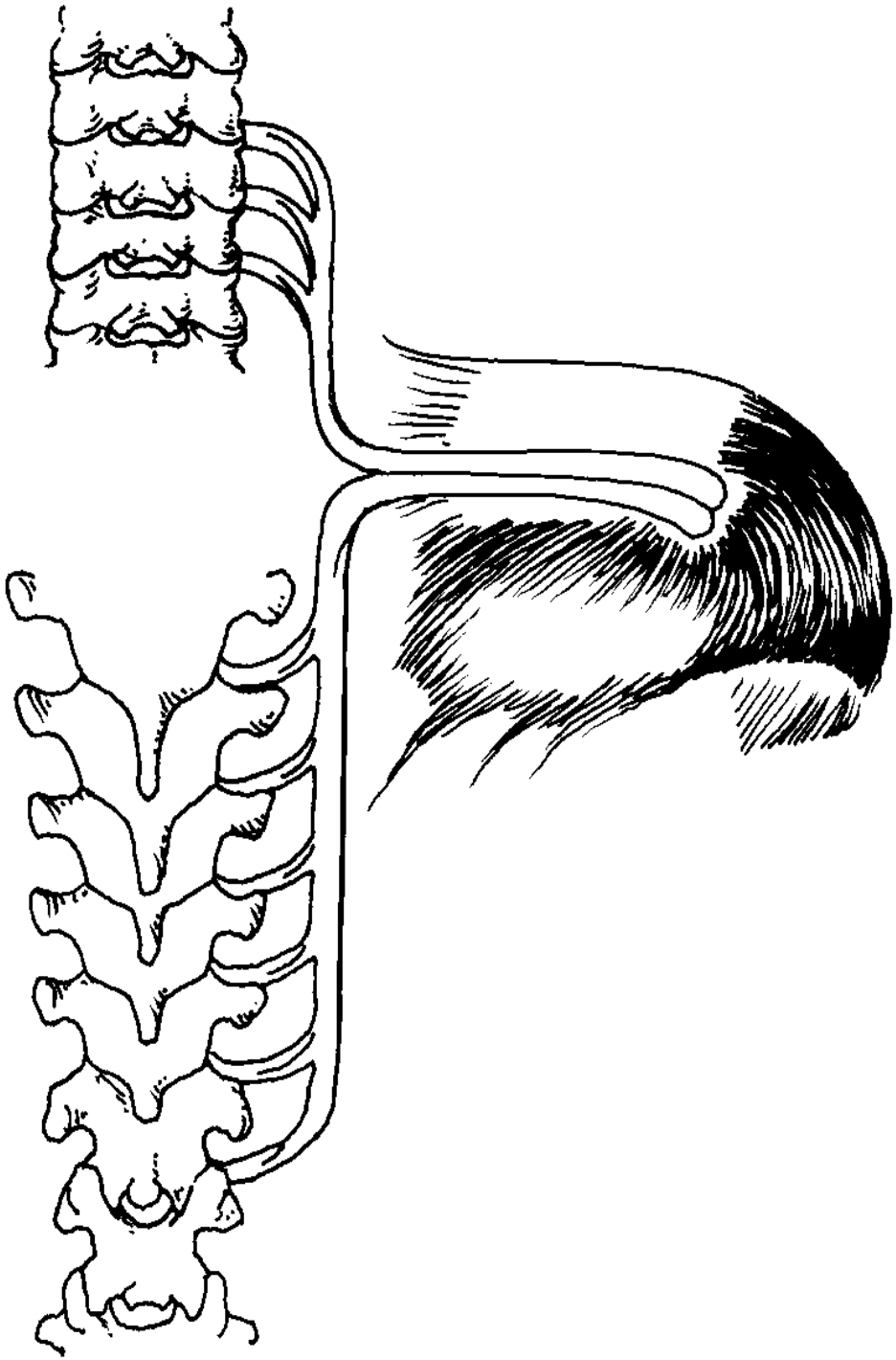
- PMC-best indicator 근육
- Challenge; push to hiatus
- Correction; pull-down
- 강한 근육pmc를 기준으로 의사가 위장아래쪽을 contact한 후 왼쪽어깨 방향으로 밀었을 때 pmc가 약해지면 hiatal hernia indication
- Chest expansion과 psoas를 테스트하고 약하면 치료한다.
- 환자가 숨을 내쉴때 위장아래쪽을 pull-down

thoracolumbar fixation **치료해야 하는 이유**

- more kyphotic : diaphragm weak
- T 11-12 associated point of stomach
- **diaphragm receive some nerve supply from T11-12**

DIGESTION

- GERD
- Rule out Helicobacter pylori
- 40%의 미국사람은 적절한 HCL분비 못하고 feeling of fullness and bloating, cramping—controversy to medical



Greater mimic of hiatal hernia

- Digestive

Stomach

Gall bladder

Epigastric

- Cardiac

Angina

Coronary occlusion

- Pain

Back

Neck

Jaw

Ear

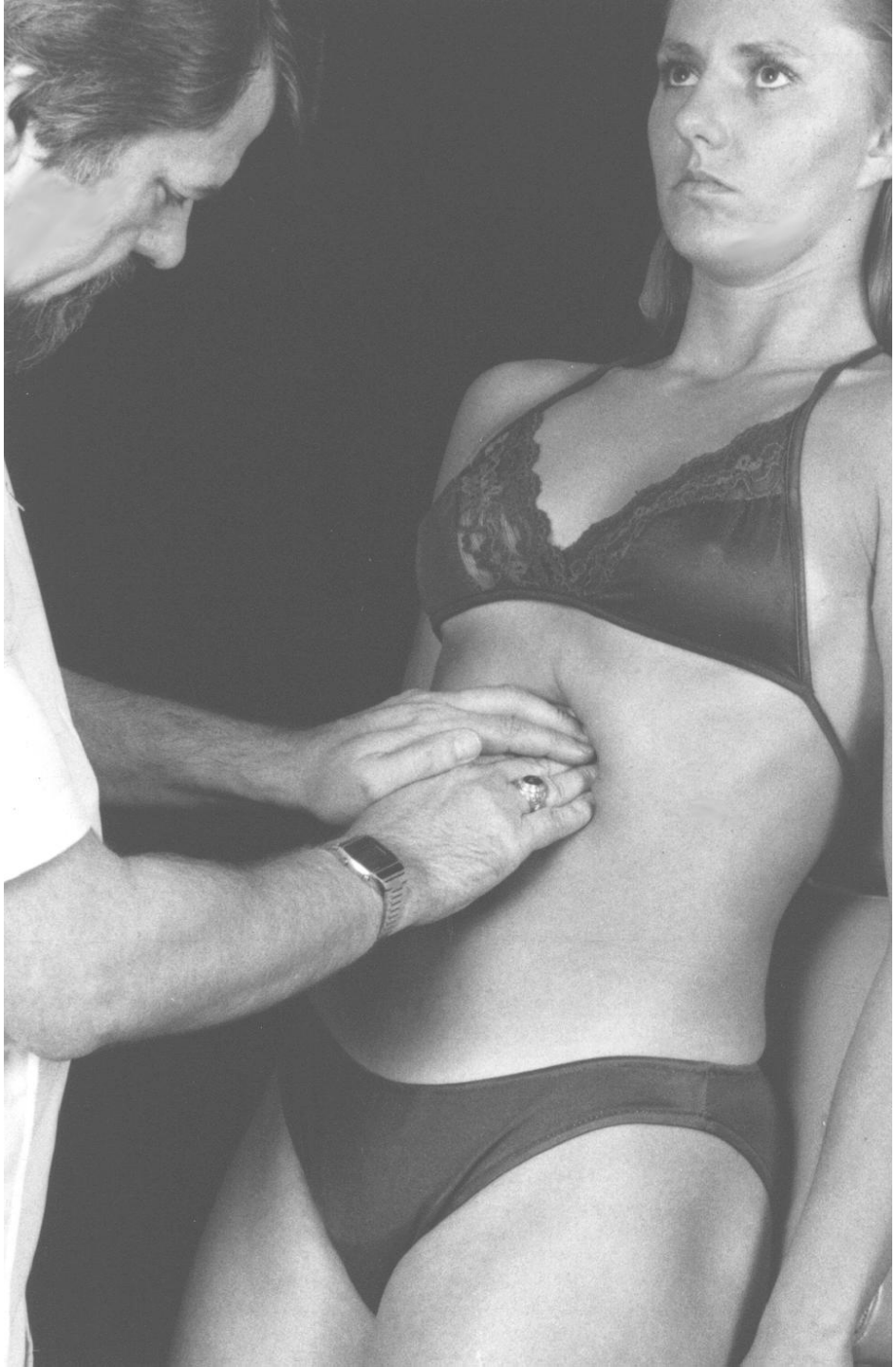
Palate

Shoulder

Arm

Incidence of hiatal hernia

- 1. parallel of age
- 2. hernia is due to muscle laxity : hital hernia correction하는 AK procedure 는 muscle tone을 증가시킴
- 3. antacid medication for gastric reflux: medical –shuts off acid production---OA



New diaphragm technique

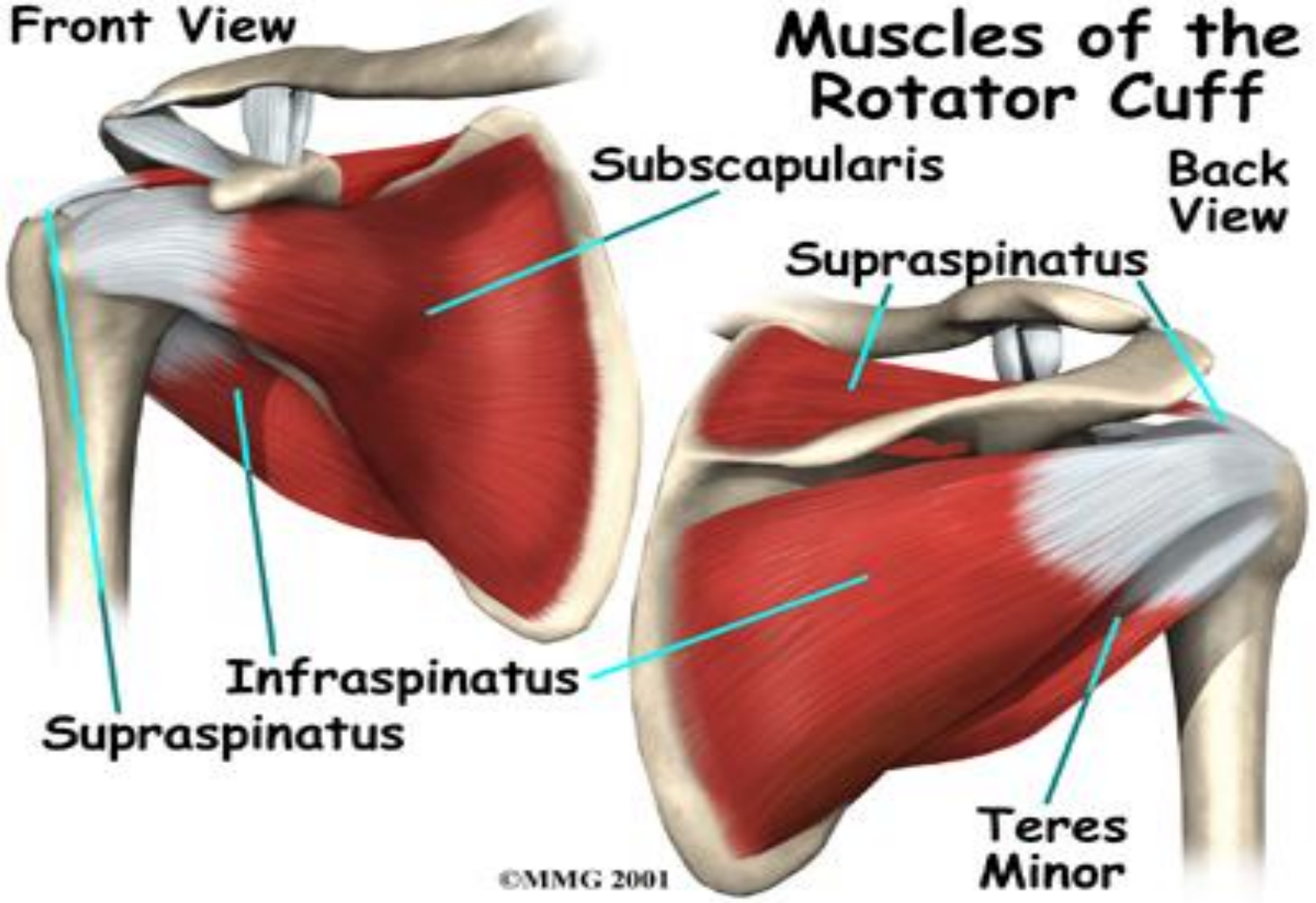
- 1. Measue vital capacity
- 2. Check ROM-thoracic sitting and supine
- 3. TL umbilicus and linea alba-Indicator weak-press 30-40초 치료
- 4. TL left 6^{th} rib-Indicator weak-percuss
- 5. test subscapularis-만일 약하면 hiatal hernia 치료하듯 한다
- 6. phrenic nerve: C3-C5 subluxation with breath cessation technique
- 7. check the 7^{th} thoracic, usu. Left T7(diaphragm point)
- 8. check the lower trap for fixation

Shoulder, thoracic outlet, hidden cervical disc

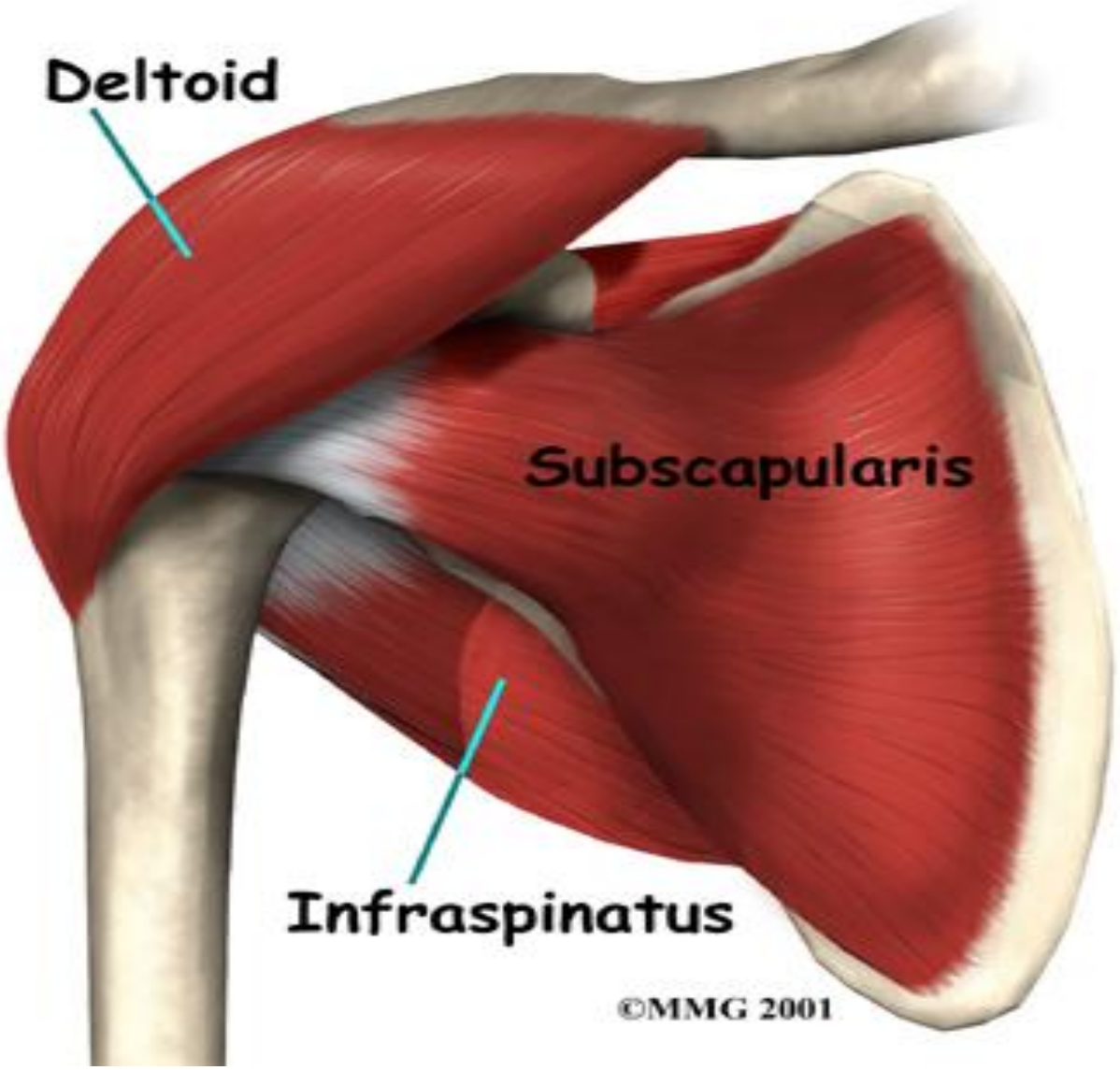
이승원

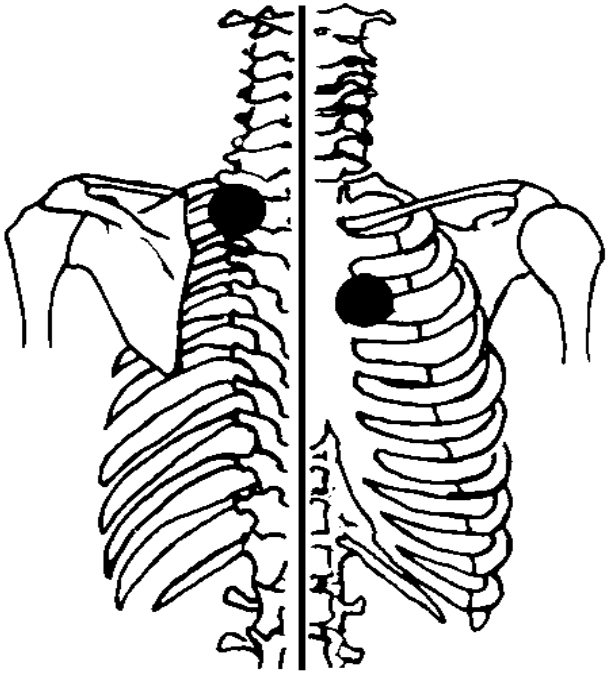
SHOULDER MUSCLES

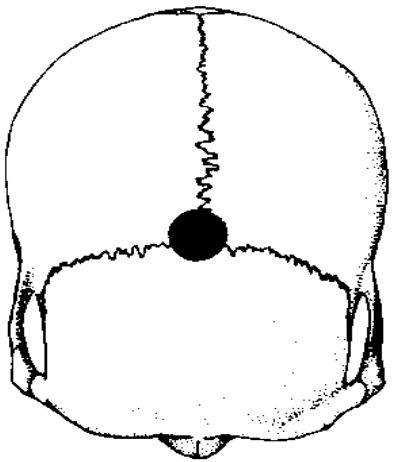
Rotator cuff

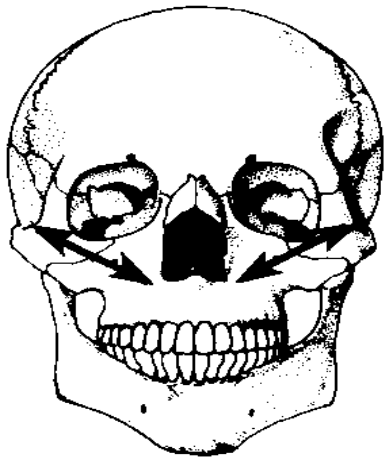


어깨 밑근, 견갑하근 subscapularis







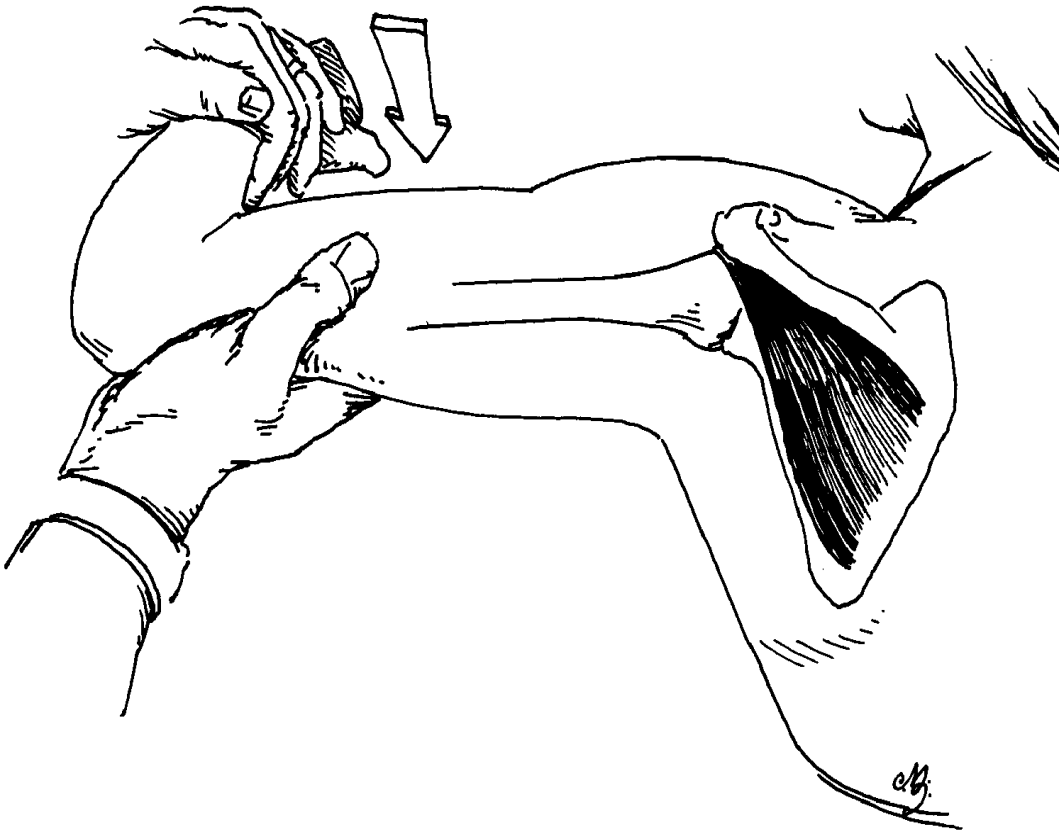


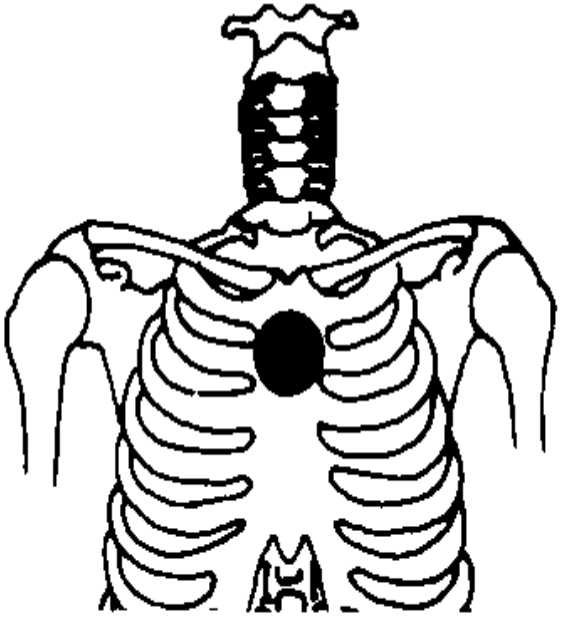
- **기시:** Anterior scapula (subscapular fossa)
- **종지:** Humerus – lesser tuberosity, shoulder joint capsule
- **기능**: medial rotation
- **Spinal Levels: Innervation:** C-5/6 (upper & lower subscapular) **TS/Meric:** T-2 **Acup:** T-5/6
- **기관:** 심장
- **경락:** 심장
- **영양:** Cardio-plus
- **Chapman's Reflex:** (Bilateral) Ant: 2nd IC space; Post:T-2/3

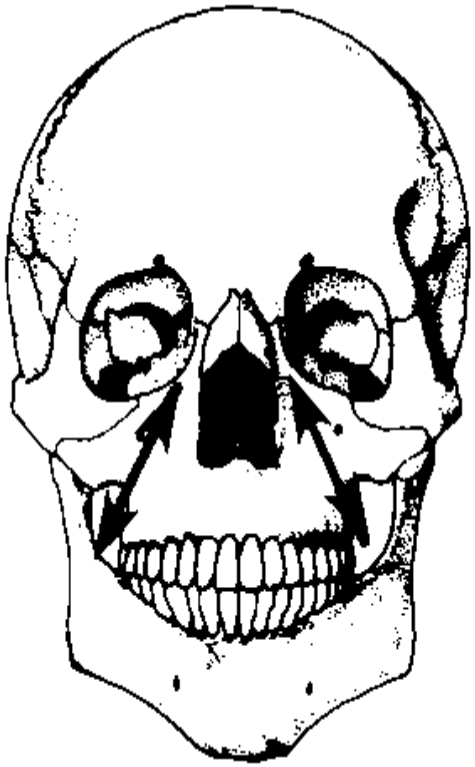
임상적 의의

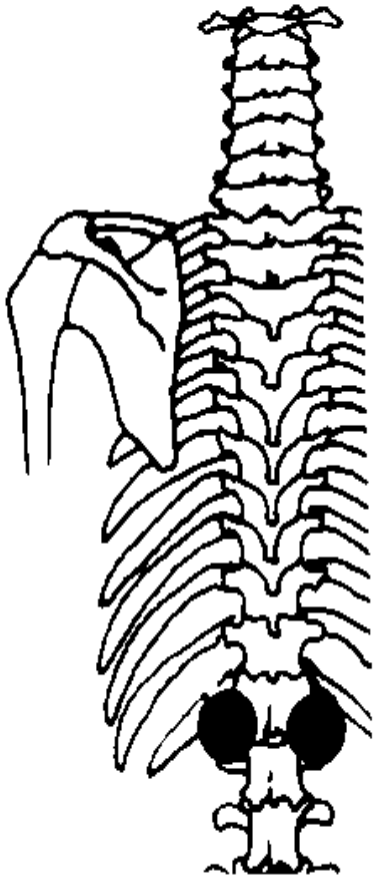
- 던지는 동작
- 테니스 동작(forehand), 골프 등.
- 앞으로 팔을 뻗치는 것이 힘들다(통증, 제한적 ROM)
- 몸 반대로 팔을 뻗치는 것이 힘들다(통증, 제한적 ROM)
- 등 뒤로 팔을 제끼는 것이 힘들다
- 기시-종지부위 손상-“rotator cuff syndrome”
- 기시부위 전체가 다 손상됨을 고려
- 심장 문제(coronary, cardiac)

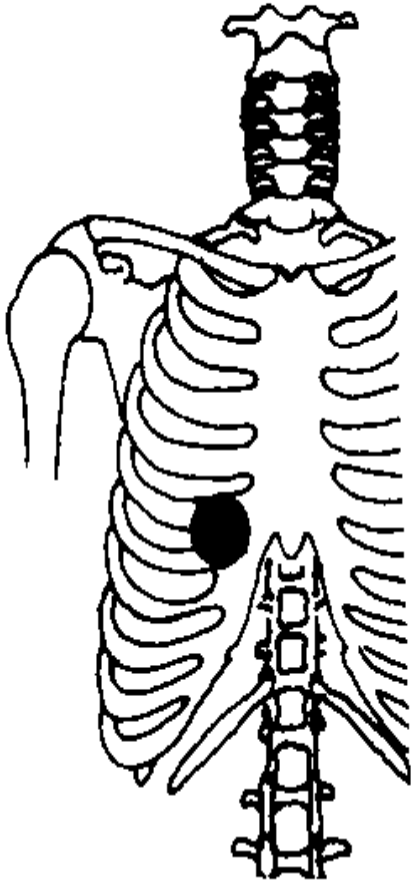
극하근 infraspinatus











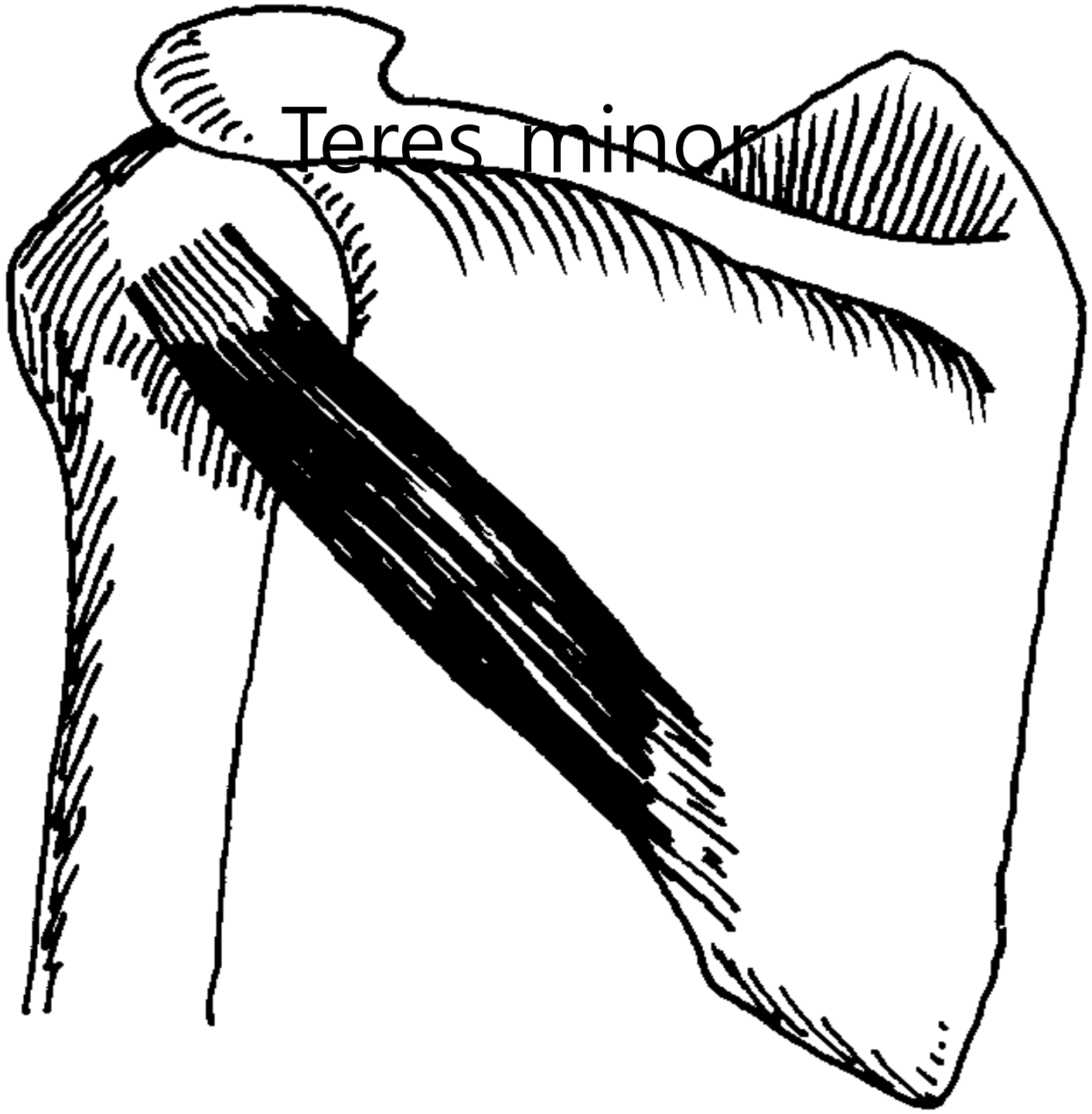
Infraspinatus

- Related to thymus
- The most important immune system: chronic ill, infection etc
- Too much cortisol inhibit thymus gland: thymus atrophy
- Vitality

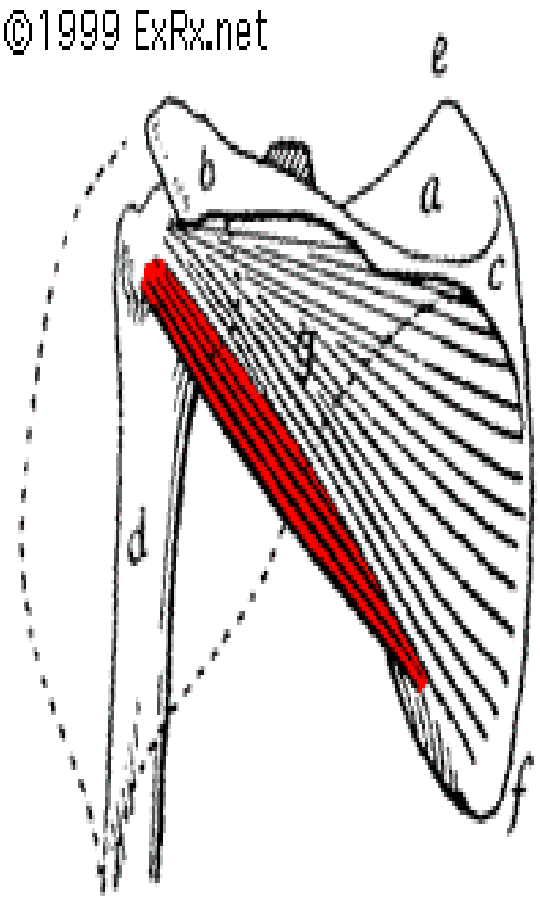
- **기시:** Medial 2/3rds of infraspinous fossa of scapula
- **종지:** Greater tubercle of humerus (middle facet), shoulder joint capsule
- **기능**: lateral rotation; with teres minor and teres major produces smooth shoulder abduction by stabilizing scapula
- **Spinal Levels:** **Innervation:** C-5,6 (suprascapular) **TS Line/Meric:** N/A **Acupuncture:** L-1/2
- **기관:** 흉선
- **경락:** 삼초경
- **영양: Immunoberry**
- **Chapman's Reflex:** (Ant. only) Right 5th IC space from mid axillary line to mid mamillary line

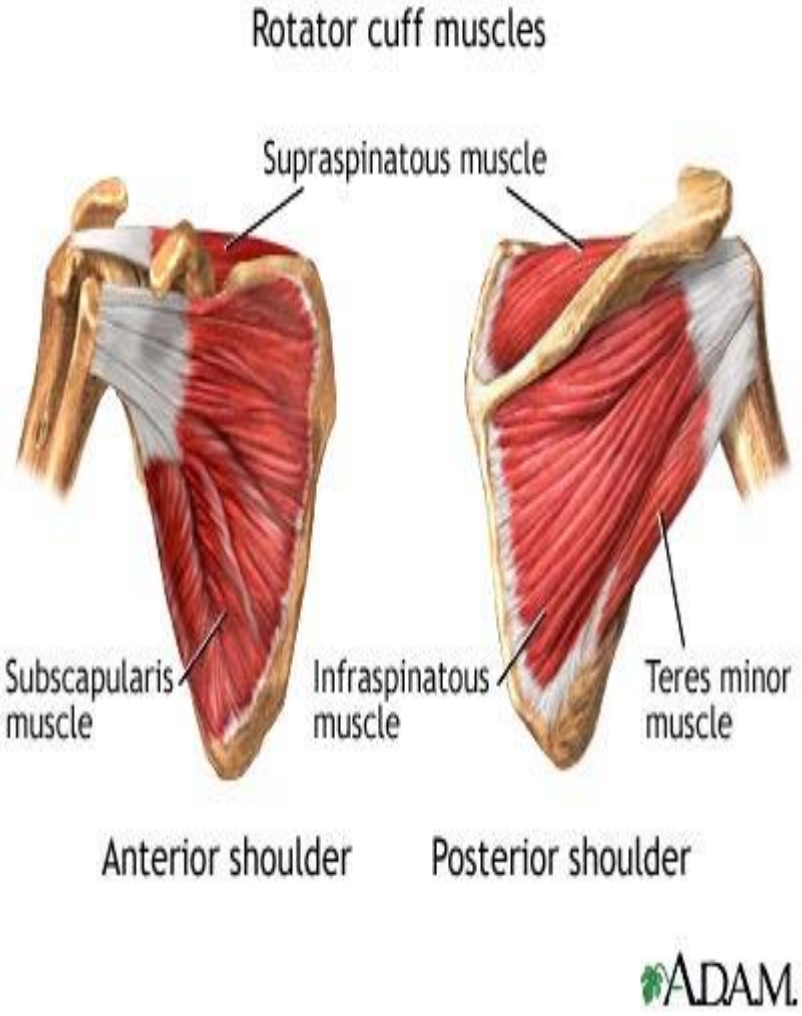
임상적 의의

- 어깨 올리기 힘들다(통증, ROM제한)
- 등 뒤로 팔 돌리기 힘들다
- 손바닥을 위로해서 팔을 머리 뒤로 올리기 힘들다
- 테니스 동작(backhand), 골프 등
- 기시-종지 손상- “rotator cuff syndrome”
- 기시-종지 손상-견갑 부위 어디든지.
- **면역력 문제(감염, 자가면역성, 암환자)**

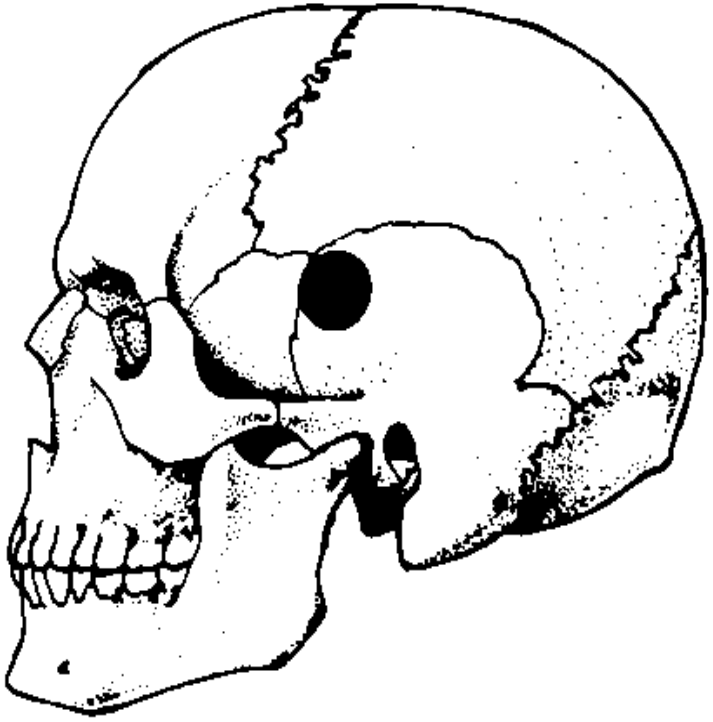

Teres minor

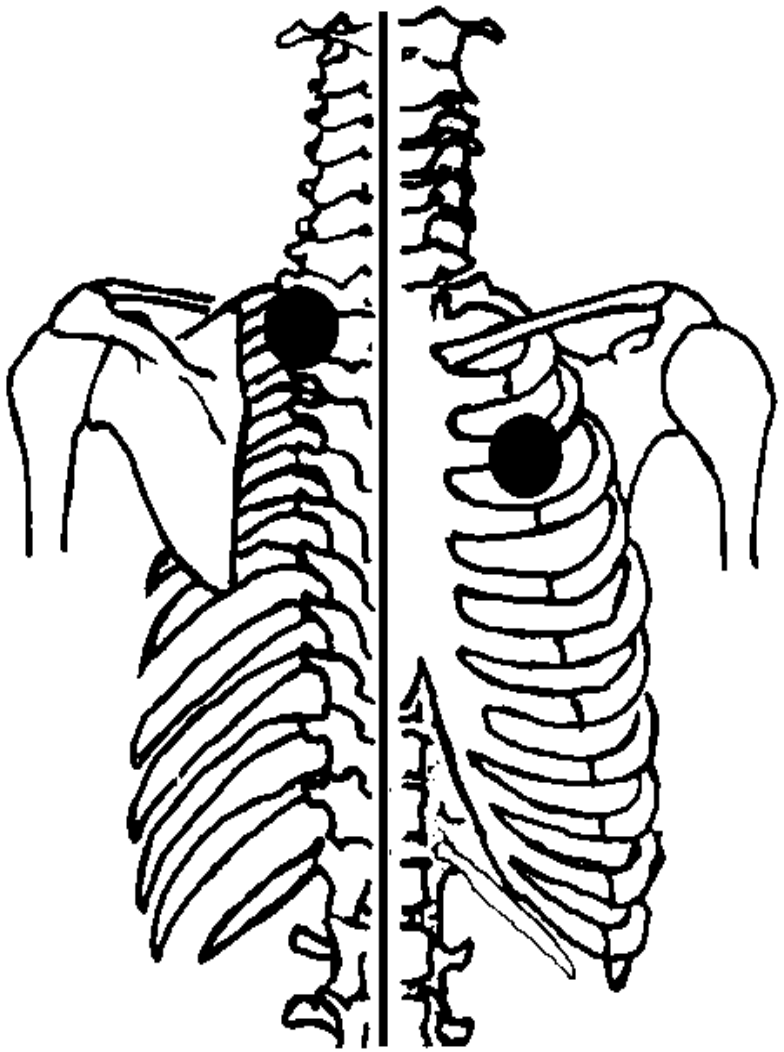
Teres minor


©1999 ExRx.net
a
b
c
d
e
f
g


Rotator cuff muscles
Supraspinatous muscle
Subscapularis muscle
Infraspinatous muscle
Teres minor muscle
Anterior shoulder
Posterior shoulder
A.D.A.M.

- **기시:** Middle to lower 1/3 of axillary border of scapula
- **종지:** Greater tubercle of humerus – lowest facet
- **기능**: lateral rotation; with infraspinatus and teres major produces smooth shoulder abduction by stabilizing scapula
- **Spinal Levels: Innervation:** C-(4),5,(6) (axillary) **TS Line/Meric:** N/A **Acupuncture:** L-1/2
- **기관:** 갑상선
- **경락:** 삼초경
- **영양:** 갑상선 추출물, 요오드, Parotid tissue,
- **Chapman's Reflex:** (Bilateral)

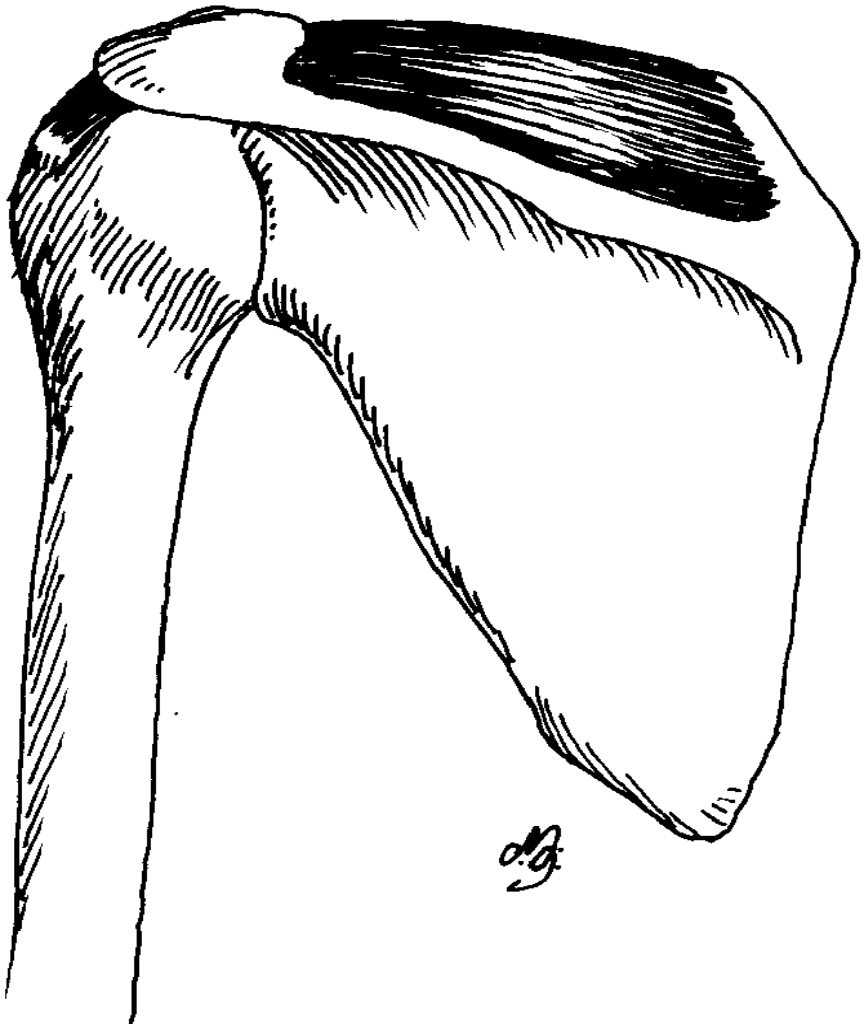


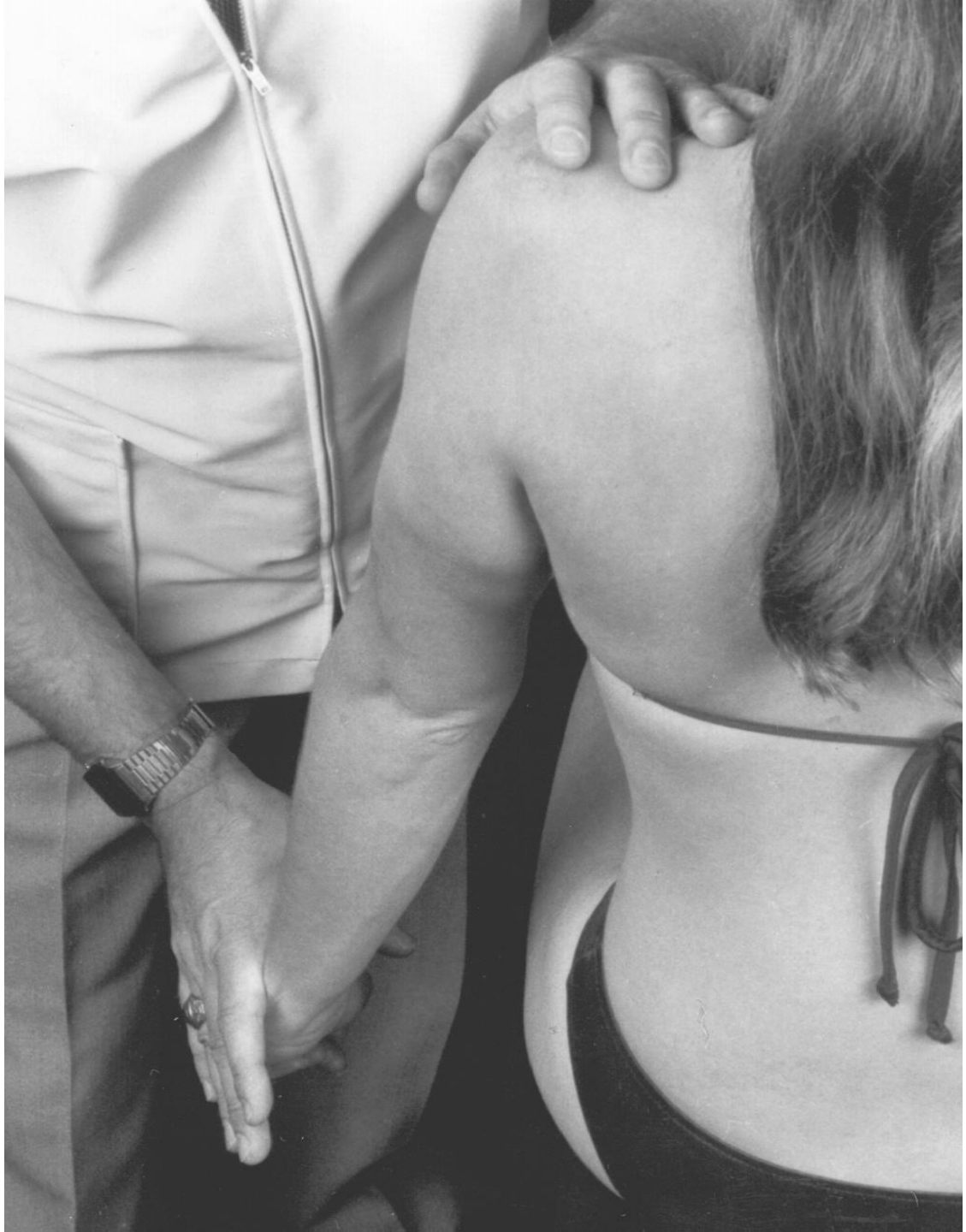


임상적 의의

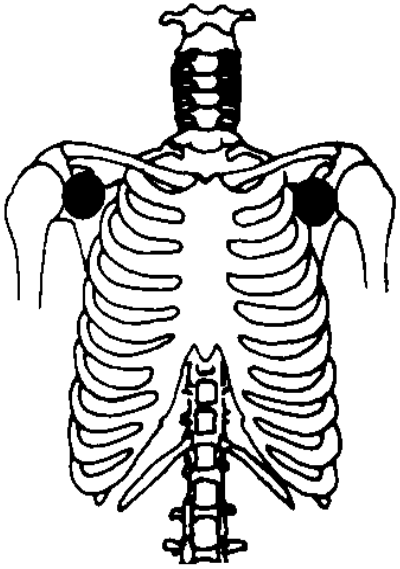
- 뒤에서 손바닥을 볼 수 있다
- 어깨 올리기 어렵다
- 팔을 뒤로 뻗치기 어렵다
- 손바닥을 위로 하고 팔을 머리위로 올리기 힘들다
- 테니스 동작(backhand), 골프 등
- 기시-종지 손상 “rotator cuff syndrome”
- 갑상선 질환

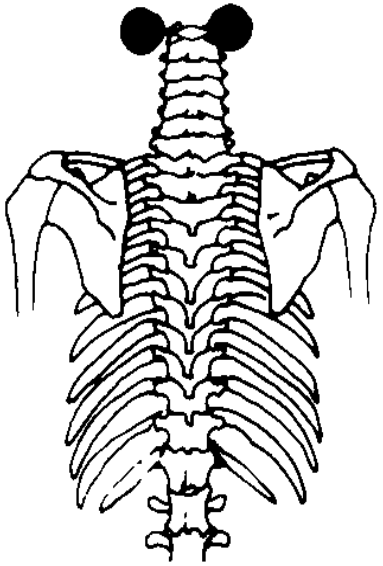
극상근 supraspinatus

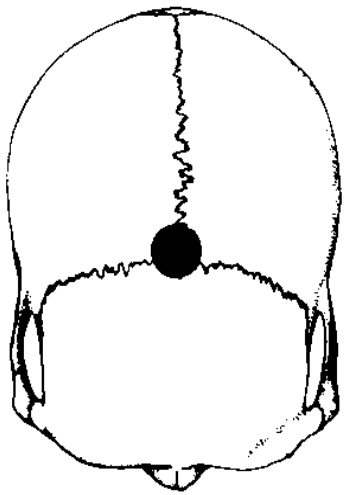




- **기시:** Medial 2/3rds of supraspinous fossa of scapula
- **종지:** Greater tubercle of humerus, shoulder joint capsule
- **기능:** begins abduction (1^{st} 15^{O} – 20^{O}); holds humeral head in glenoid fossa
- **Spinal Levels: Innervation:** C-5,(6) (suprascapular) **TS Line/Meric:** N/A **Acup:** T-6/7, T-7/8
- **기관:** Brain, thyroid(neurolink)
- **경락:** 독맥 혹은 임맥
- **영양:** Brain vitale
- **Chapman's Reflex:** (Bilateral) Ant: Over coracoid process; Post: Base of skull to C-1 lamina





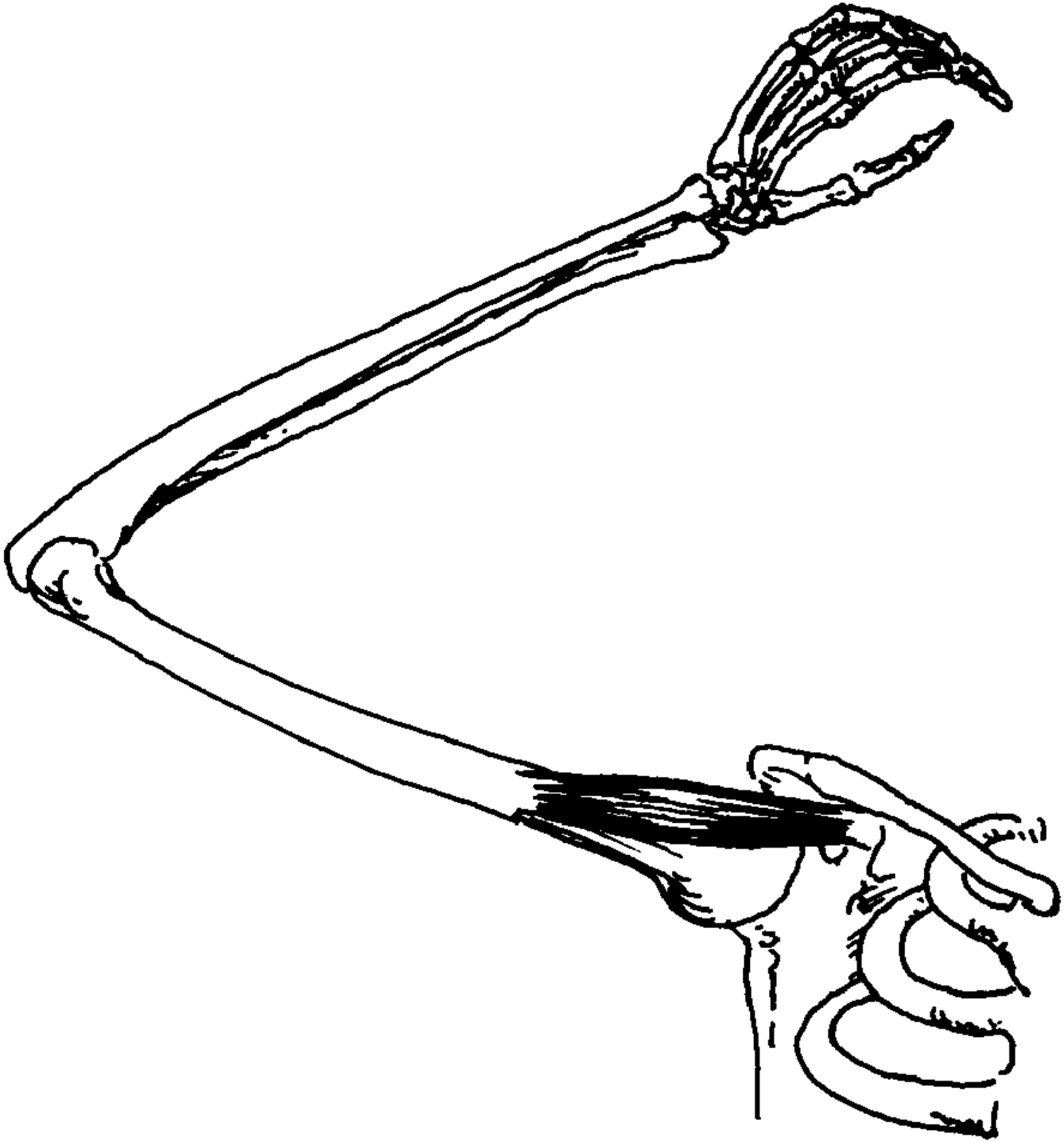


임상적 의의

- humeral abduction어렵다
- 어깨와 관련된 통증 이나 가동력 문제
- 기시-종지 손상 “rotator cuff syndrome”
- Degeneration –tearing
- 뇌 – cerebrovascular accident (including transient ischemic attacks)

Corcobrachialis

- Organ: lung
- Musculocutanous nerve innervation C6,7
- NV, NL
- 머리뒤로 손을 돌리기가 힘들다.



임상적 의의

- 빗질 어렵다
- 면도가 어렵다
- 팔을 위로 뻗치고 있기 힘들다
- 폐

기시: Tip of coracoid process – shares tendon with short head of biceps

종지: Medial side of humerus – just opposite deltoid insertion

기능: flexion; adduction

Spinal Levels: **Innervation:** C-5,6,7 (musculocutaneous) **TS Line/Meric:** T-4 **Acup:** T-3/4

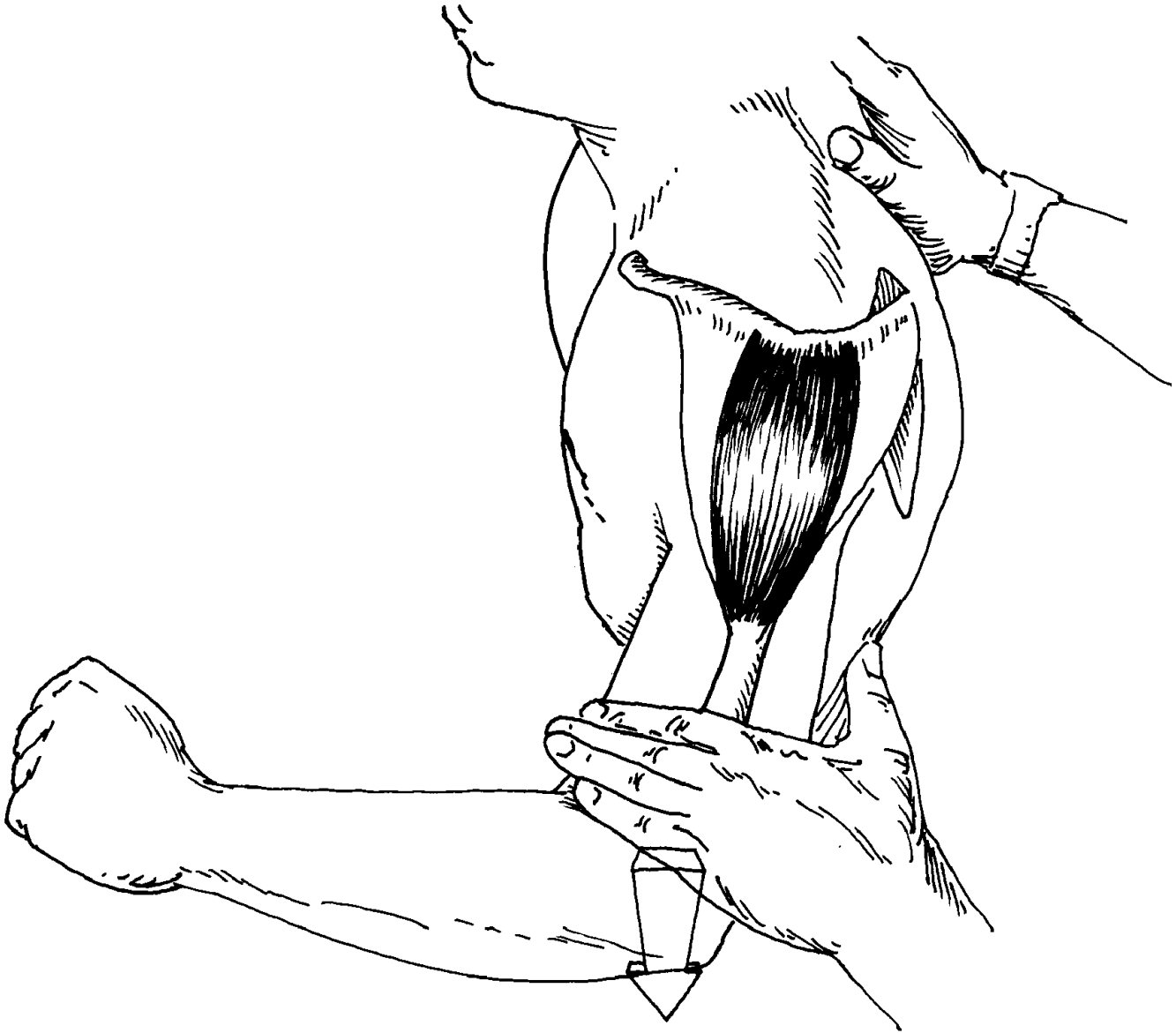
기관: 폐

경락: 폐

영양: Vitamin C; Lung tissue

Chapman's Reflex: (Bilateral) Ant: 2nd, 3rd, 4th IC spaces; Post:T-3/4

Middle deltoid



- **기시:** Upper surface of acromion (embraces insertion of upper trapezius)
- **종지:** Deltoid tubercle of humerus
- **기능**: abduction; cannot initiate abduction; lifts arm only to 90^{O} – further elevation from tilting glenoid fossa superiorly
- **Spinal Levels:** **Innervation:** C-5/6 (axillary) **TS Line/Meric:** T-3 **Acupuncture:** T-3/4
- **기관:** 폐
- **경락:** 폐
- **영양:** 비타민C; 폐 추출물, (RNA)
- Chapman's Reflex: **(Bilateral) Ant: (2^{nd}), 3^{rd}, (4^{th}) IC spaces; Post: T-(2)/3/4**

임상적 의의

- 어깨 abduction어렵다
- 폐 청진시 Absent – pneumothorax
- 폐와 관련된 질환(less likely in asthma)
- Route of elimination (nasal / sinus congestion)
- Bilateral - C-7 / T-1 / T-2 AK “fixation”

PRP(platelet rich plasma) prolotherapy(인대증식치료) 소개

PRP-prolo

- **자신의 혈액에서 치유(healing)를 담당하는 성장인자를 분리, 농축시켜서 손상된 조직에 주사하여 자연에서는 볼 수 없는(supra-physiologic) 빠르고 강력한 치유를 유도하는 근본적인 치료 방법**

  - **PRP (Platelet Rich Plasma) : 혈소판이 농축된 혈장**
  - **Prolotherapy(증식주사) : 조직의 재생을 유도하여 손상된 인대나 근육을 근본적으로 치유시키는 주사법**

PRP란 환자의 혈액을 이용한 시술방법

채혈 :
환자분이 원하시는 시술프로그램에
따라 1 ~2회 정도 채혈합니다.

Kit 활용 :
채혈된 혈액을 Kit에 주입합니다.

1차 분리 :
혈액 분리 작업

2차 농축 :
PRP 고농축 작업

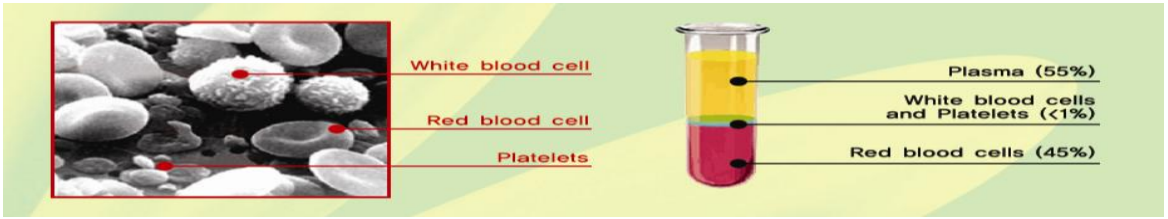
3차 농축 :
고농축 PRP 추출 작업

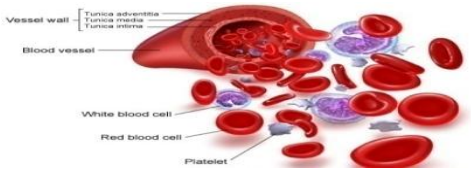
완성 :
환자분이 원하시는 시술프로그램에
따라 시술합니다.

1. PRP의 정의

혈액을 고속회전시키면, 혈구와 혈소판, 혈장으로 나누어지는데 이 중에서

성장인자가 풍부한 혈소판이 다량 함유된 혈장을 뜻합니다.





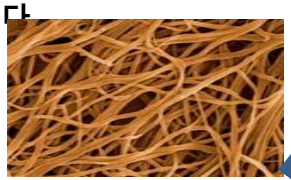
2. 혈소판 연관 성장인자의 기능

PDGFaa , PDGFbb , PDGFab , TGFB1 , TGFB2 , VEGF , EGF등의 성장인자를 함유하고 있다.

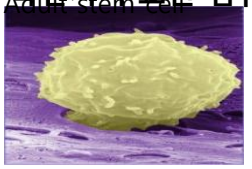
이들 성장인자는 줄기세포의 복제 , 조골세포의 증식 및 골양조직의 생성촉진, 내피세포의 증식,

새로운 혈관 생성의 촉진, 섬유아세포의 증식을 촉진시켜 교원 섬유의 생산을 증가시켜

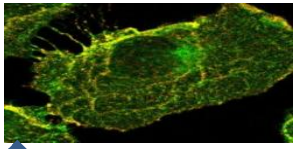
조직을 재생합니다.



Scaffold
(Fibrin)



Stem cell



Growth Factor

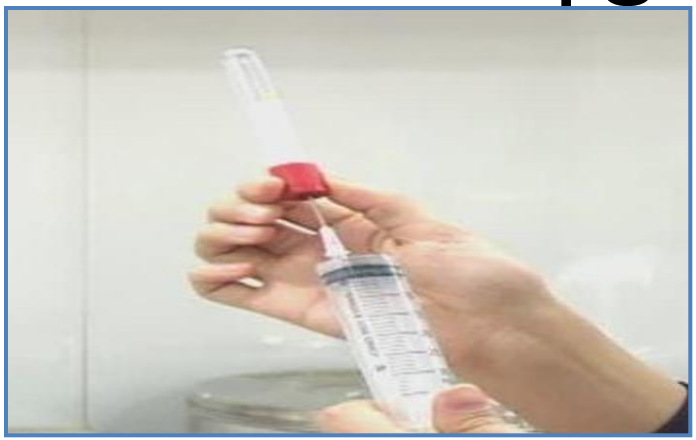
3. 혈장의 기능 - 혈장 단백질?

혈장에는 치유 과정을 시작하고 조절하는 다양한 단백질이 포함되어 있습니다. 환자 혈액의 적은 양으로도 이 단백질들을 농축할 수 있는데, 그 종류에는 albumin, immunoglobulin, fibrinogen, alpha 1-antitrypsin, regulatory protein 등이 있습니다. 이러한 단백질들은 세포의 분화를 처리량에 비례하여 자극하는데, 알부민은 삼투압을 형성하여 조직에 여러 분자들을 이동시켜주는 역할을 하고, regulatory protein은 유전자 발현을 조절해 주는 역할, immunoglobulin은 면역반응을 fibrinogen은 fibrin으로 변화하여 혈소판의 활성, 혈액 응고, 신호 유도 등을 담당합니다.

Method

- Anticoagulant : ACD-A
- Blood drawn : 20ml
- CBC Device : Coulter STKS
- Concentrated twice

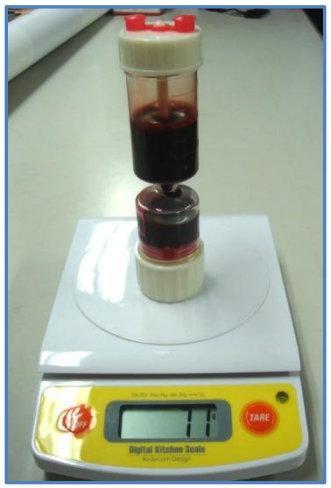
Prosys Bio Kit PRP 추출 과정



항응고제를 혈액의 1/10 비율로
주사기에 주입

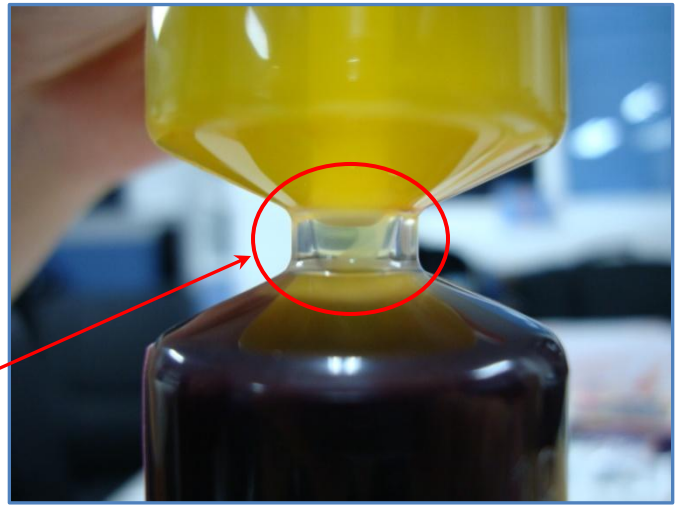
항응고제를 포함한 채혈량
20cc~30cc 혈액체취

채혈된 혈액을 분리 Kit의
벽면을 통해 주입



채혈된 Kit의 무게를 잰 후
수평을 맞추고 1차 원심 분리

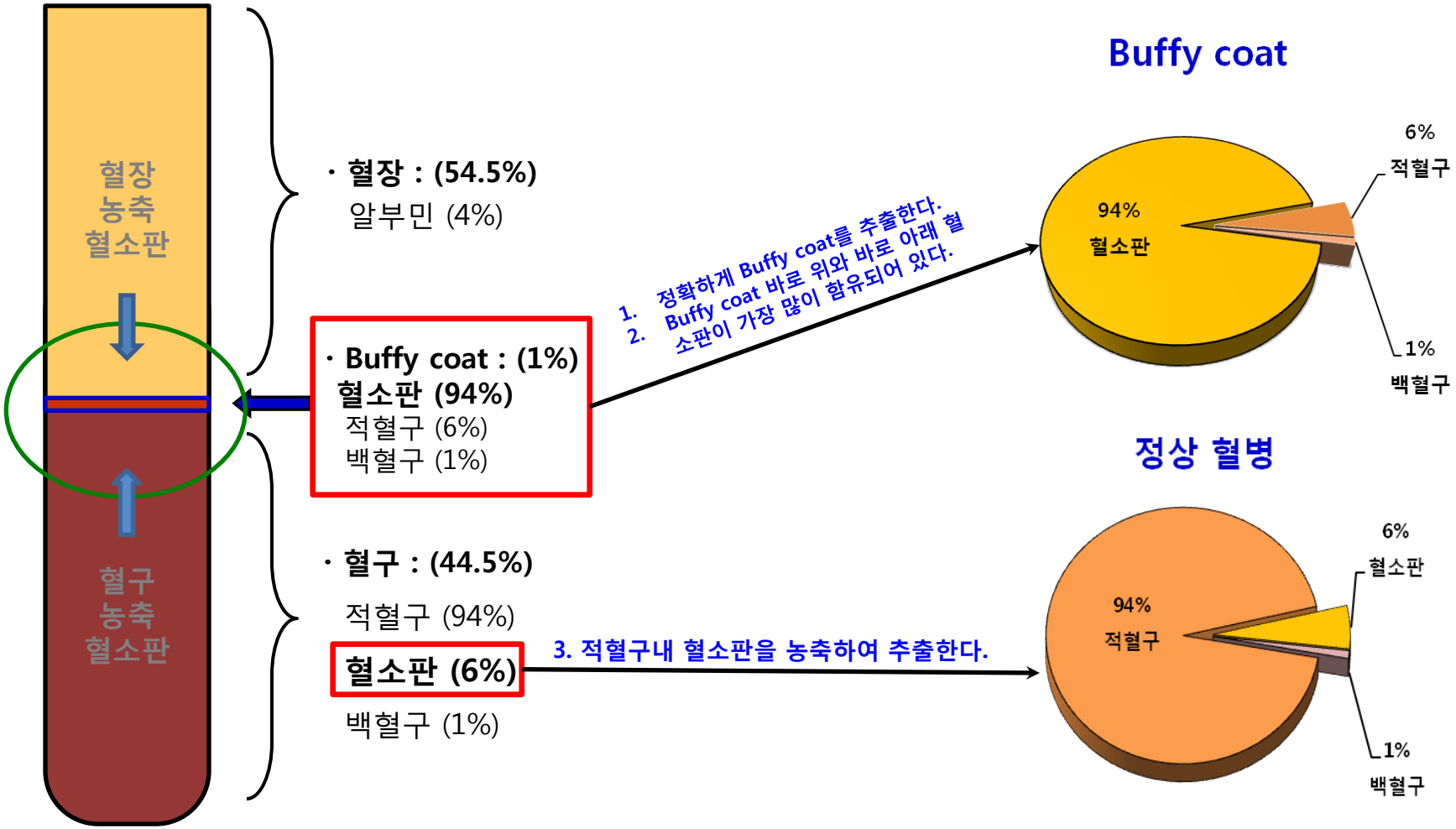
Prosys Bio Kit PRP 추출 과정



1차 분리 (약 95% 이상의 분리와 Buffy coat 확인)

PRP (Platelet –Rich Plasma)?

"고농축 혈소판을 추출하고, 혈장으로 희석하여, 사용하는 혈병제재"를 뜻한다.



혈소판과 혈장단백질

1. 혈소판

GF	기능
TGF-β (Transforming growth factor beta)	미분화된 중간엽세포를 분화하도록 자극 내피세포, 섬유아세포,조골세포의 세포분열을 조절 콜라겐 합성과 콜라겐 효소분비 조절 다른 GF들의 세포분열을 조절 내피세포의 화학주성과 신혈관 생성을 자극
PDGF (Platelet derived growth factor)	콜라겐 합성 효소의 분비조절과 콜라겐 합성조절 대식세포와 중성구 화학 주성자극 줄기세포의 복제
EGF (Epidermal growth factor)	콜라겐 합성 효소분비를 조절 상피, 중간엽세포의 세포분열을 조절
VEGF (Vascular endothelial growth factor)	혈관 투과도와 혈관 생성증가 내피세포의 세포분열 자극
CTGF (Connective Tissue Growth Factor)	혈관 생성, 관절 재생, 섬유형성, 혈소판 응고 촉진

혈소판과 혈장단백질

2. 혈장단백질

① 염증 및 상처를 치료하고 삼투압을 통하여 약물전달을 용이하게 하며, 면역조절 기능을 가진다.

② 혈장단백질은 혈소판 내 존재하는 효소의 역할이 중요하므로 원심분리기의 온도가 매우 중요하다. (37~42℃)

- 알부민(albumin)
  삼투압을 형성하여 조직에 여러 분자들을 이동시켜주는 역할담당
- 글로브린 (globulin)
  인체내의 면역기능을 담당
- 피브리노겐 (fibrinogen)
  Fibrin으로 변화하여 혈소판의 활성, 혈액응고, 신호유도를 담당하여 상처의 빠른 치유를 유도한다.

활성화된 혈소판의 역할

I. 살균작용 : 대식세포를 불러들여, 저항체를 형성하고 세균 성장을 억제한다.

II. 상피분화 : 콜라겐 다발과 연동하여, 조직화 시킨다. 콜라겐의 재조직화 시 보다 많은 양의 콜라겐 다발과의 결합을 유도한다.

III. 자가이식조직의 조작특성을 증진시킨다. 필러, 자기지방이식, 모발이식등의 생착력을 증대시킨다.

IV. Stem Cell의 화학주성적 이동을 자극한다. 즉, Stem Cell을 이동, 분열, 재생을 통한 세포분열을 자극하고 성장인자를 효과적으로 발생시켜 인체에 필요한 세포들로 만드는 역할을 합니다.

V. Angiogenic factor(혈관신생 유도인자)의 합성을 증진시킨다.

VI. 신호단백질의 농도가 증가한다. 상처부의에 세포를 불러 분열시키는 작용을 한다.

VII. 특히 , 모세혈관에서 혈관의 내면(내피세포층)에 정상적인 연속성 또는 완전성을 유지시켜준다.

VIII. 이차성지혈(혈액응고)과 Fibrin형성을 촉진하고 활성화시킨다.

IX. 혈소판 유도성장인자(PDGF)를 통한 혈관 치유의 증진. 내피세포의 이주와 평활근 생산을 자극

X. PDGF를 포함한 성장인자를 통하여 상처 수복 및 Serotonine과 또한 호중구기능을 조절하는 혈관화성 물질을 방출하여 염증에 필요한 역할을 담당한다.

Clinical application
Orthopedic, sports medicine

- Tendinosis **(건염 & 건병증)**
- Acute and chronic muscle strain
  (급성 & 만성 근육 염좌)
- Ligamentous sprain **(인대 염좌)**
- Joint capsular laxity
  (어깨관절을 둘러싸며 안정성을 제공해주는 관절낭의 느슨해짐)
- Arthritis **(관절염)**
- Articular cartilage defects **(관절의 연골 결함)**
- Meniscal injury **(반월상연골 손상)**
- Chronic synovitis **(만성 활액막염)**