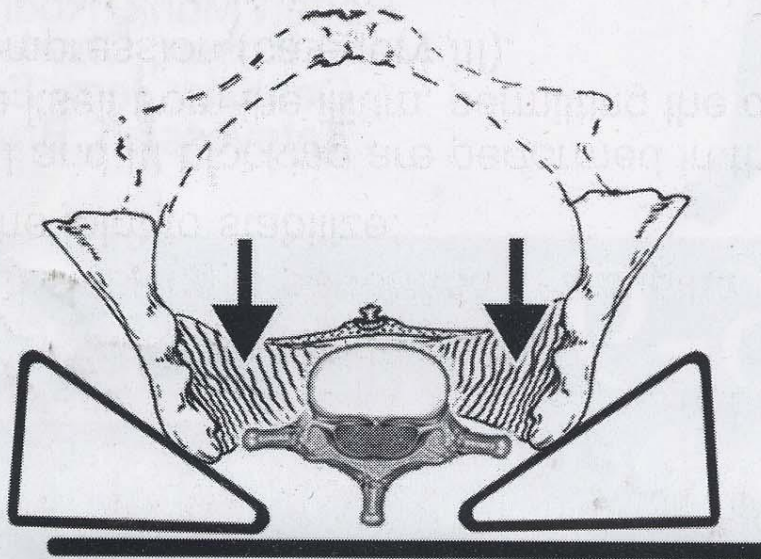


# **골반변형 (Category I, II, III)**

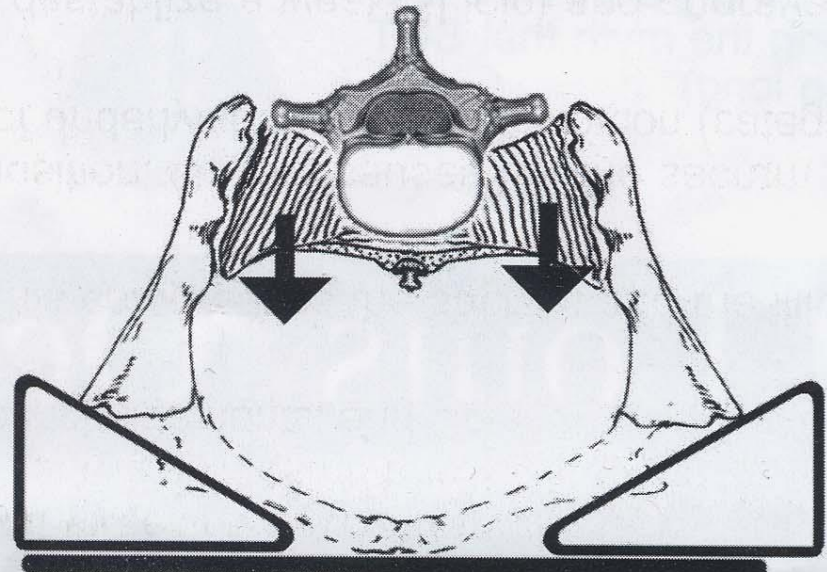
First developed by DeJarnette

# What is the difference between Supine vs. Prone Blocking?

**Supine Blocking ( Category II)**  
(gravity presses the sacrum into the illia)



**Prone Blocking (Categories I and III)**  
(gravity pulls the sacrum away from the illia)



The SOT blocks are most commonly used in the treatment of three specific categories of body distortion: Category I, associated with the anterior sacroiliac joint and its synovial membrane; Category II, associated with the posterior sacroiliac joint and its posterior weight bearing ligaments; and Category III, associated with sciatica and lumbar discopathy.

Category II blocking is performed in a supine position. This compresses the sacrum and the ilium, allowing the joint to stabilize.

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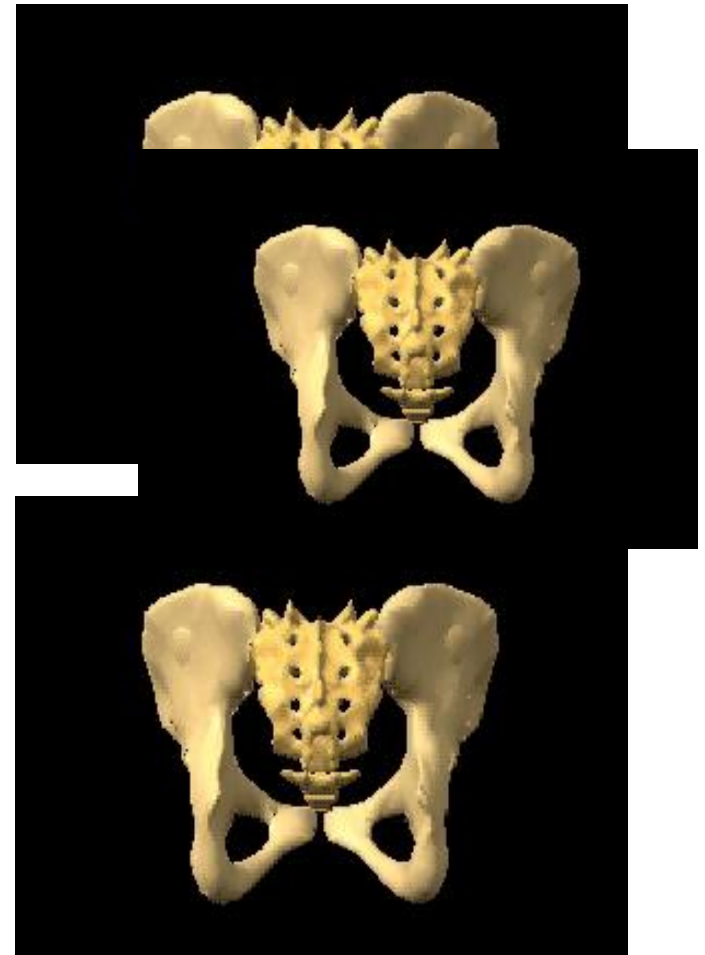
This is a significant distinction since prone blocking can destabilize a weak SI joint and aggravate a Category II condition.

Knutson G, "The Sacroiliac Sprain; Neuromuscular Reactions, Diagnosis and Treatment with Pelvic Blocking," Journal of the American Chiropractic Association, Aug. 2004, 41(8): 32-9.

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# 제2형 골반변형

- 정의; osseous disrelationship between sacrum and ilium
- 증상; 요통, lower bowel complaints, 생식기관 기능이상 , 어깨 질환, 가동범위저하(목)
- Visual signs; unlevelled pelvis, lateral sway on postural analysis



# 제2형 골반변형 후방장골 PI

관련근육

xray 연관성

압통이 있는 부위

다리길이 차이



# 제2형 골반변형 후방좌골 AS

관련근육

xray 연관성

압통이 있는 부위

다리길이 차이



# 제 2형 골반변형

UoMS Sign (후하방 장골엉덩뼈 = PI ilium)

- Upper inguinal area 압통 (sartorius, rectus femoris origins)
- obturator 압통 (gracilis origin)
- 내측 대퇴, 슬관절 압통 (sartorius - gracilis 만나는 곳/ 종지점)
- Short leg side

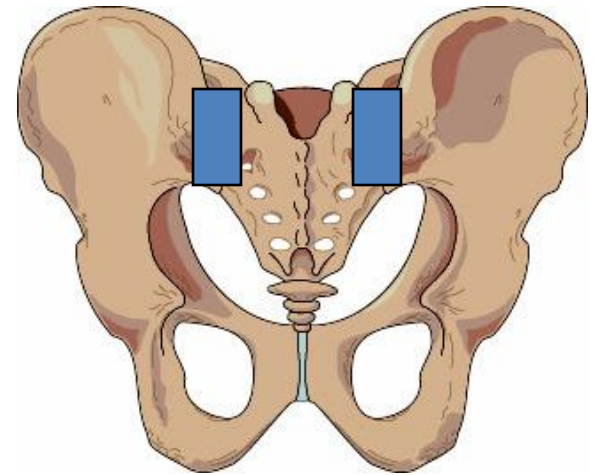
# LiLL Sign

(전상방 엉덩뼈장골 = AS ilium)

- Lower inguinal area 압통 (adductors origins)
- ischial 압통 (hamstrings origins)
- Lateral thigh and knee 압통 (hamstrings, G. max insertions)
- Long leg side



# 접촉검사

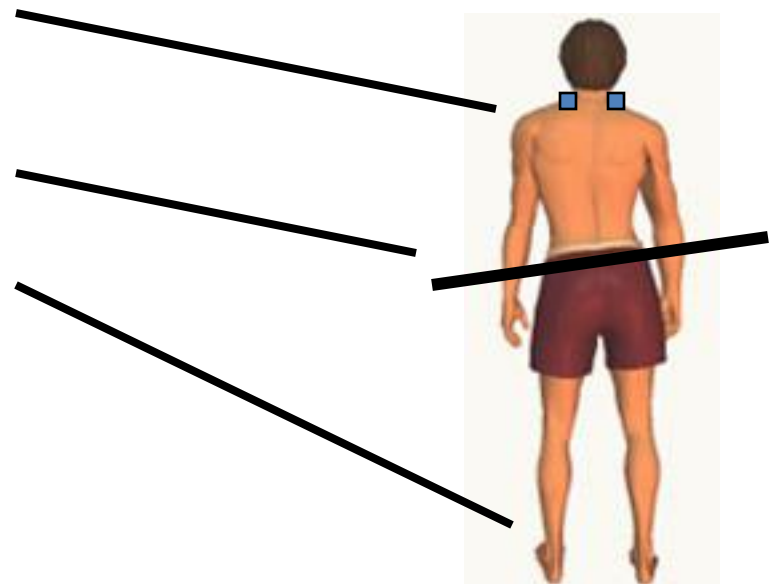


# 특징적인 증상

- 골반통 Pelvic discomfort
- Leg pains
- 요통 Lumbar complaints
- Decreased cervical rotation
- Abdominal pains

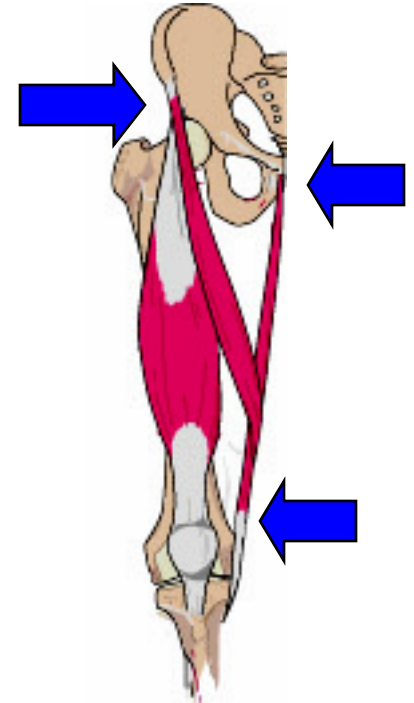
# General findings

- Lateral sway in standing position
- First rib head tenderness A & P
- Pelvic imbalance
- Short leg on posterior ilium side



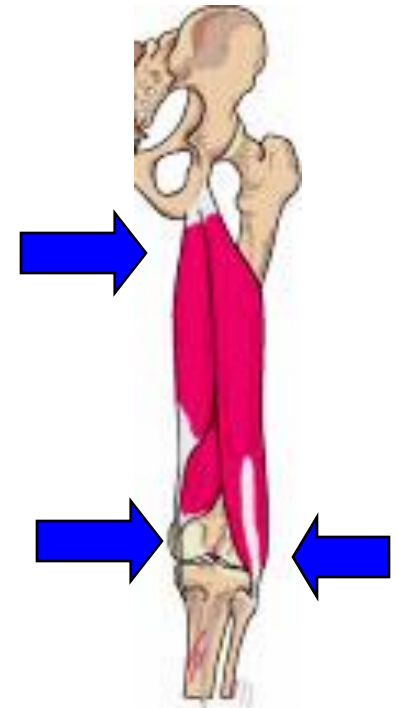
# Testing Posterior ilium

- Tenderness is found at the origin and insertion of the sartorius and the gracilis
  - As well as at the first rib head at the sternum and at the attachment of the first rib and the first thoracic vertebra.
- Weakness will be found of the sartorius, gracilis or the rectus femoris



# Testing Anterior ilium

- Tenderness is found on the lateral thigh, the obturator foramina and the first rib attachments anteriorly and posteriorly with the anterior ilium (posterior ischium).
- Weakness of the hamstrings will be found



# Correction

- **Correct the related muscle weakness**
  - Posterior - sartorius - gracilis - rectus fem.
  - Anterior - hamstrings -
  
  - Internal - abdominal oblique
  - External - gluteus medius



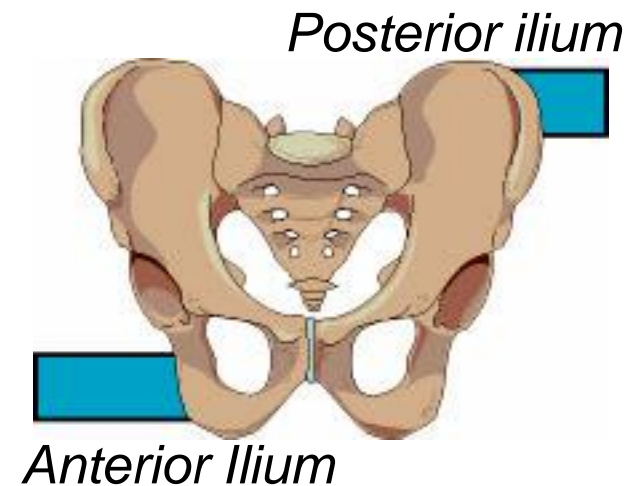


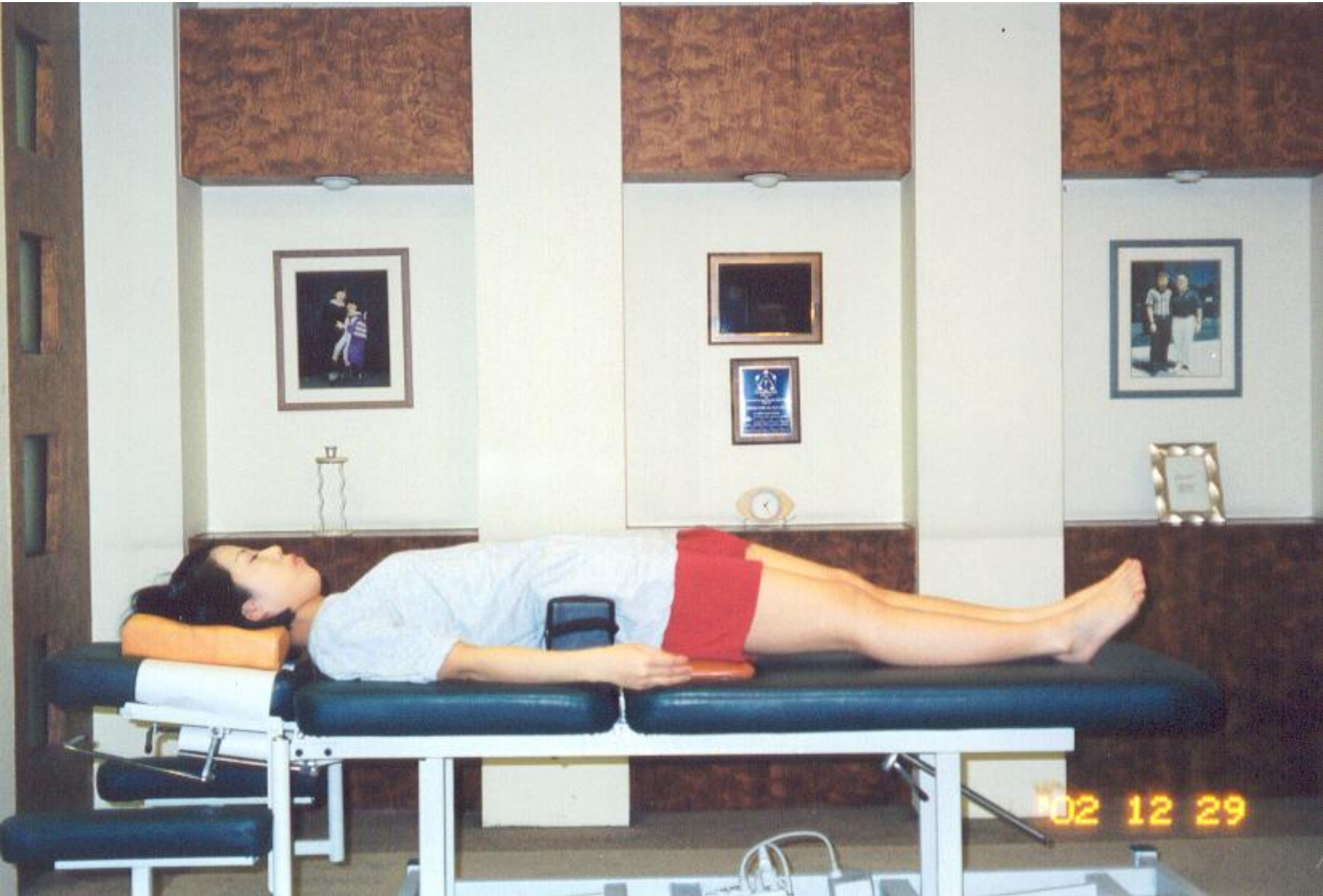




# Correction

- **Block procedure**
  - 후방 장골 : PSIS
  - 후방 좌골: 좌골
    - 8-10분 정도 블록





# Cat II block 치료 left PI right AS



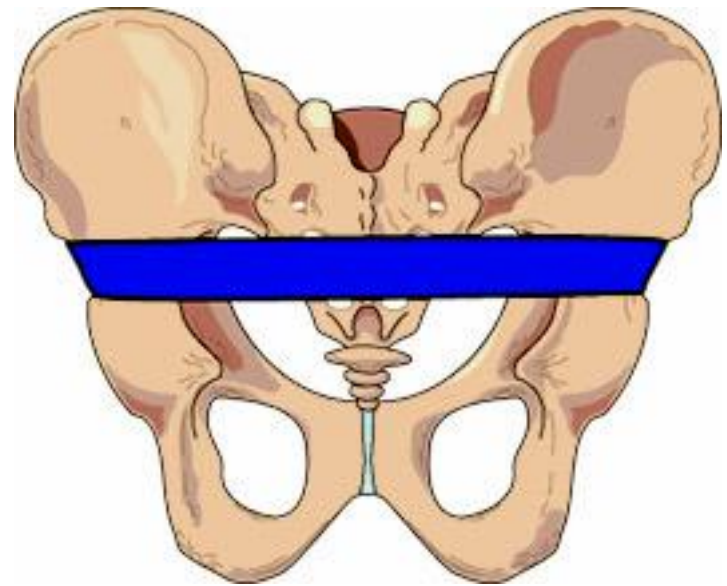
# Block Mobilization

- Flex the short leg to ninety degrees and then rotate the leg away from the body and then straighten the leg.
- The long leg is then flexed and rotated across the body and then returned to its normal position.



# 골반 벨트Trochanter Belt

- 허리근육의 압통 감소
- 천장관절의 압통 감소
- 경추의 압통 감소
- 요추의 굴곡, 경추의 회전 증가
- 정립보조기  
970-6111



# 골반벨트 사용 구입처 정립보조기 790-6111



# 2형 골반변형 정리

- 다리 길이를 잴다: short or long?
- 골반의 높이를 비교해본다: high or low pelvic?
- 환자가 서있는 상태:lateral sway?
- 1<sup>st</sup> rib tender? 같은 lesion side
- 치료적 접촉검사(TL):한쪽씩
- 지표근육이 약하면 lesion with category 2
- 환자가 TL상태에서 들숨/날숨하여 다시 강해지는지 확인: ex(glut.med) or in(oblique)
- Challenge:p to a(ilium)-지표근육이 약하면 PI
  - P to A(ischium)-지표근육이 약하면 AS



# 정리(cont..)

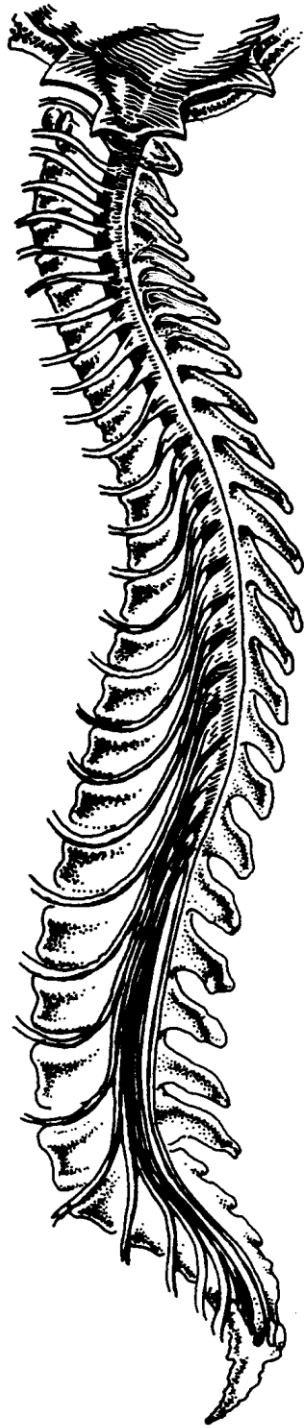
- **PI pelvis: UMS(upper fossa,medial knee통증, short leg)**
  - 약한 근육-sartorius, gracilis, rectus, psoas 검사한다
- **AS pelvis: LLL(lower fossa, lateral knee통증, long leg)**
  - 약한 근육-hamstring, G-max, oblique 검사한다
- **치료-manual adjustment/block-무릎 구부린 상태에서 short leg방향으로 mobilization**

# 골반 제1변형(Category I)

- torqued as a unit
- 치료적 접촉검사: 두 단계:
- 1단계: 양손을 천장관절에 치료적 접촉검사를 한다.
- 2단계: lesion side에 두 손을 겹쳐서 접촉검사를 한다
- 유발검사: 한 쪽은 PSIS, 다른 한 쪽은 Ischium에 동시에 눌러서 유발검사를 하는데 주로 piriformis를 지표근육으로 사용한다

# 골반 I 변형

- Torqued whole pelvis as a unit
- Dr. DeJarnette
- Treated by block: untorqued the pelvis in prone position
- No low back pain but nagging on the upper trap pain(first rib)
- Buttock pain (piriformis)
- Pain on the C3 on the side of Cat I
- Tenderness on the Achilles tendon on the side of Cat I
- SC tenderness
- Primary respiratory mechanism involved





**TL on R SI two handed**

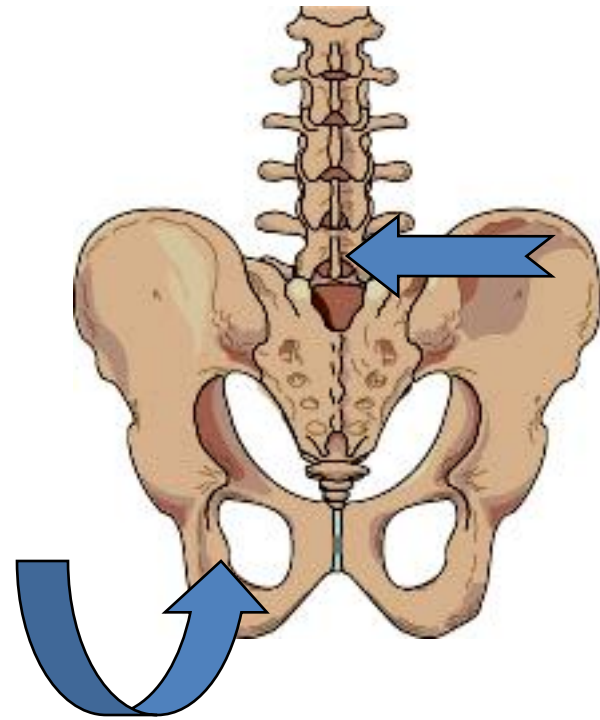


# Cat I 접촉검사, block 치료, pumping

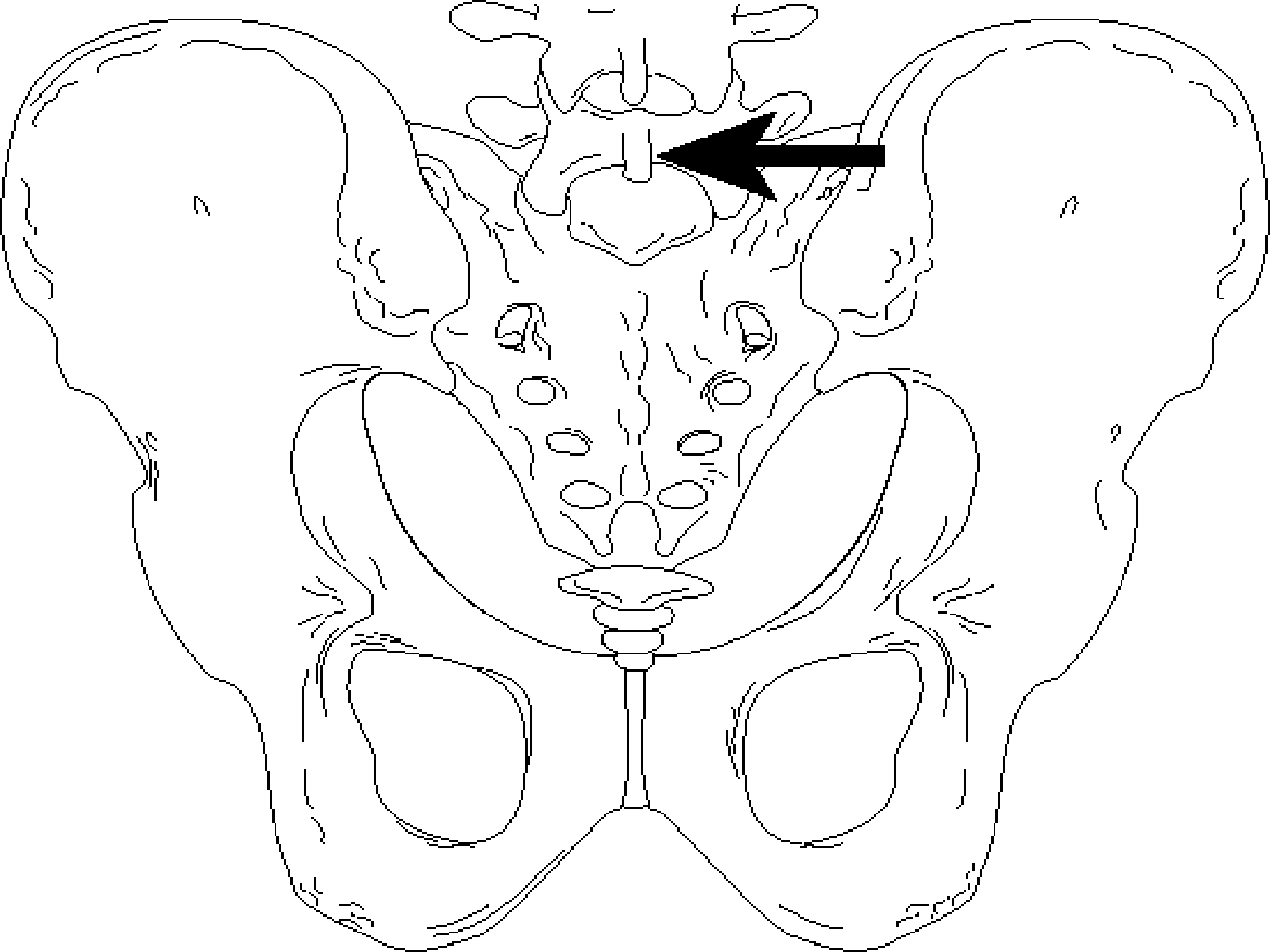


# 제 3골반 변형 Category III

- Dis-relationship between pelvis and spine 골반과 척추의 상관관계의 이상
- 유발검사:
  - 요추 5번의 척추돌기를 궁둥뼈 검사방향으로 밀었다가 떼다.
  - 궁둥뼈 결절(ischial tuberosity)을 앞에서 뒤로 눌렀다가 떼다.

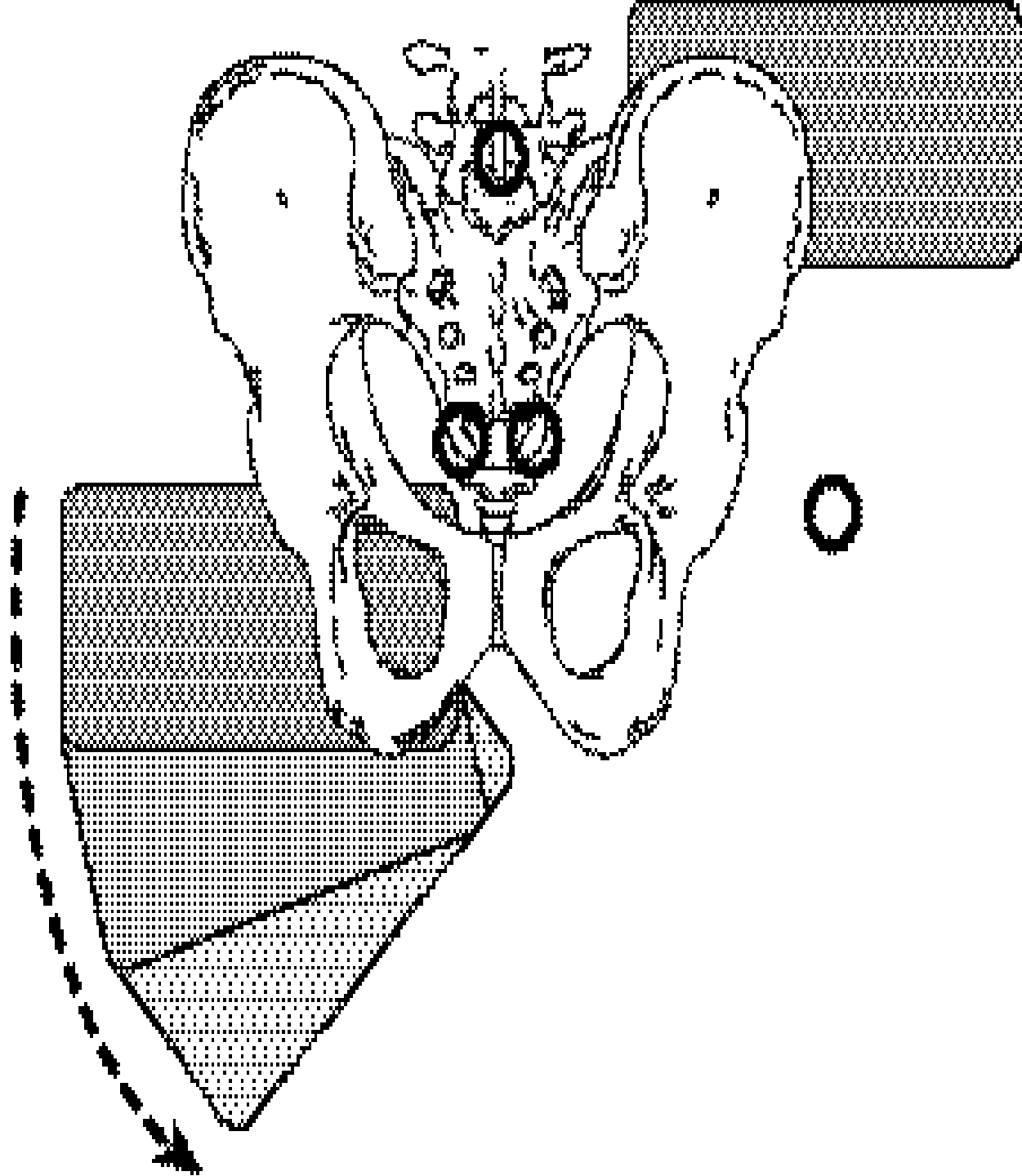






# 유발검사





# Right short Cat III

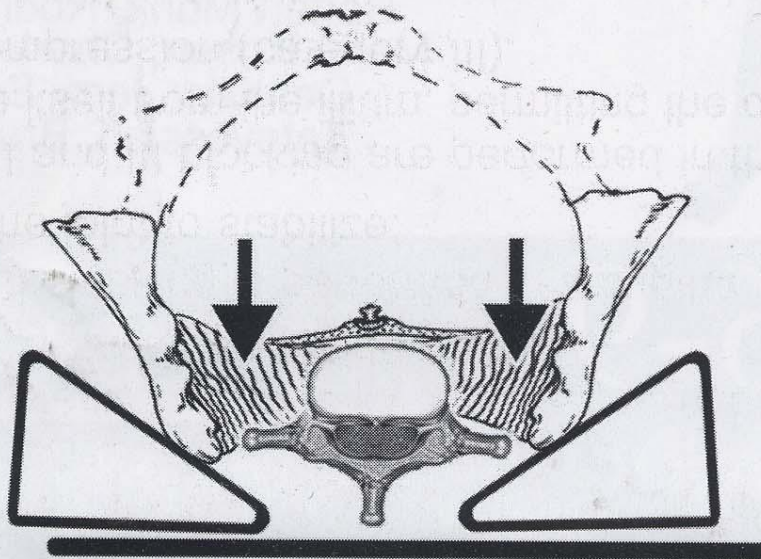


# 골반 변형 (Category I, II, III) review

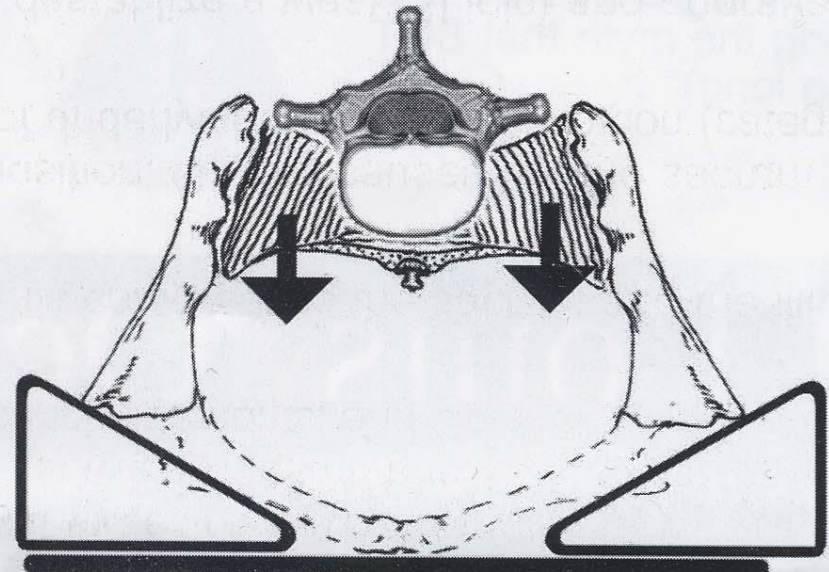
First developed by DeJarnette

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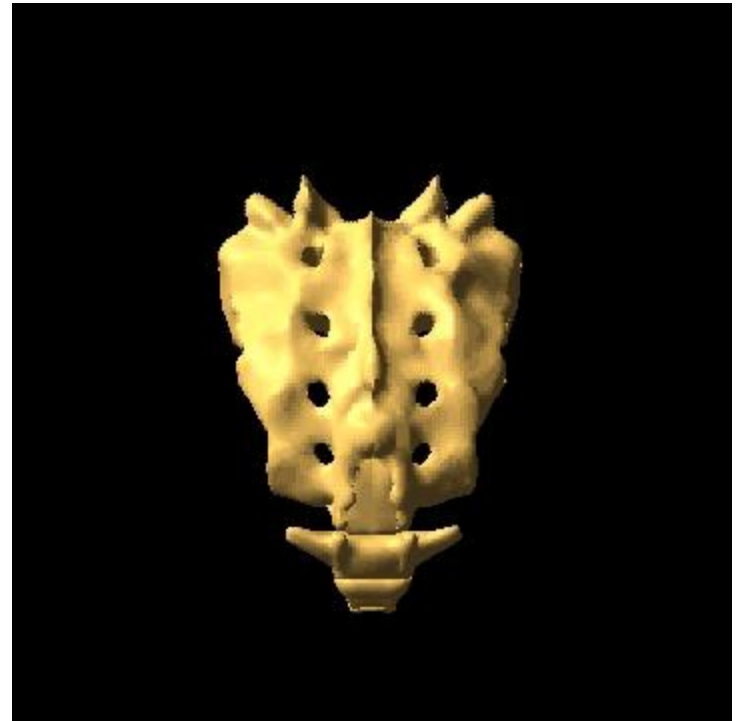
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# What is Sacral Wobble?

- There is a torque pattern of motion that occurs at the sacrum during normal walking.
- This resembles a figure 8.





# Testing

- TL over the sacrum. If weakness is found have the patient inspire and expire and find the phase of respiration that strengthens the muscle made weak by TL

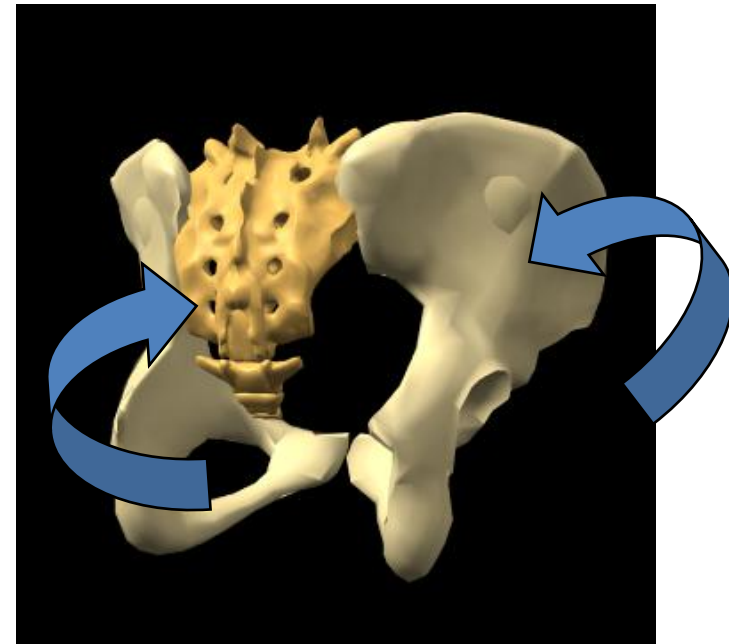


# Sacral wobble 접촉검사



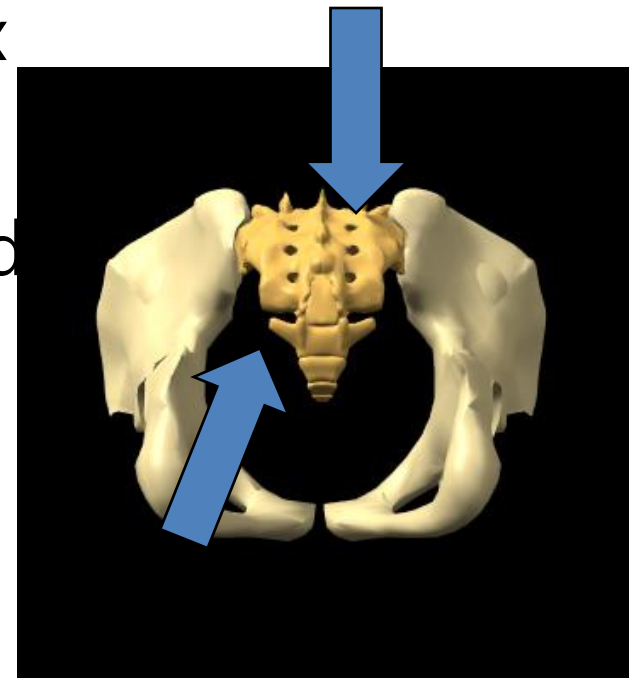
# Correction - Inspiration

- Contact the sacrum on the posterior lower one third and the opposite anterior iliac spine and approximate the two. Challenge both sides to determine the side needing correction.
  - Repeat this procedure during inspiration for four to five times and retest for correction.



# Correction - Expiration

- Contact under the sacral apex on one side and the sacral base on the opposite side. Pull posterior on the apex and push anterior on the base.
- Test for weakening of an indicator muscle.
  - After determining the side of involvement, repeat this procedure for four to five expirations and retest for correction.



# What is Meningeal Release?

- The dura mater is firmly attached
  - inside the cranial bowl,
  - Atlas, Axis and third cervical
  - by the filum terminale into the dorsum of the first coccygeal segment

# What is Meningeal Release?

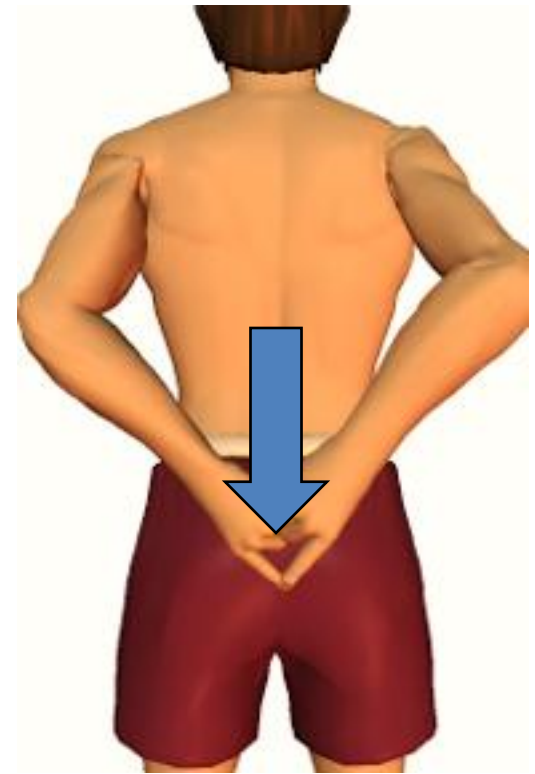
- In coccyx imbalances, abnormal stress can be applied to the dura mater causing reflex muscle tension along the spine.
  - Goodheart has described the coccyx as a take up mechanism to keep constant tension on the dura mater.
- Tension on the dura appears to be controlled by the coccyx

# Spinal Length

- Goodheart noted that healthy patients had the same spinal length, within 14 mm. (use rolling tape measure from coccyx to occiput)
  - If they were measured in the supine, sitting and standing positions.
  - Patient's with chronic problems have dramatic differences in the length of their spines.

# Therapy Localization

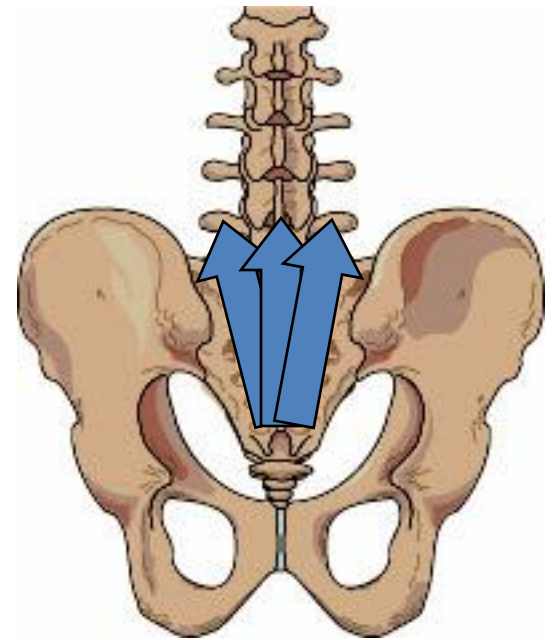
- The patient is asked to therapy localize to the coccyx and apply inferior pressure. A strong muscle is tested for weakening.
- Palpation of the paravertebral muscles will show tenderness on one side of the spine
  - Cervical paravertebrals are always present





# Challenge

- Palpate the associated muscle tenderness
- Contact over the coccyx and traction the skin cephalad
- Vary the vector until the greatest reduction in pain is found



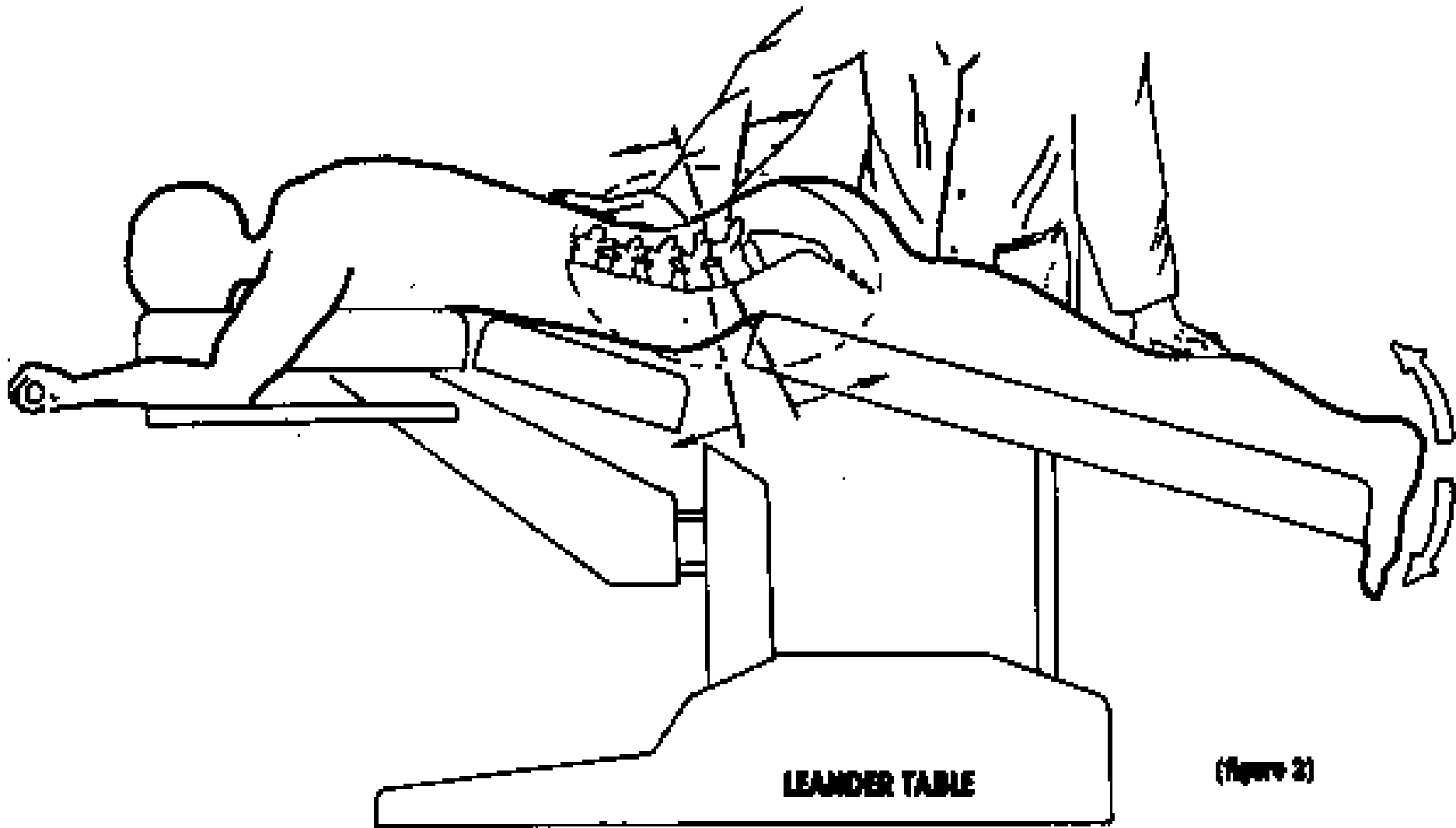
# Correc



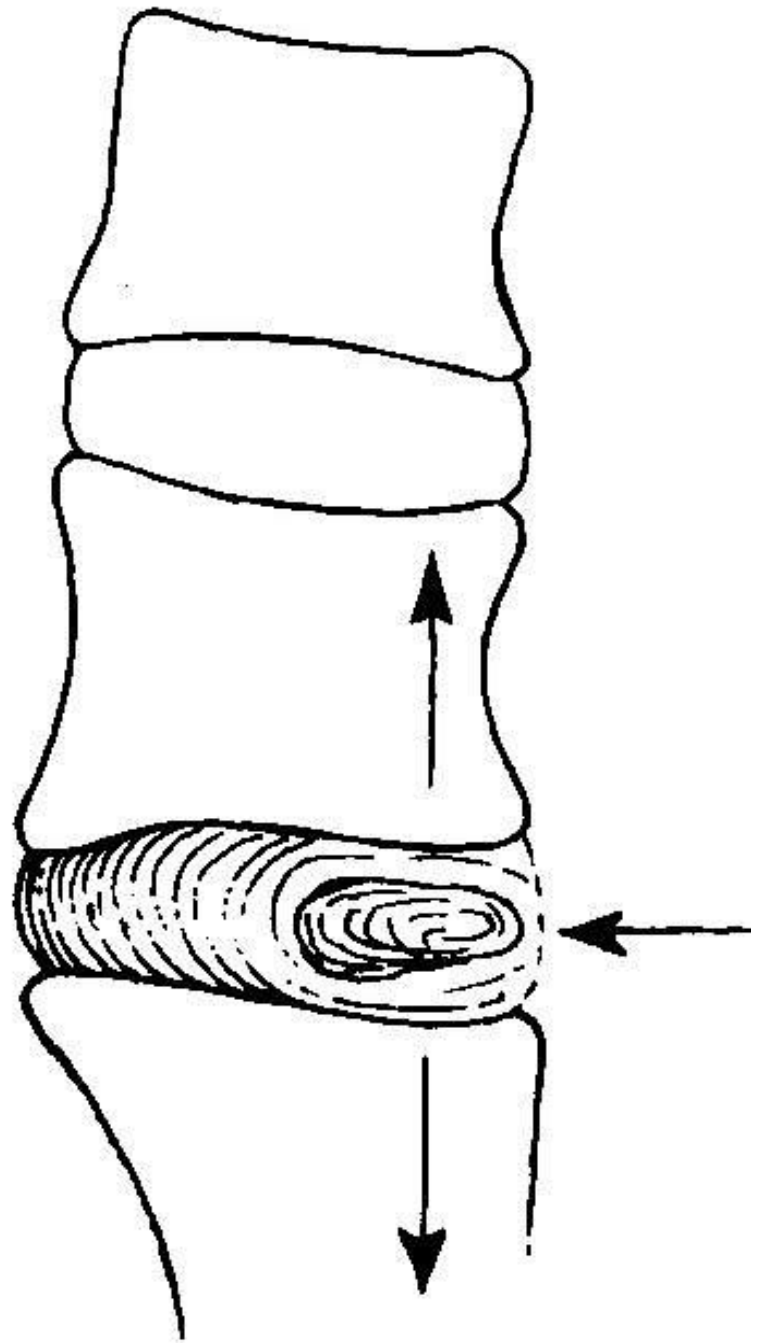
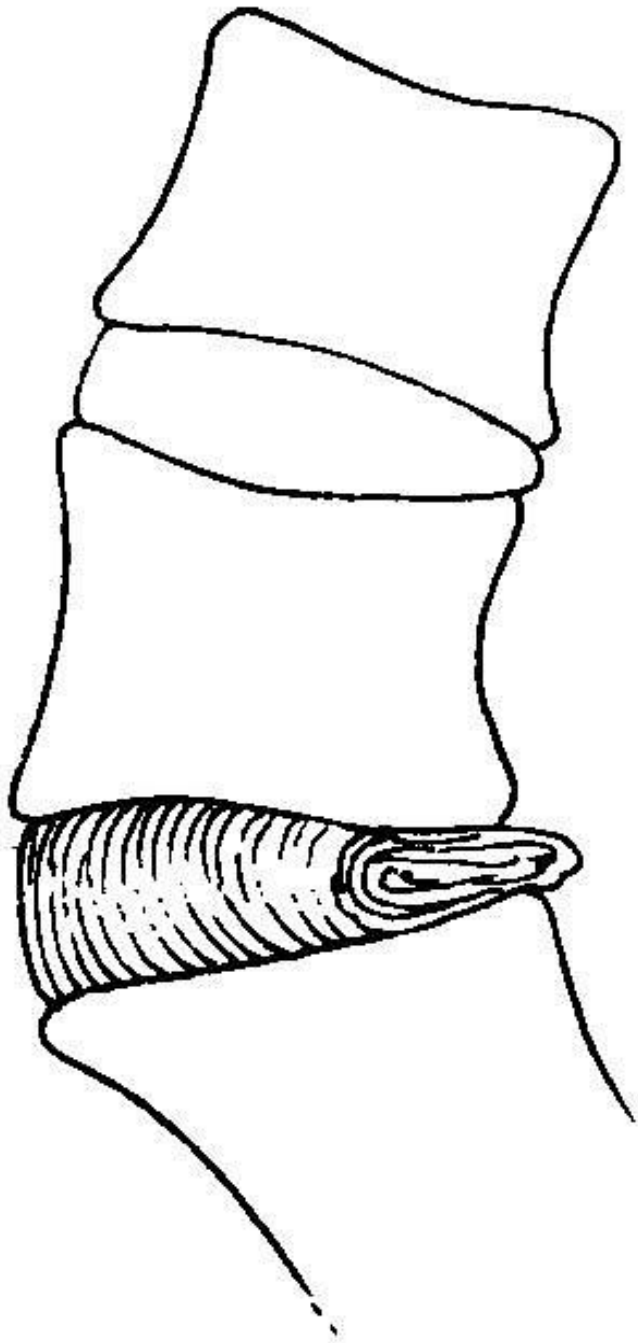
- Contact the skin over the coccyx and pull in the challenge direction found above.
  - Apply this pressure in a cephalad direction while the patient inspires.
  - Simultaneously, contact the atlas and pull inferior.

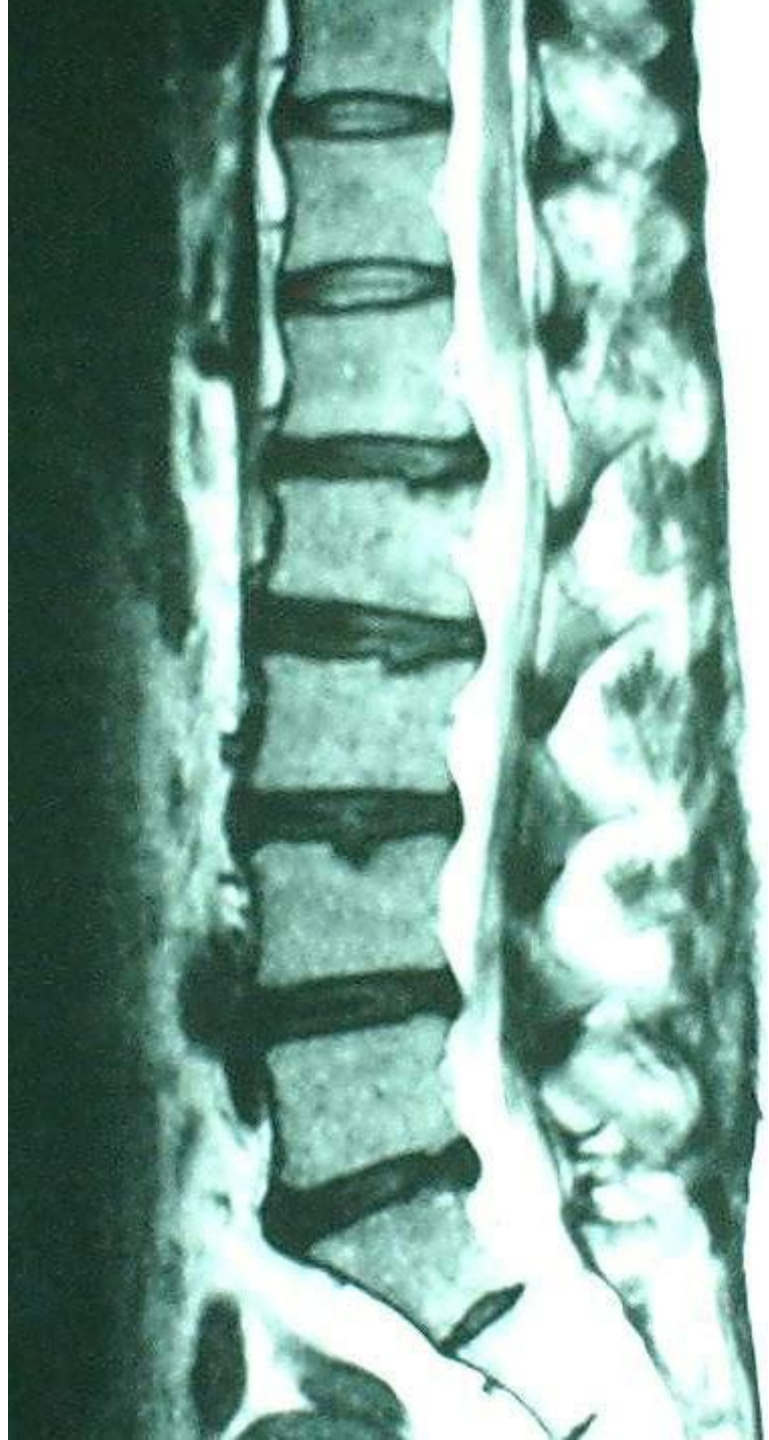
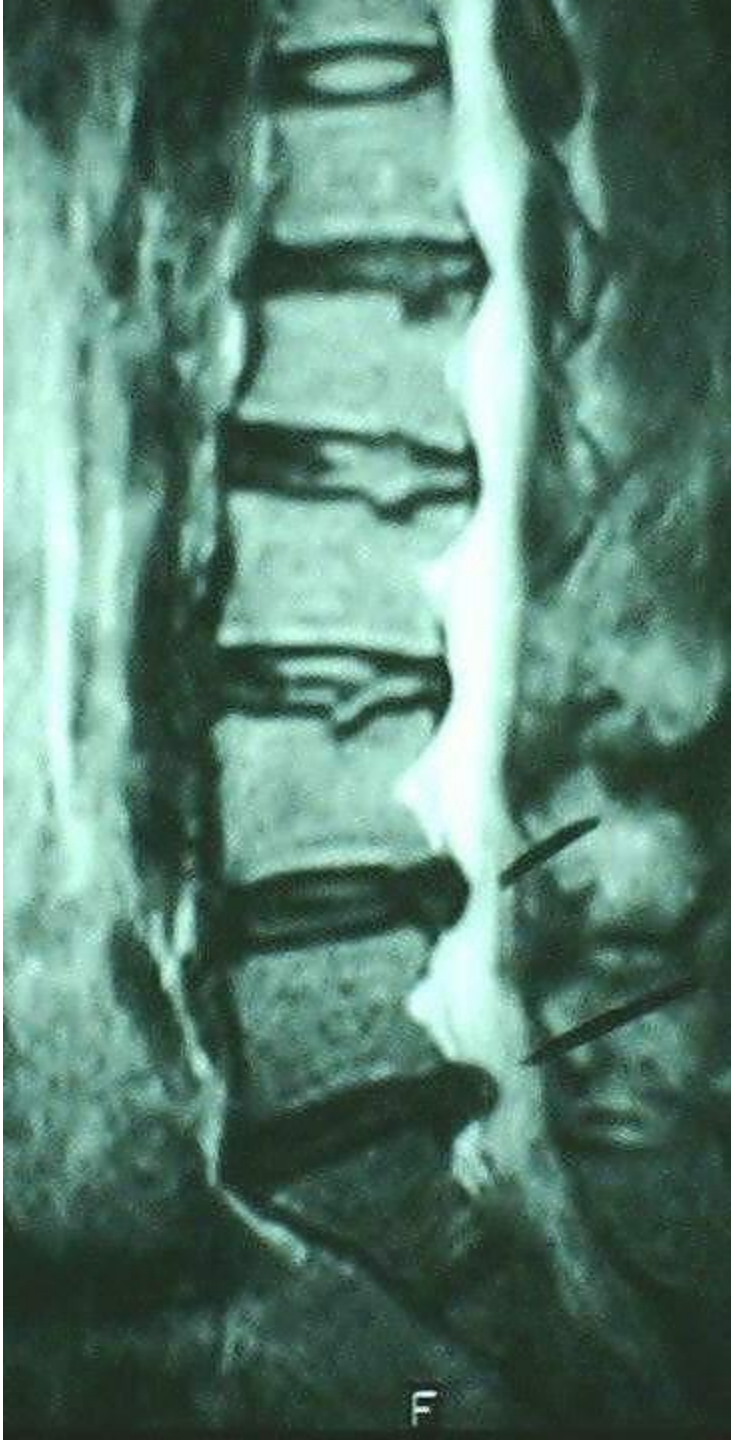
- Repeat this five to seven times
- Palpate for reduction in muscle tenderness
- Remeasure the spinal length for normalization

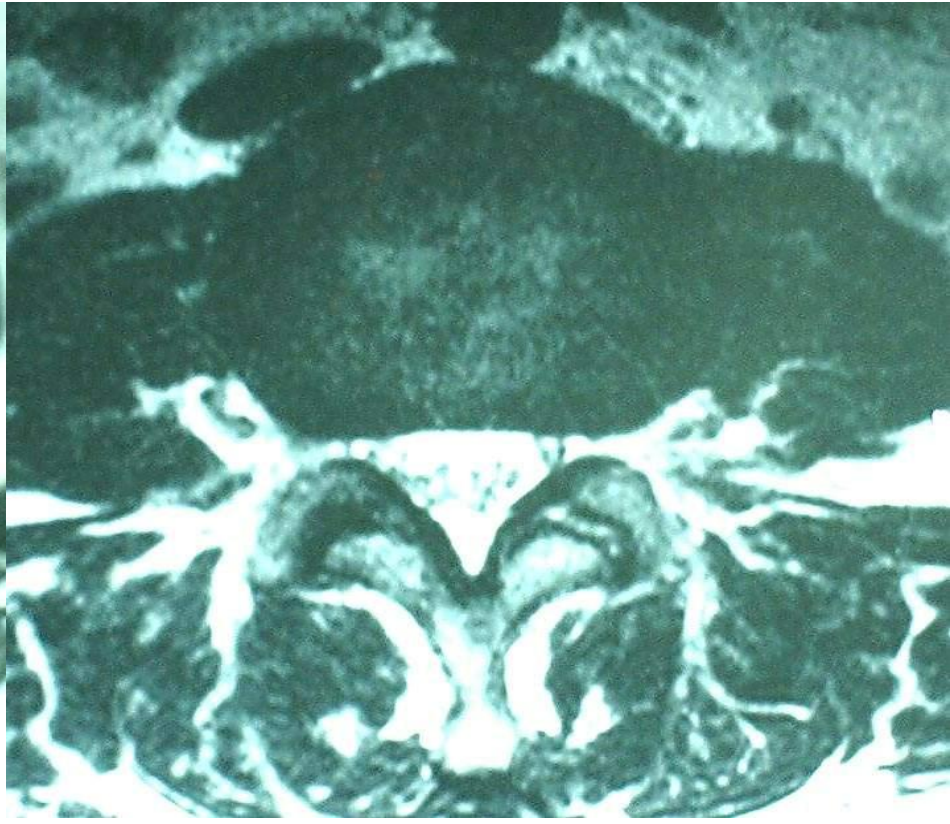
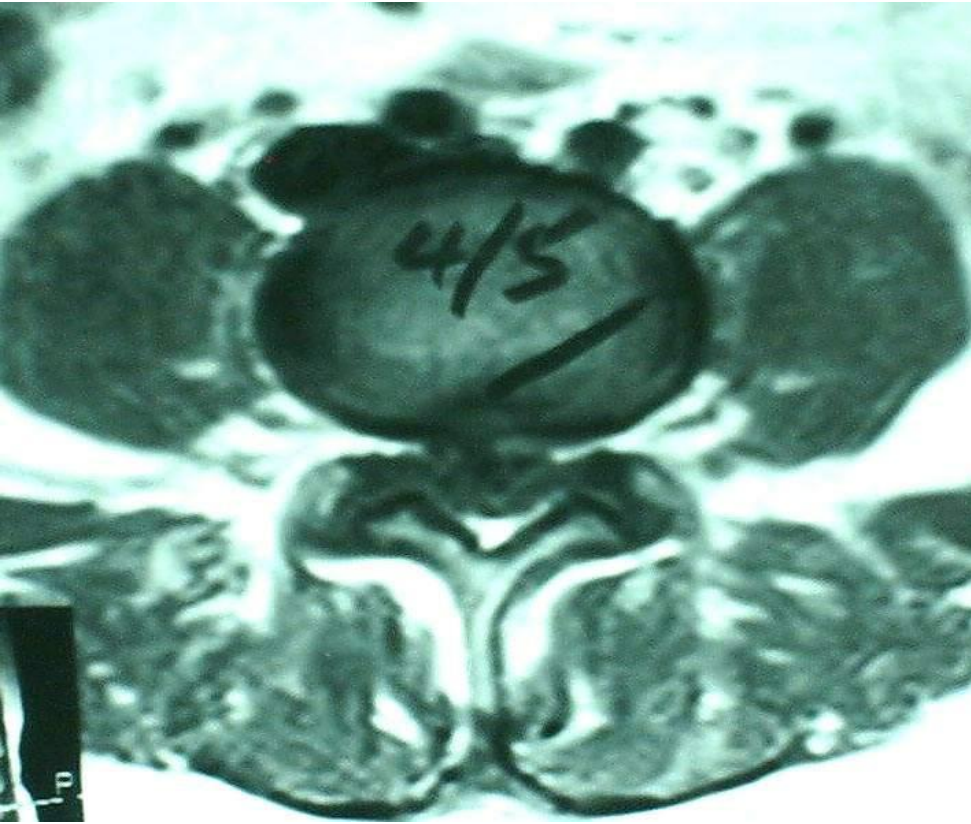
# HIVD 치료



(Figure 2)



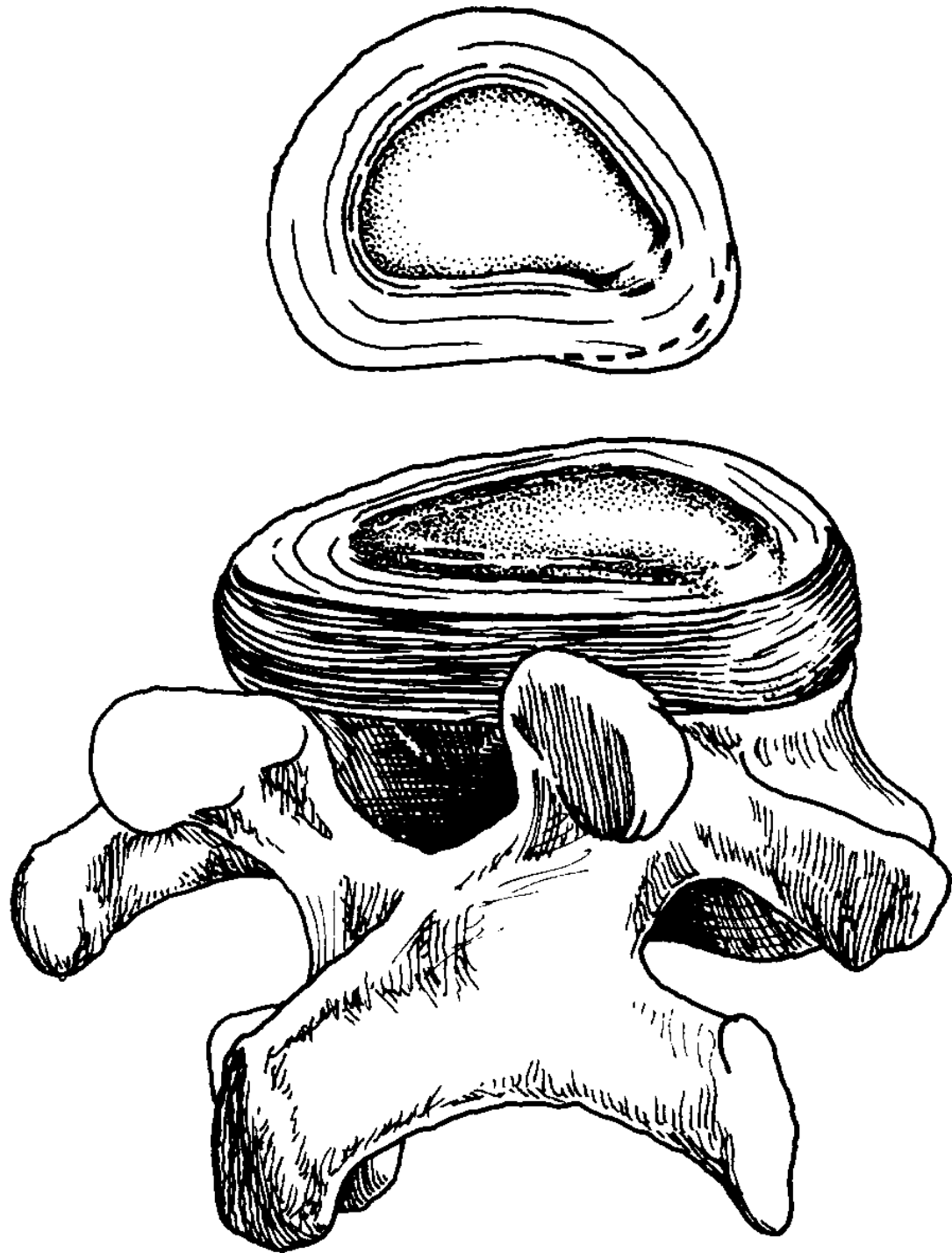


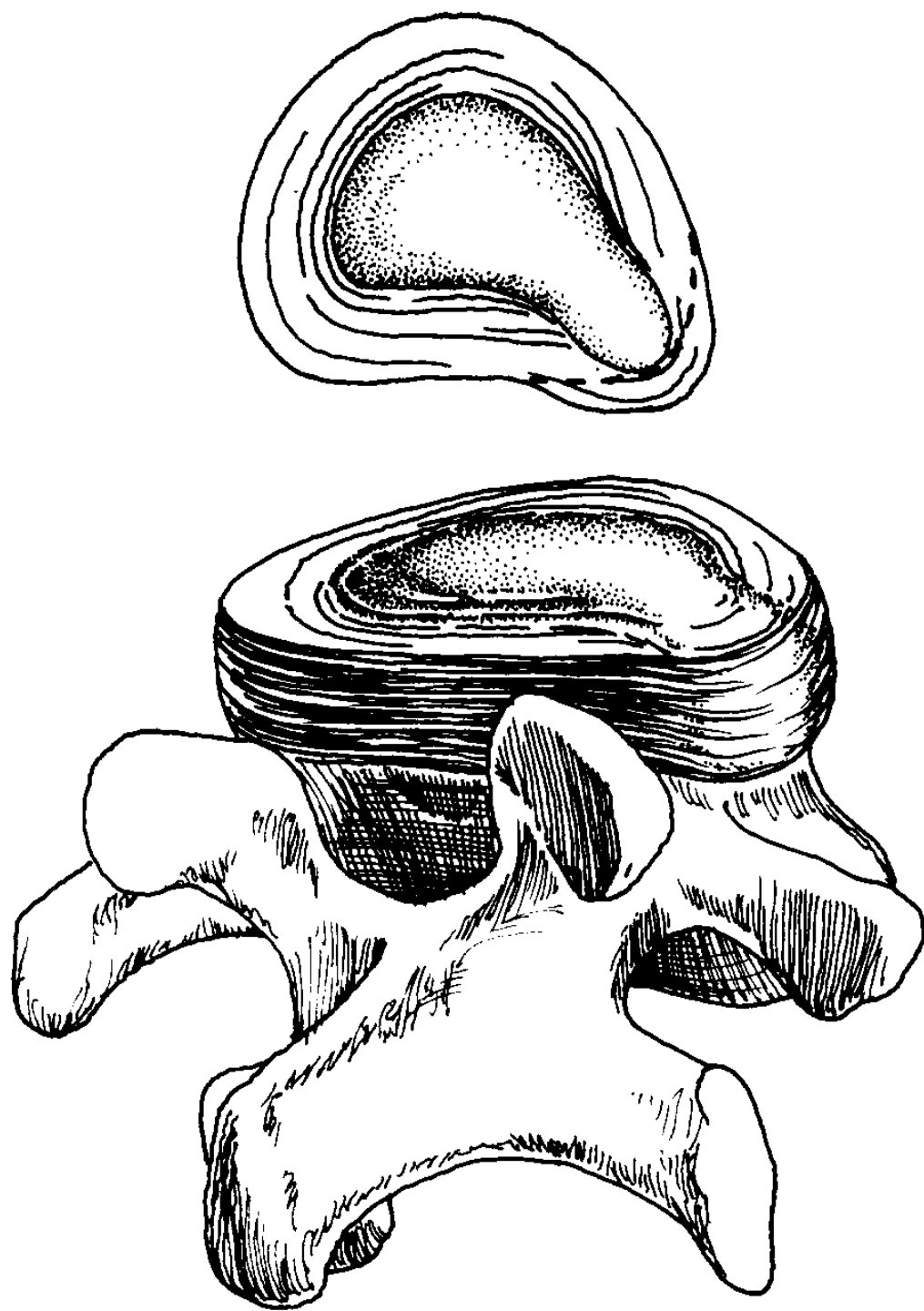


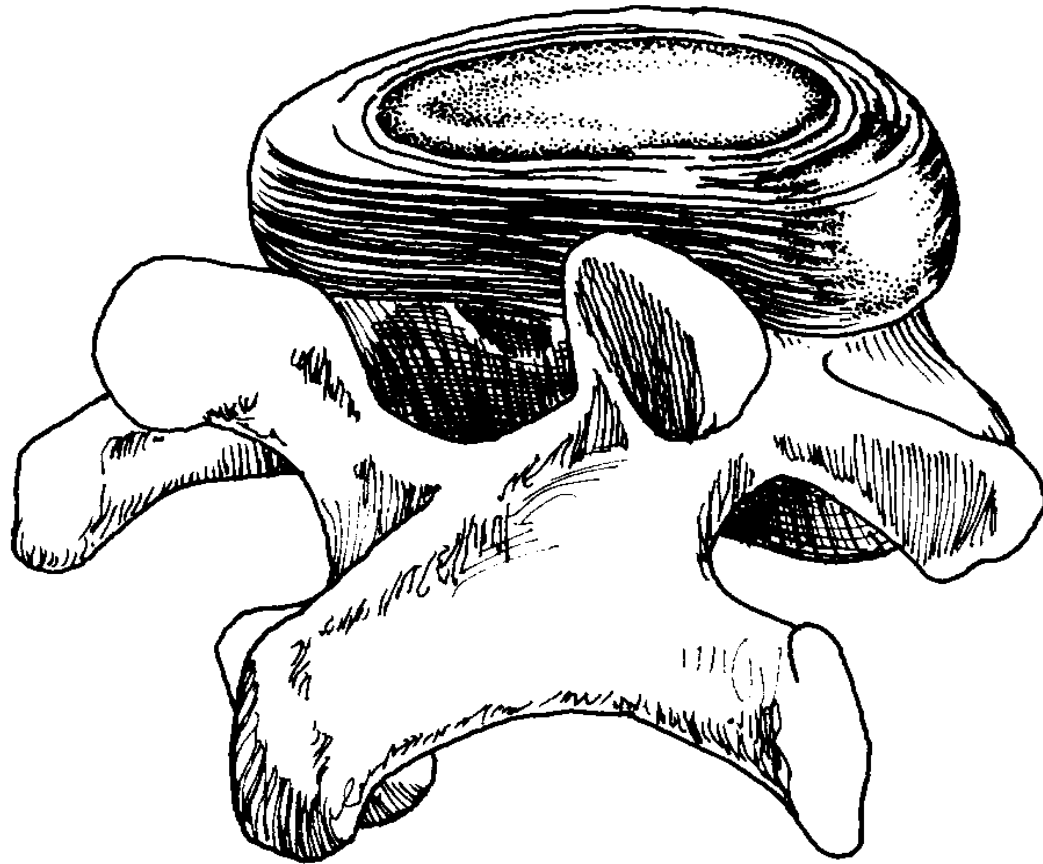
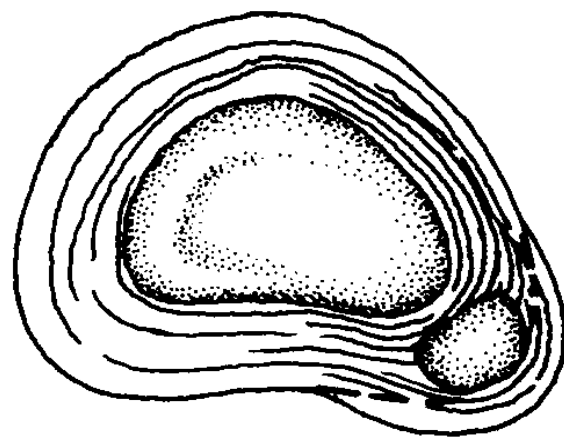
# Disc 치료

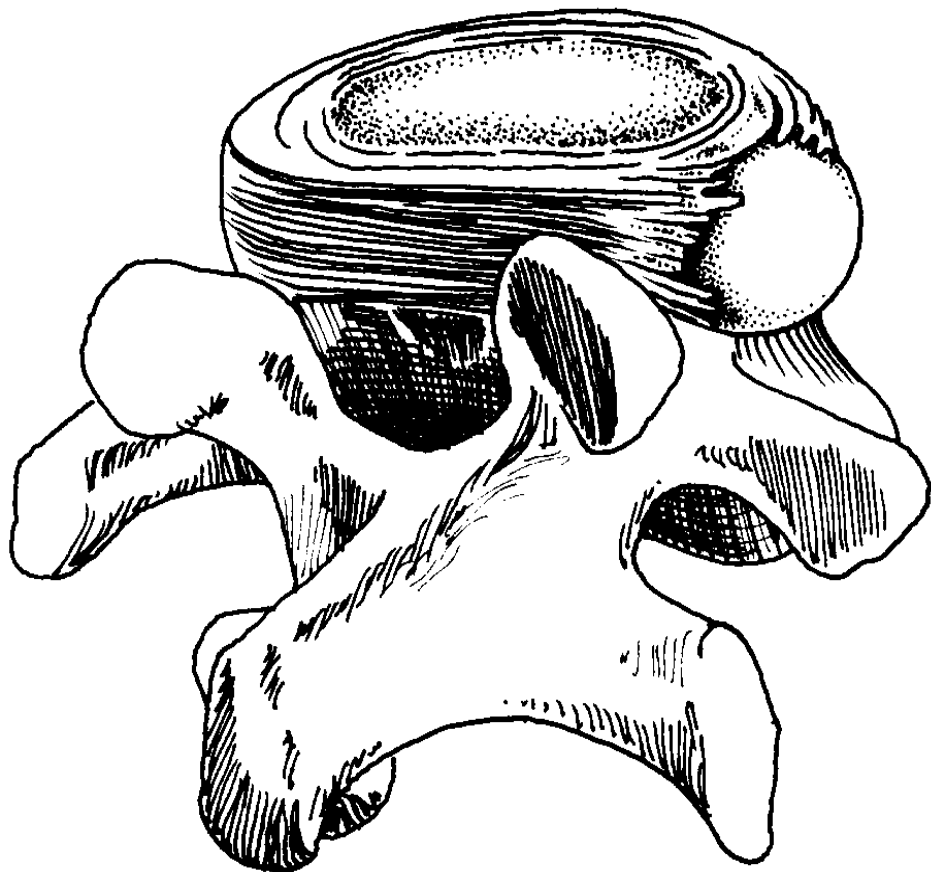
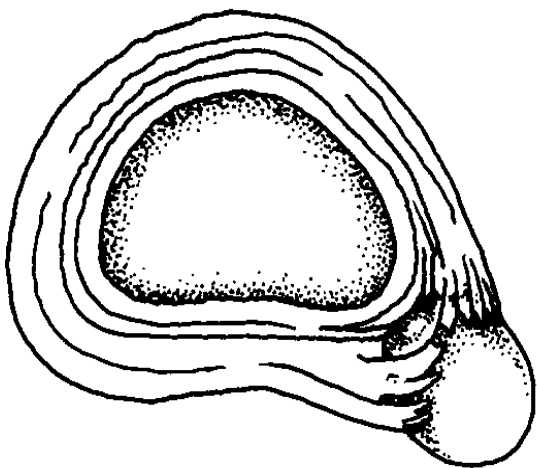
- Adrenal, toxic, hidden food allergy(dysbiosis)
- Cranial : sphenobasilar
- Cat: spine-pelvis disrelationship, iliolumbar etc
- Lumbar subluxation
- Excessive pronation of foot
- Atlas subluxation
- Psoas, piriformis, gluteal muscle
- Disc release
- Flexion distraction (Leander, cox technique)
- 골반견인
- Iliocecal valve
- Disczyme



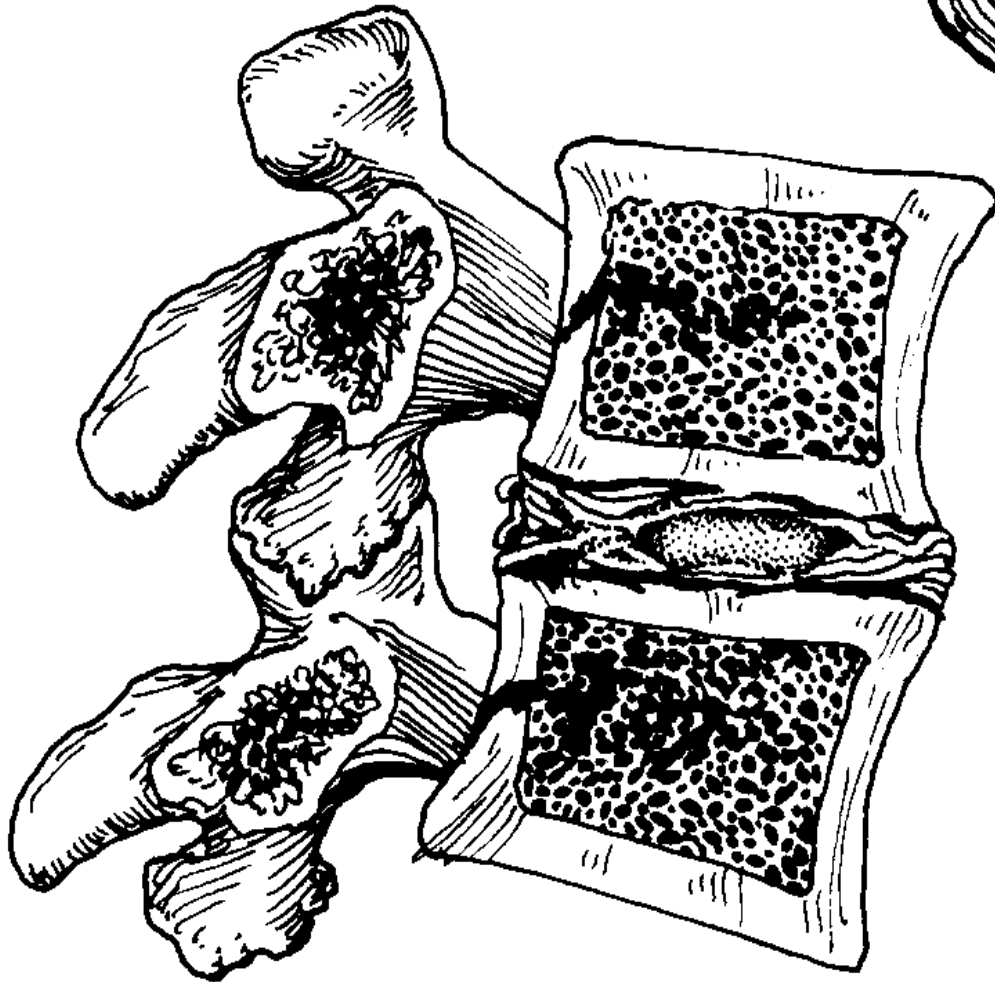
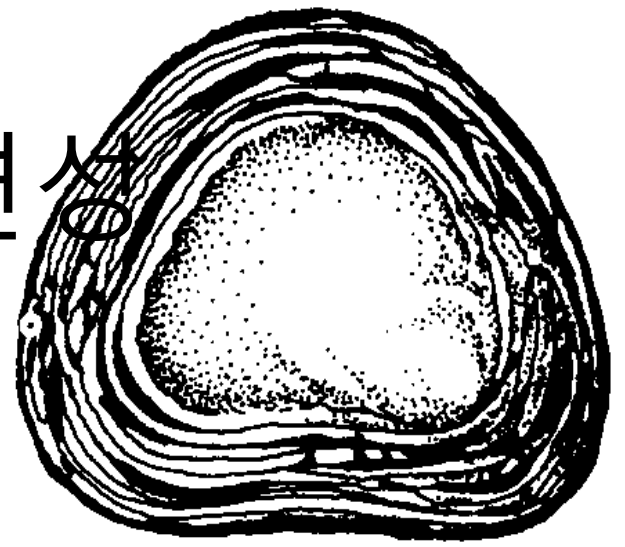


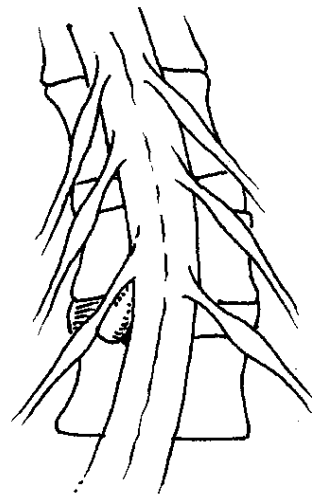
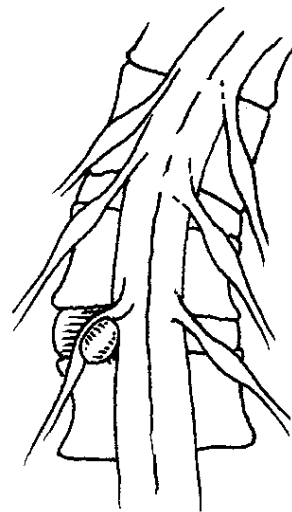
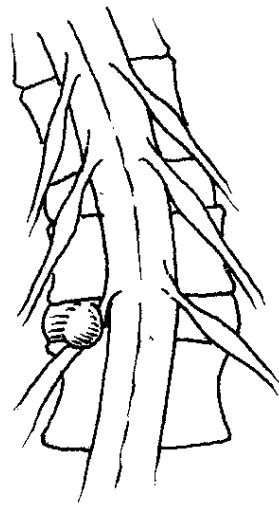
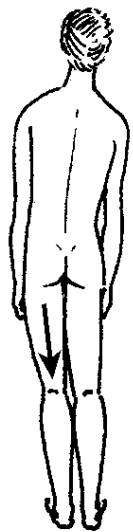
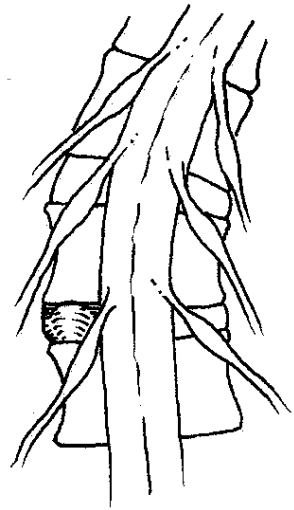






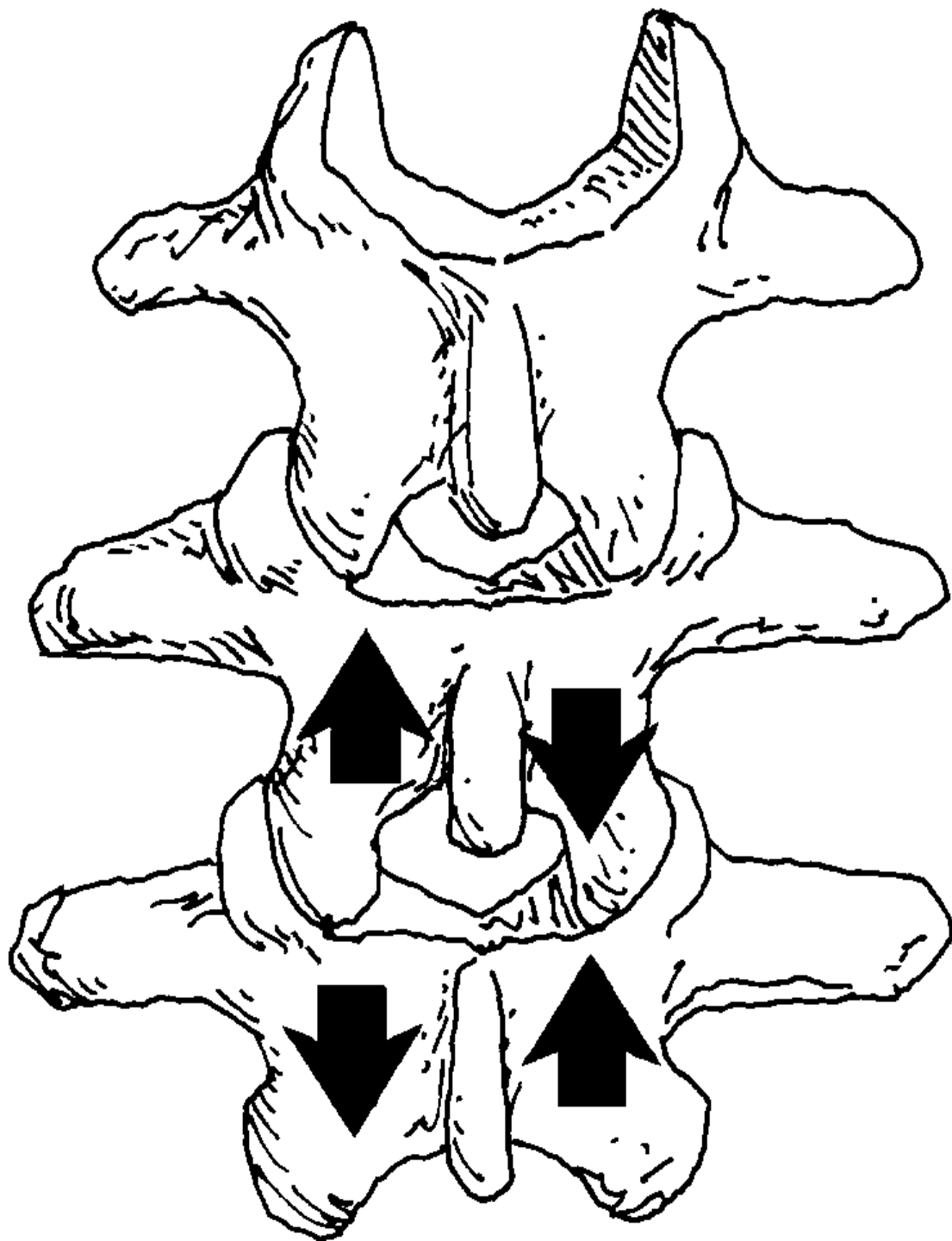
# 추간판의 변형





# Lumbar disc

- Therapy Localization to vertebra above and below the disc with two hands simultaneously
- Challenge the vertebra to either separate, approximate
- Find which phase of respiration negates the above challenge
- Perform pumping motion on vertebra for 10-15 reps (breath in하면서 sp나 tp down, breath out 하면서 up)





# 굴근반사 구심성 체계(FLEXOR REFLEX AFFERENT <FRA>)를 이용한 아탈구의 진단

1. 피부를 살짝 꼬집는다(척추 돌기, 발목, 발)
  2. 아탈구된 부위에 통각을 가하면 신전근만이 약해진다
- 굴근반사 구심성 체계는 회피반사(withdrawal reflexes)를 활성화 시킨다:
    - ↗ Flexor withdrawal reflexes
    - ↗ Crossed extensor reflexes

골근반사 구심성 체계는 다음과 같은 감각수용체를 자극함에 의해서 발생

1. Nociceptors
2. Touch receptors
3. Pressure receptors
4. Mechanoreceptors
  - A. Joints
  - B. Muscle spindles 2ry endings

# 응용근신경학에서의 수기치료

- 항상 유발검사에서 지표근육이 약해지는 방향으로 치료를 한다
- 환자를 측면으로 두고 수기치료를 할 때 어떤 위치가 가장 좋은지를 지속성 미로 반사를 응용하여 위치를 결정하는 것이 좋다.
- 왼쪽으로 굴곡 혹은 왼쪽얼굴이 바닥으로 향하면 왼쪽의 신전근이 강해진다.

- 머리를 돌리고 나서 유발검사를 했을 때 가장 유발검사 양성 이 되는 위치로 두고 수기치료를 한다.

# Detoxification

## Symptom Picture of General Toxicity

### 일반적인 증상

- 무기력감 (Malaise)
  - ✓ 만성 피로
  - ✓ 두통
  - ✓ 관절통과 근육통
- 만성적인 가래 (Chronic mucous production)
- 운동 후 극심한 피로감

1

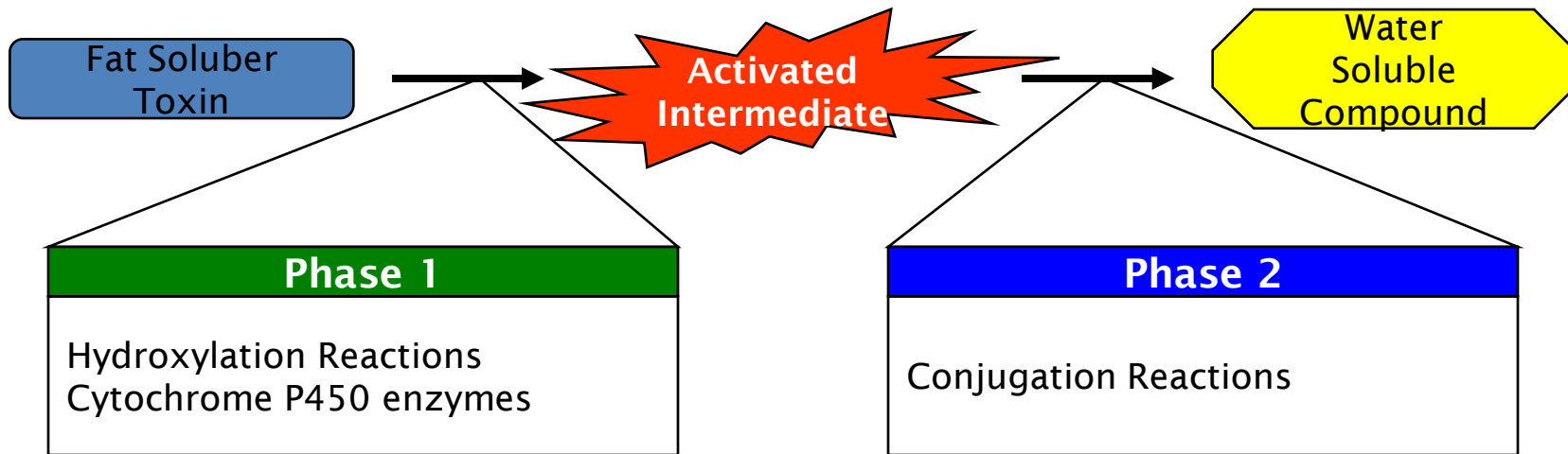
## Detoxification

“Detoxification is primarily the act of taking fat-soluble toxins and making them more polar in order to be eliminated from the body”

체내에 있는 잠재적 toxic compound를 제거 하려고 하는 일련의 과정

2

## Two Major Pathway of Hepatic Detoxification



3

## Phase1 & Phase2

### Phase1

독성 해독 Phase1에 관여하는 유전자는 ‘activators(활성체)’라 부르는 효소를 만듦

Activators 효소들은 독성물질(*undesirable substance*)에 단분자의 산소나 질소를 붙임. 이러한 작은 변화는 Phase2에서 더 쉽게 독성 물질을 배출하도록 함.

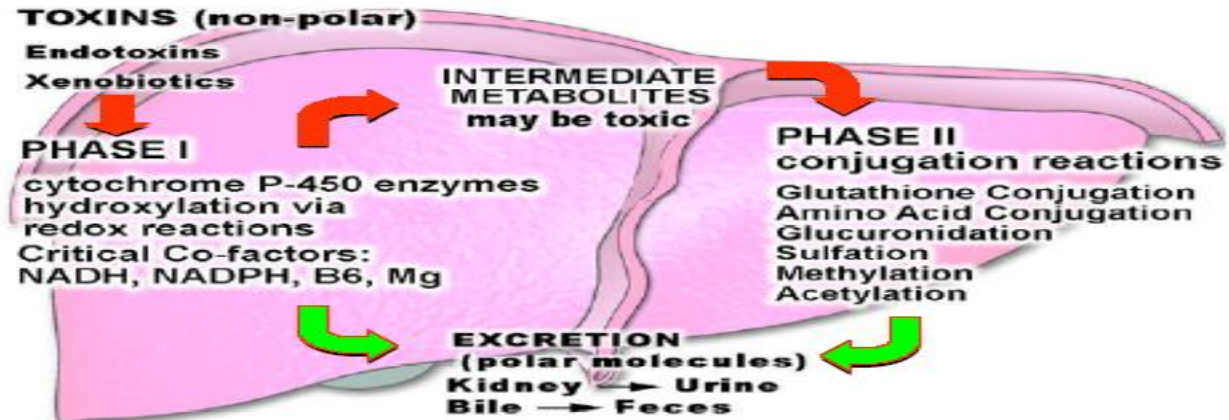
### Phase 2

독성 해독 Phase1에 관여하는 유전자는 ‘excretors(배설체)’라 부르는 효소를 만듦

excretors 효소들은 Phase1에서 활성화된 독성물질에 glutathione이라는 화학물질과 결합시켜 체내 독성 물질을 수산화하여 오줌이나 땀으로 배출시킴.

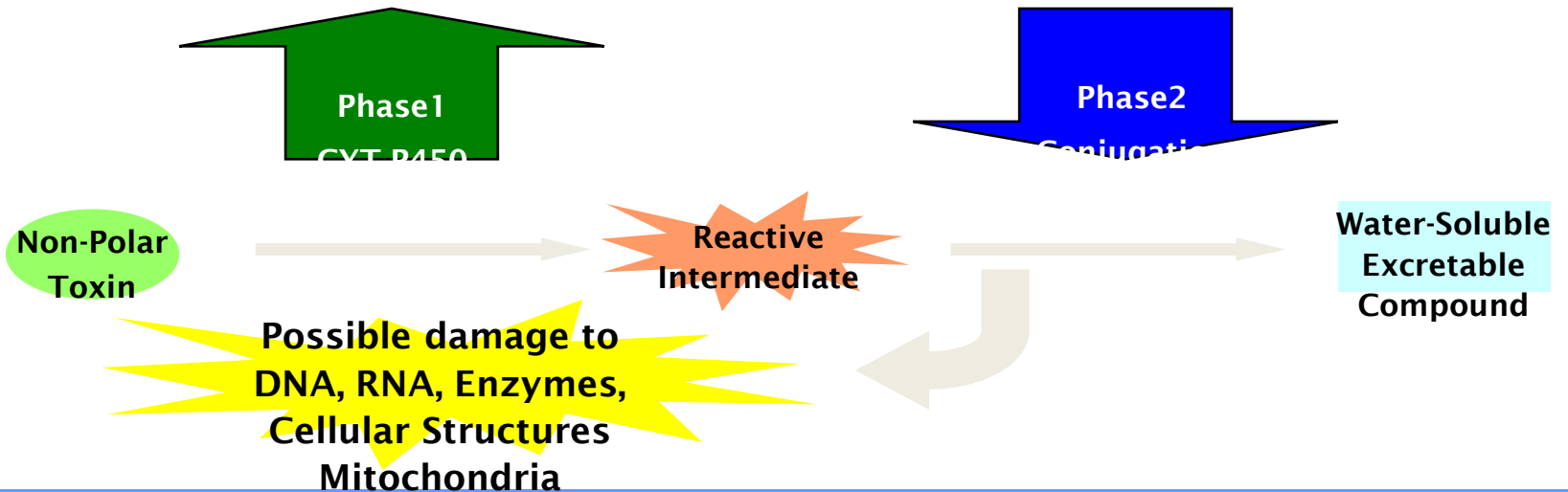
4

# Liver Detoxification



5

# Imbalanced Detoxification



6



# glutathione

- Tripeptide:
  - Glutamine
  - Cysteine
  - Glycine
  - Reduced(GSH)
  - Oxidized(GSSG)

- Liver's reservoir of glutathione is depleted with exposure to xenobiotics as petrochemicals, acetaminophen, alcohol, toxins, household chemicals, heavy metals and infection
- Peroxidase
- Transferase
- Reductase-

# Cellular consequences of decreased glutathione

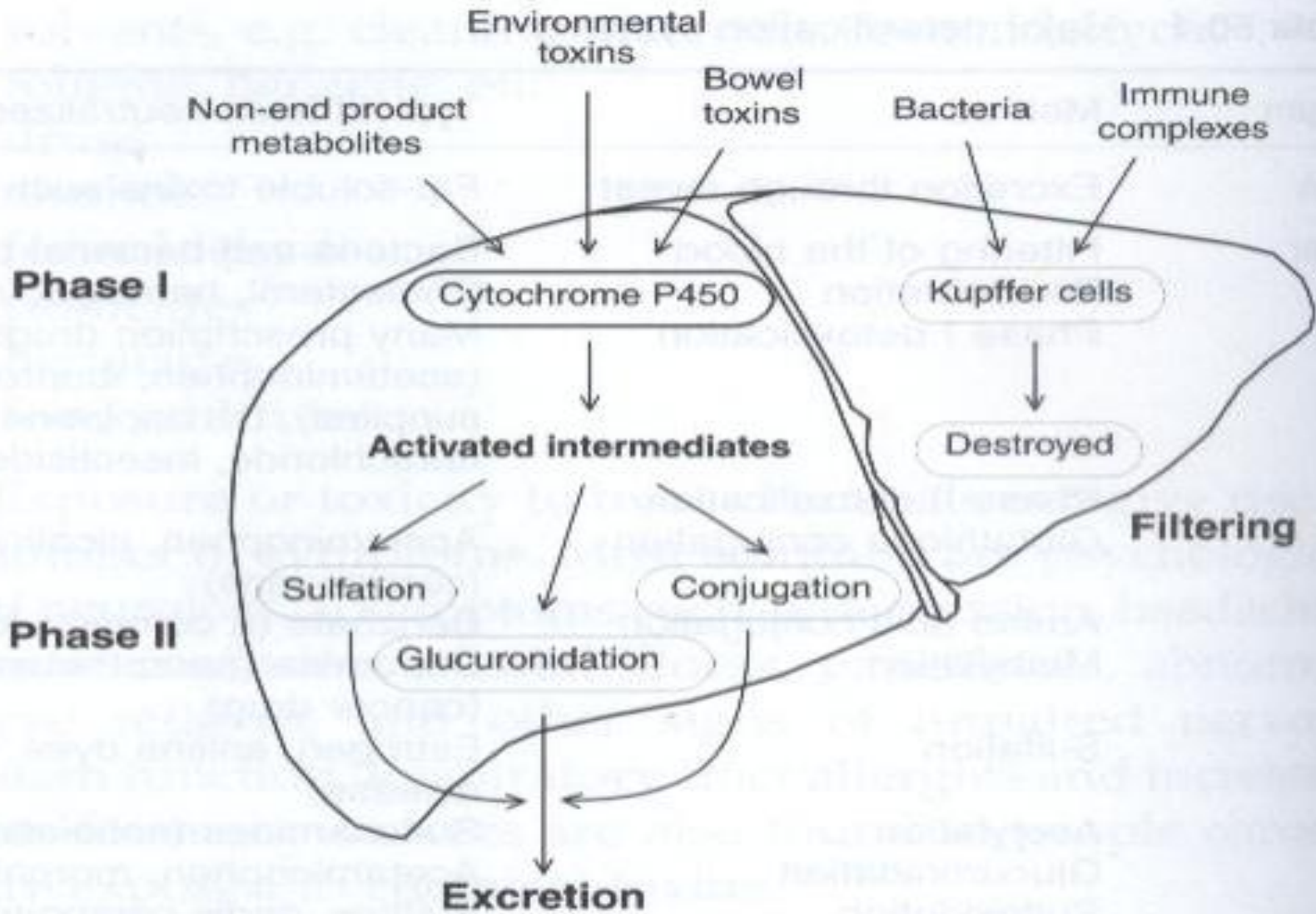
- Decreased detox-neurotoxic
- Degeneration of gut epithelium-increased permeability and autoimmunity
- Increased S-adenosylhomocysteine-decreased cellular methylation capacity
- Decreased total antioxidant capacity-make everything worse

# MTHFR & Autism

- Impaired methionine metabolism-deficient SAM, cysteine, GSH
- neuroDJD-developmental delay, hypotonia, seizure
- Intervention
  - Need folinic acid/5MTHF/methylcobalamin/B6
  - Riboflavin-coenzyme for MTHFR
  - Betaine/TMG

# GST polymorphisms

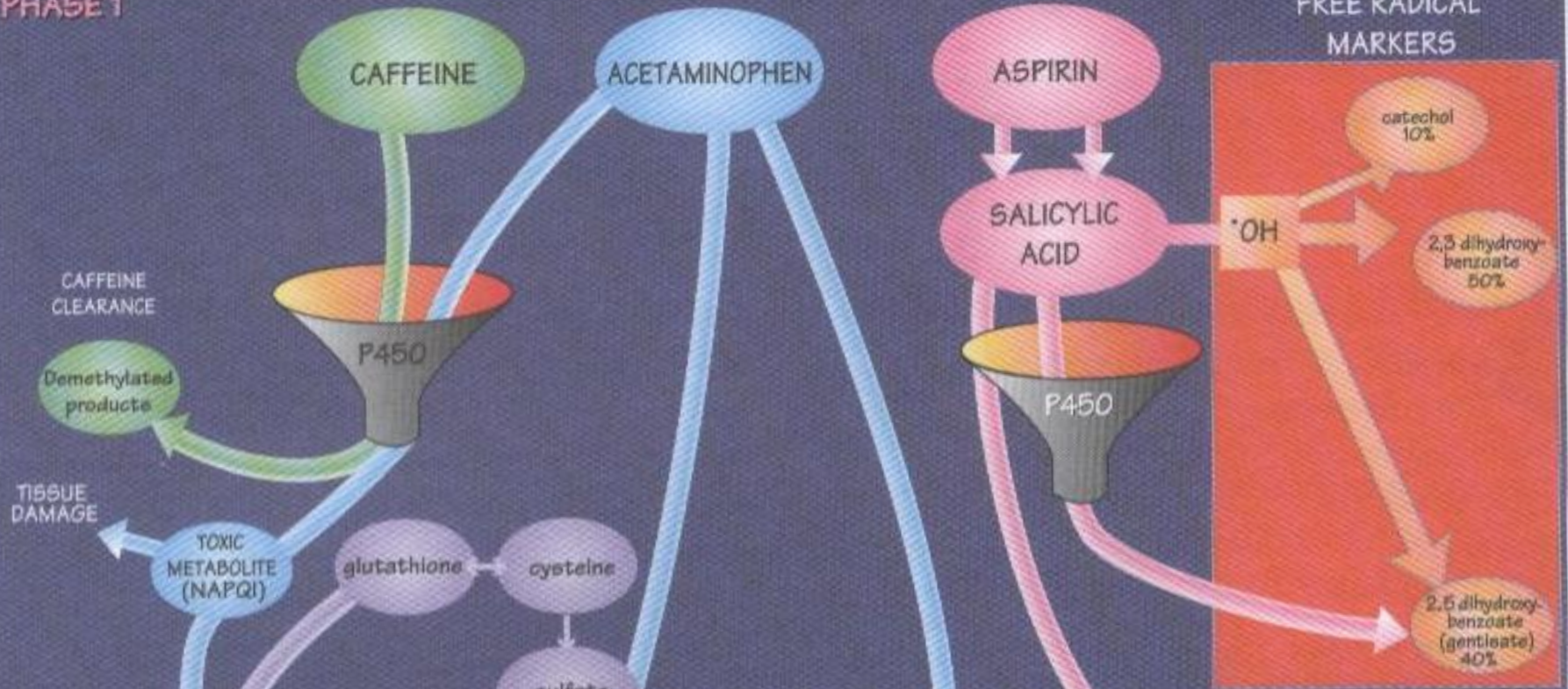
- Glutathione S transferase require GSH; cysteine and GSH levels often low in autistics-reduced ability to detox xenobiotics and heavy metals
- Oxidative stress common in autism-depletion of GSH
- GSTT1 inhibited by Thimerosal



**Figure 50.1** The liver's detoxification pathways.

# Detoxification pathways

## PHASE 1



## PHASE 2

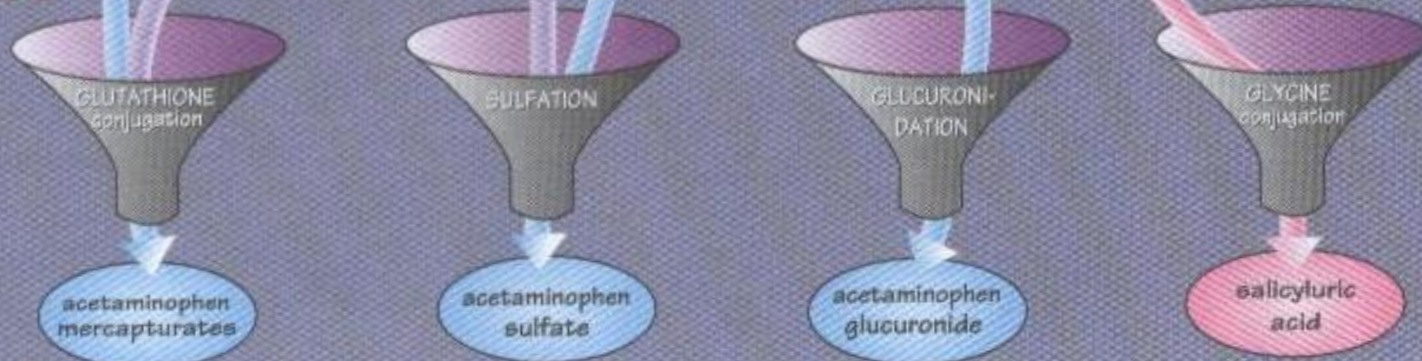


Figure 1

**OH**

**Conjugation**



**Many hormones are methylated after hydroxylation before they are conjugated.**

**СН<sub>3</sub>**

# Exogenous toxins(Xenobiotics)

- Prescription drugs
- Illegal drugs
- Food additives, dye, coloring
- Pesticides, herbicides, fungicides
- Alcohol and other solvents
- Natural food components
- Organic compounds(toluene, formaldehyde)
- Toxic heavy metals

# Excitotoxin

- **Russel L. Blaylock**
- **Added to food and beverages that cause neuronal excitability and subsequent depletion of neuronal ATP and calcium influx, ultimately lead to neuronal degeneration and death**
- **NT: Glutamate, aspartate-associated with ALS, Alzheimer's, Parkinson's**
- **MSG, aspartame(phenylalanine + aspartate)**
- **Adverse effect of it can be reduced by Mg, vit C,E**

**It is convenient to consider the metabolism of xenobiotics in two phases.**

**1. Phase 1 hydroxylation catalyzed by the mono-oxygenases cytochrome P450's.**

**It is convenient to consider the metabolism of xenobiotics in two phases.**

**1. Phase 1 hydroxylation catalyzed by the mono-oxygenases cytochrome P450's.**

**2. Phase 2 Methylation or Conjugation.**

**50% of all drugs prescribed to humans are metabolised by the various P450 enzymes.**

**However many P450 enzymes are inhibited by various drugs or their metabolic products, producing another cause of drug interaction.**

# **Inability to Phase 1 detoxify**

- 1. Leads to either the absorption and displacement in phospholipid cell membranes,**
- 2. Inactivation of specific enzymes**
- 3. The toxin binding with serum albumin, which is antigenic leading to the production of antibodies against it.**



# **Phase 2**

# **Conjugation**

**Phase 2 reactions conjugate the derivatives from Phase 1, where applicable, with molecules such as Glutathione, Glucuronic acid, Sulfate, Acetyl CoA, SAM, Taurine, Cysteine, Glycine and Threonine.**

**This makes the derivatives even more water soluble for excretion through the urine or bile.**

# Functional Lab for detox

- **Challenge test**
- **Phase I: caffeine CYP 1A2**
- **Phase II: acetaminophen (glucuronidation, sulfation, glutathione), aspirin (glucuronidation, glycine conjugation)**

# Hydroxylated toxin

*glutathione*  
– S-  
*transferase*  
Zn<sup>++</sup>

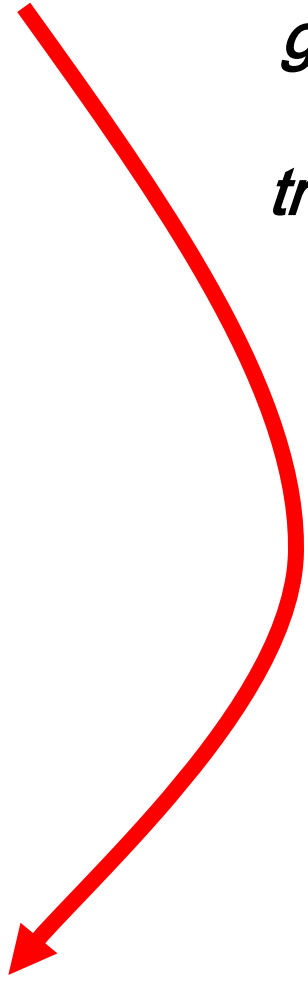
*glutathione reductase*  
NADPH



Glycine  
P-5-P  
Glutamic acid  
ATP  
Cysteine

*glutathione peroxidase*  
Selenium

**Glutathione conjugate**



**Glutathione conjugation  
(cysteine, glycine and glutamic  
acid) is catalyzed by  
*glutathione-S-transferase.***

**This enzyme is present mostly  
in the liver cytosol.**

# Phase 1 toxic intermediate

Reduced Glutathione

*glutathione peroxidase Sel*

Oxidised Glutathione

*glutathione-s-transferase*

*Zn ++*

*Broccoli*

*Lemongrass*

*Celery*

*Watercress*

**Glutathione (P-5-P) conjugate**

**A failure in the glutathione conjugation would lead to covalent combination to DNA and RNA and other cell proteins creating serious cell damage.**



**N.Acetyl Cysteine  
aids detoxification**

**1. Glutathione**

**2. Acetylation**

**3. Sulfation**

**4. Cysteine**

**Glucuronidation  
conjugation is the  
favoured pathway  
for the  
metabolism of  
many  
neurotransmitters,  
hormones, phenol  
and benzoic acid.**

**Sulfation conjugation uses 3-phosphoadenosine-5-phosphosulfate (PAPS), or sulfates or most commonly elemental sulfur or MSM as the sulfur donor.**

**Many neurotransmitters and hormones are conjugated via this pathway.**

# **Chemicals conjugated by Sulfation**

**1. Acetone**

**2. DDT / DDE**

**3. Ethylene glycol**

**4. Fluorine**

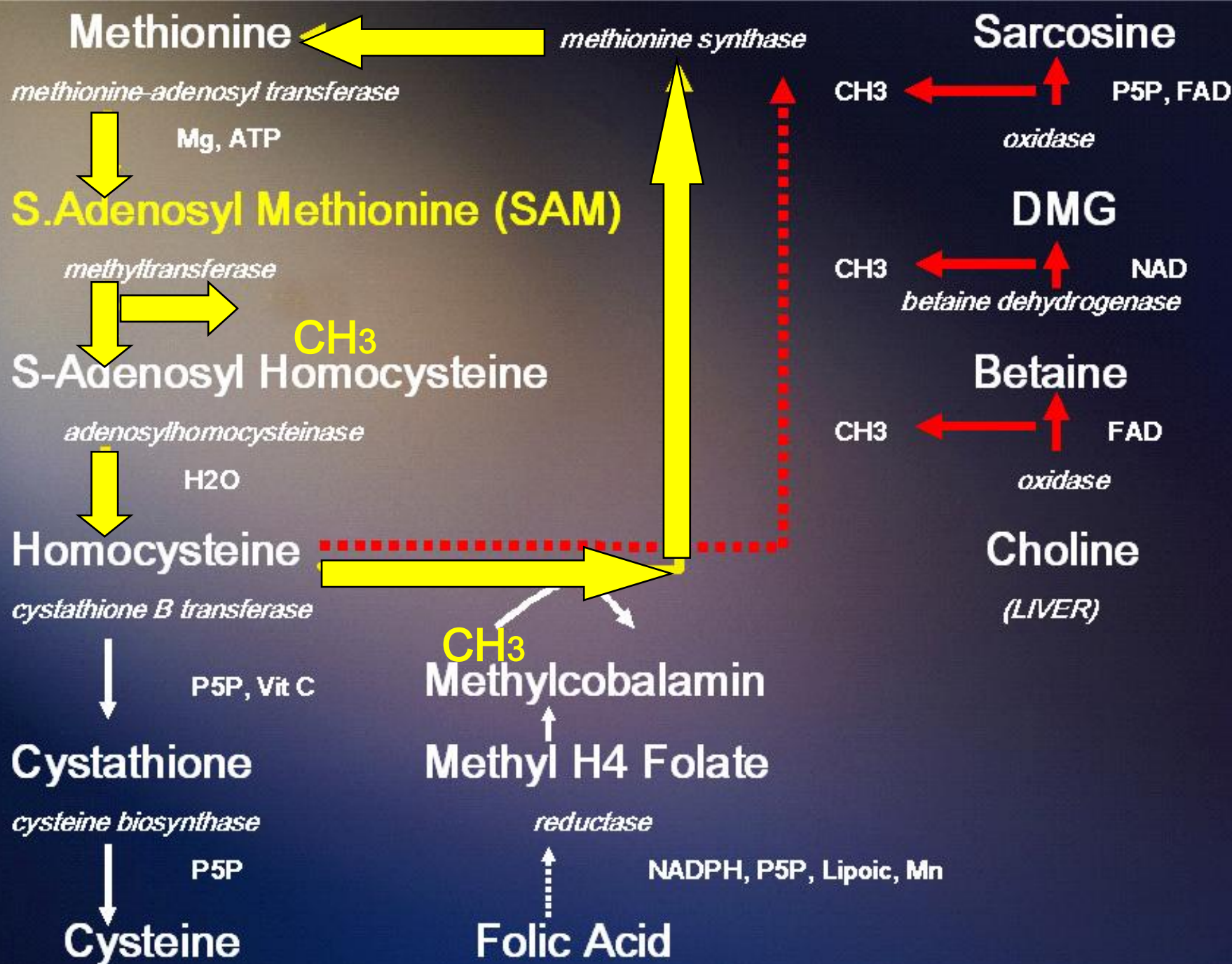
**5. Toluene**

**6. TRIC**

**Methylation conjugation is catalyzed by the various methyltransferases employing**

**S-Adenosylmethionine as the methyl donor (SAM).**

**Many hormones are initially hydroxylated, then methylated and lastly conjugated usually by glucuronidation or sulfation.**



# **Amino acid conjugation**

**can use either Taurine, Glycine, Cysteine or Threonine as conjugating donors.**

**Sodium benzoate is conjugated with glycine.**



<b>CONJUGATE</b>	<b>BIOMARKER</b>	<b>NUTRIENTS</b>
XOH + GLUTATHIONE	GLUTATHIONE-S-TRANSFERASE	GLUTATHIONE (NAC, Glutamate, Glycine) B6, Zn
XOH + GLUCURONIDATION	GLUCURONIC ACID	GLUCURONIC ACID
1. XOH + SULFATION 2. SULFITE OXIDASE	1. PAPs 2. SULFITE OXIDASE	PAPs, S, MSM Mol, Fe.
XOH + ACETYLATION	ACETYL CoA	Acetyl CoA (B5, Mg, Acetic acid)
XOH + METHYLATION	SAM	Methionine, MgATP, B12, Folic, Betaine, DMG
XOH + TAURINE	TAURINE	Taurine, NAD, Vit C, Vit A
XOH + THREONINE	THREONINE	Threonine
XOH + GLYCINE	GLYCINE	Glycine, B6, B2, Mg, Folic.
XOH + CYSTEINE	CYSTEINE	NAC, Methionine, B6

# DIAGNOSIS

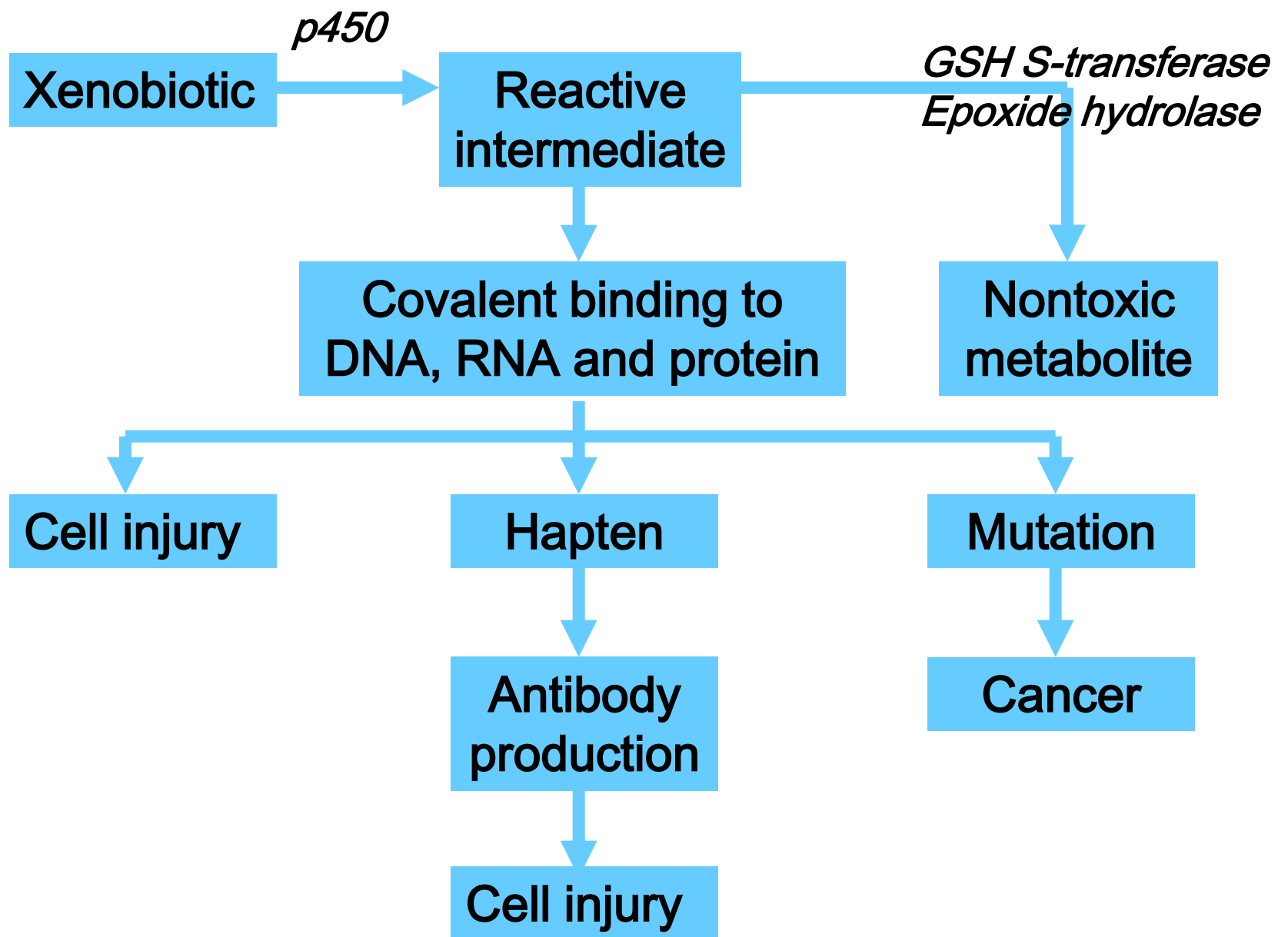
**Positive meridian will be negated by the CHEMICAL nosode and then to the various conjugates:**

**aminoDtox, LV-GB, three a day  
antioxidant, 타치온주사, DMSA, EDTA,  
포공영, 대계, 오미자, 시호, 강황, 인진**

## **PHASE 2 (CONJUGATION)**

**Inability to Phase2 detoxify  
may lead to the production of  
Reactive Intermediates which  
can be carcinogenic.**



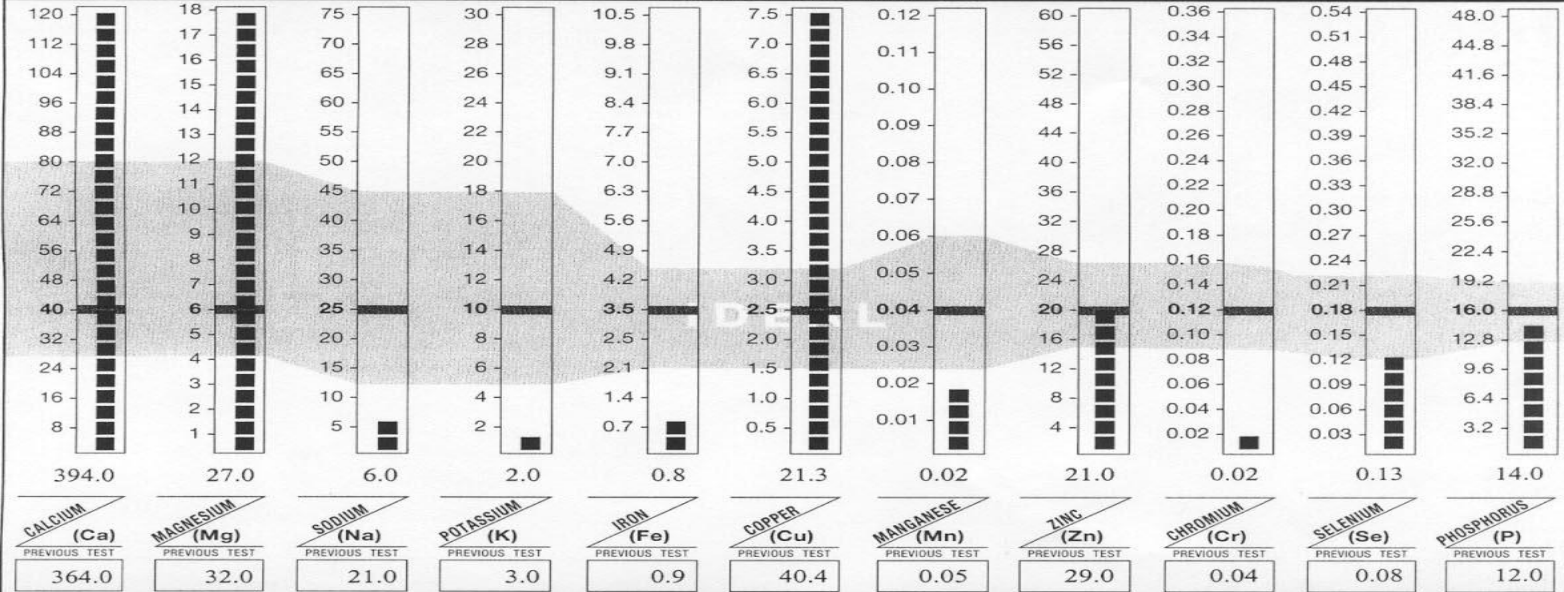


PATIENT NAME: **Bonnie Mailhot**

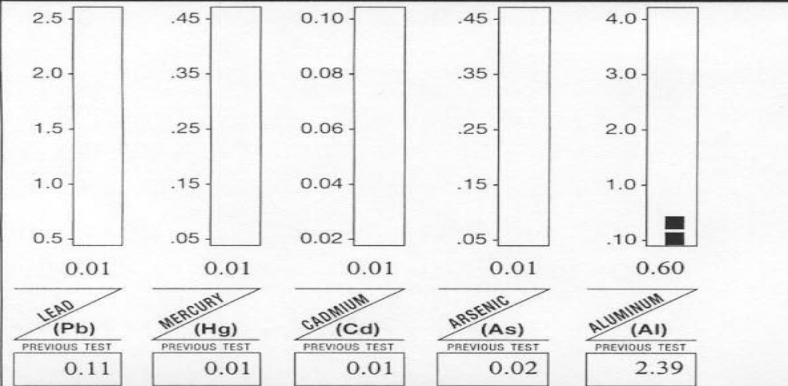
**Designs For Health**

SEX: **F**    AGE: **38**    DATE: **2/20/03**    LAB NO.: **285781**    CLIENT ACCT. NO.: **97220**

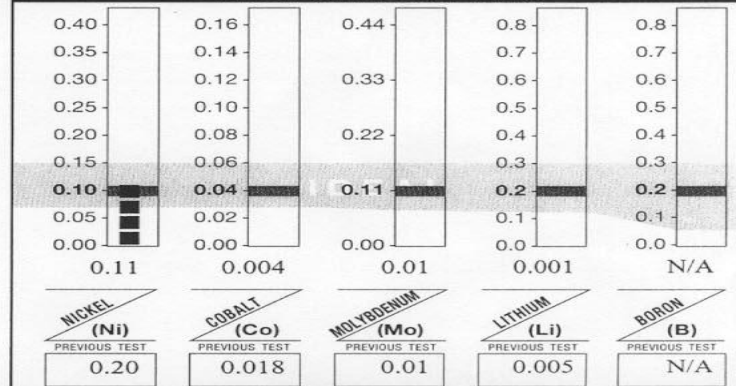
### NUTRIENT MINERALS



### TOXIC METALS



### ADDITIONAL MINERALS



### SIGNIFICANT MINERAL RATIOS

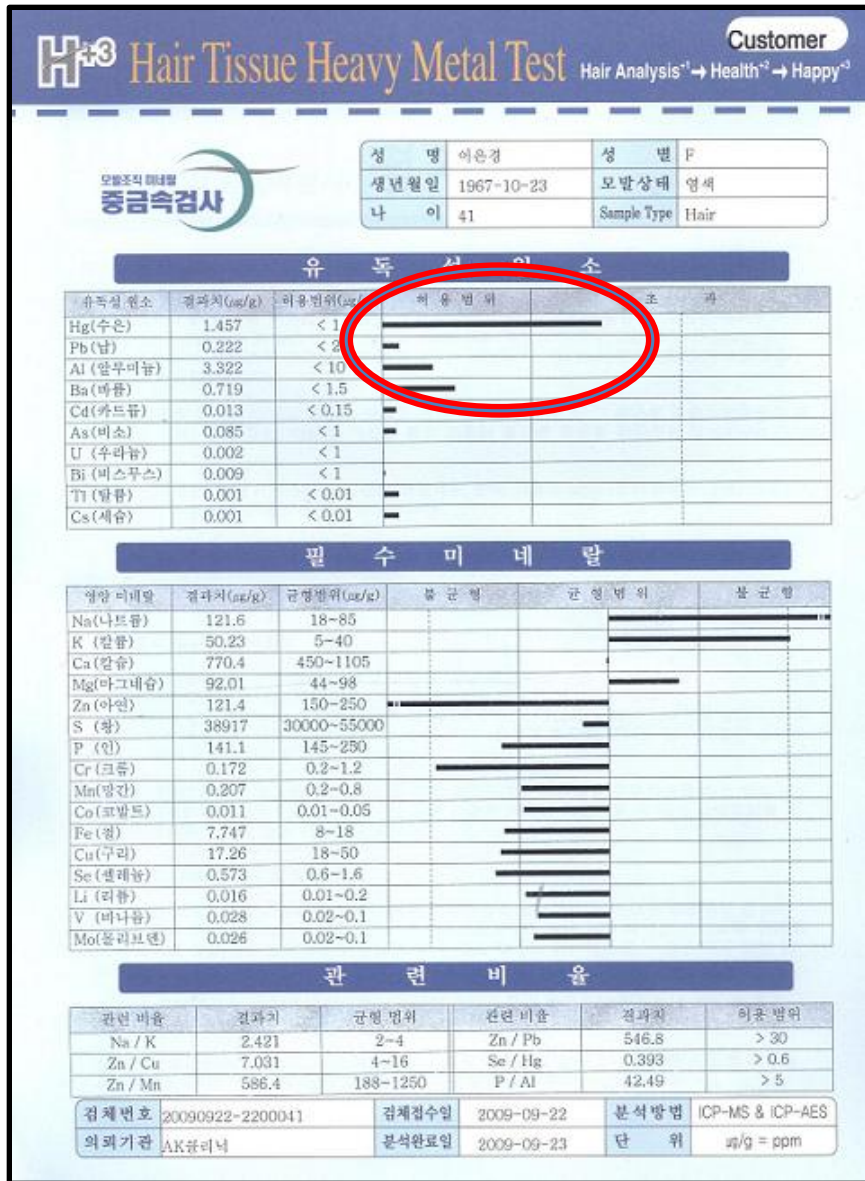
MINERAL RATIO	IDEAL RATIO	CURRENT RATIO	% OF IDEAL	PREVIOUS RATIO	LOW		IDEAL	HIGH	
					○	○	○	○	○
CA/MG	6.67	14.59	219	11.38	○	○	○	○	○
CA/K	4.00	197.00	4925	121.33	○	○	○	○	○
NA/MG	4.17	0.22	5	0.66	○				
NA/K	2.50	3.00	120	7.00	○	○	○	○	○
ZN/CU	8.00	0.99	12	0.72	○○				
CA/P	2.50	28.14	1126	30.33	○	○	○	○	○

MIXED OXIDIZER

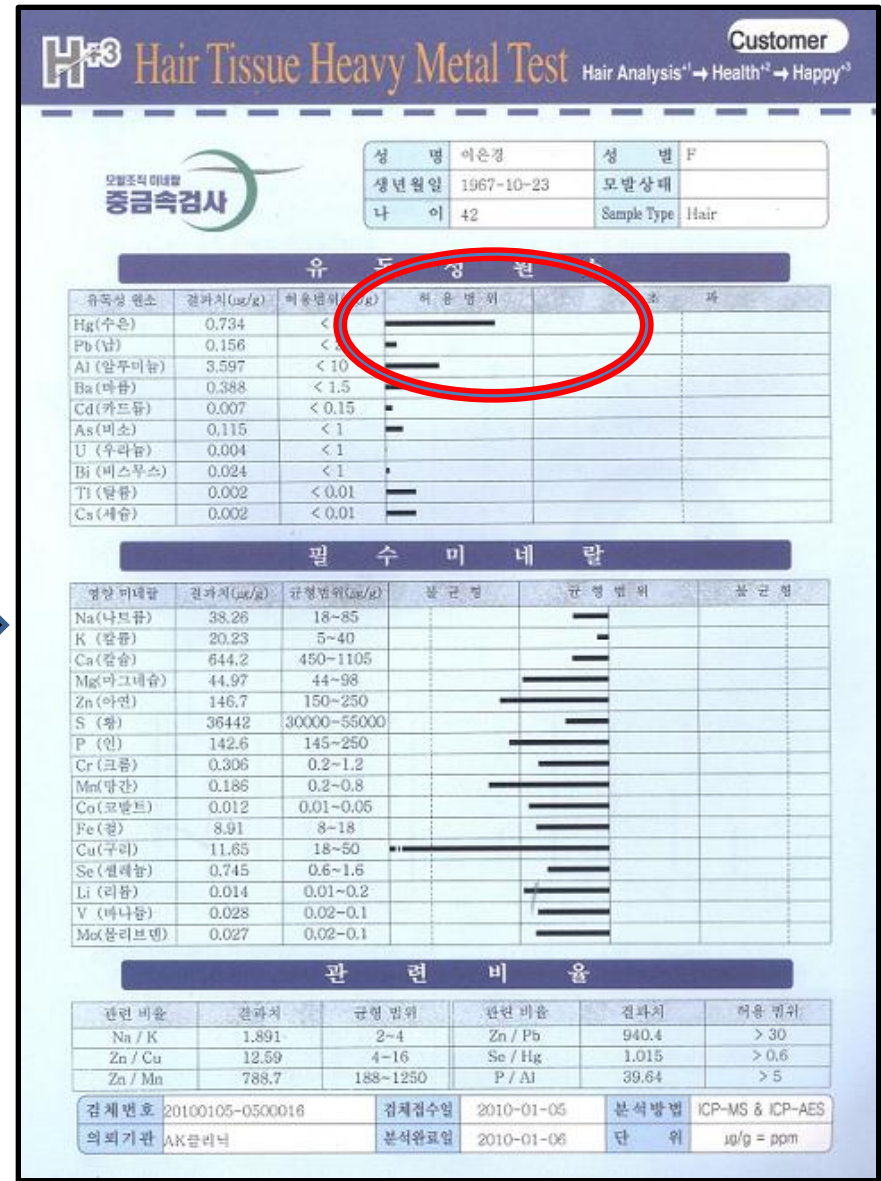
FAST OXIDIZER

SLOW OXIDIZER  \*\*\*

# 해독 전



# 해독 후



**H<sup>+3</sup>**

# Hair Tissue Heavy Metal Test

Hair Analysis<sup>1</sup> → Health<sup>2</sup> → Happy<sup>3</sup>

Customer



성명	이은경	성별	F
생년월일	1967-10-23	모발상태	염색
나이	41	Sample Type	Hair

## 유독성 원소

유독성 원소	검과치(μg/g)	허용범위(μg/g)	허용범위	초과
Hg(수은)	1.457	< 1	████████████████████	
Pb(납)	0.222	< 2	████████████████	
Al(알루미늄)	3.322	< 10	██████████████████	
Ba(바륨)	0.719	< 1.5	██████████████	
Cd(카드뮴)	0.013	< 0.15	██████████	
As(비소)	0.085	< 1	██████████	
U(우라늄)	0.002	< 1	██████████	
Bi(비스무스)	0.009	< 1	██████████	
Tl(탈륨)	0.001	< 0.01	██████████	
Cs(세슘)	0.001	< 0.01	██████████	



해독 전

**H<sup>+3</sup>**

# Hair Tissue Heavy Metal Test

Hair Analysis<sup>1</sup> → Health<sup>2</sup> → Happy<sup>3</sup>

Customer



성명	이은경	성별	F
생년월일	1967-10-23	모발상태	
나이	42	Sample Type	Hair

## 유독성 원소

유독성 원소	검과치(μg/g)	허용범위(μg/g)	허용범위	초과
Hg(수은)	0.734	< 1	██████████████████	
Pb(납)	0.156	< 2	██████████████	
Al(알루미늄)	3.597	< 10	██████████████████	
Ba(바륨)	0.388	< 1.5	██████████████	
Cd(카드뮴)	0.007	< 0.15	██████████	
As(비소)	0.115	< 1	██████████	
U(우라늄)	0.004	< 1	██████████	
Bi(비스무스)	0.024	< 1	██████████	
Tl(탈륨)	0.002	< 0.01	██████████	
Cs(세슘)	0.002	< 0.01	██████████	

해독 후



# 해독 전

# 해독 후

## H<sup>3</sup> Hair Tissue Heavy Metal Test Doctor



성명	김정미	성별	F
생년월일	1980-07-01	모발상태	파마
나이	29	Sample Type	Hair

### 유독성 원소

유독성 원소	결과치(µg/g)	허용범위(µg/g)	비교
Hg(수은)	0.407	< 1	Bar chart showing 0.407 vs 1
Pb(납)	0.227	< 1	Bar chart showing 0.227 vs 1
Al(알루미늄)	12.81	< 10	Bar chart showing 12.81 vs 10
Ba(바륨)	0.393	< 5	Bar chart showing 0.393 vs 5
Cd(카드뮴)	0.007	< 0.15	Bar chart showing 0.007 vs 0.15
As(비소)	0.1	< 1	Bar chart showing 0.1 vs 1
U(우라늄)	0.014	< 1	Bar chart showing 0.014 vs 1
Bi(비스무트)	0.009	< 1	Bar chart showing 0.009 vs 1
Tl(탈륨)	0.001	< 0.01	Bar chart showing 0.001 vs 0.01
Cs(세슘)	0.001	< 0.01	Bar chart showing 0.001 vs 0.01

### 필수 미네랄

영양 미네랄	결과치(µg/g)	규정범위(µg/g)	비교
Na(나트륨)	12.31	18-85	Bar chart showing 12.31 vs 18-85
K(칼륨)	14.74	5-40	Bar chart showing 14.74 vs 5-40
Ca(칼슘)	466.2	450-1105	Bar chart showing 466.2 vs 450-1105
Mg(마그네슘)	36.64	44-98	Bar chart showing 36.64 vs 44-98
Zn(아연)	304.9	150-250	Bar chart showing 304.9 vs 150-250
S(황)	38141	30000-65000	Bar chart showing 38141 vs 30000-65000
P(인)	159.2	145-250	Bar chart showing 159.2 vs 145-250
Cr(크롬)	0.182	0.2-1.2	Bar chart showing 0.182 vs 0.2-1.2
Mn(망간)	0.202	0.2-0.8	Bar chart showing 0.202 vs 0.2-0.8
Co(코발트)	0.011	0.01-0.05	Bar chart showing 0.011 vs 0.01-0.05
Fe(철)	8.178	8-18	Bar chart showing 8.178 vs 8-18
Cu(구리)	10.69	18-50	Bar chart showing 10.69 vs 18-50
Se(셀레늄)	0.66	0.6-1.6	Bar chart showing 0.66 vs 0.6-1.6
Li(리튬)	0.011	0.01-0.2	Bar chart showing 0.011 vs 0.01-0.2
V(바나듐)	0.03	0.02-0.1	Bar chart showing 0.03 vs 0.02-0.1
Mo(몰리브덴)	0.027	0.02-0.1	Bar chart showing 0.027 vs 0.02-0.1

### 관련 비율

관련 비율	결과치	규정 범위	관련 비율	결과치	허용 범위
Na / K	0.835	2~4	Zn / Pb	1343	> 30
Zn / Cu	28.52	4~16	Se / Hg	1.622	> 0.6
Zn / Mn	1509	188~1250	P / Al	12.43	> 5

검체번호	20090922-2200042	검체접수일	2009-09-22	분석방법	ICP-MS & ICP-AES
의뢰기관	AK클리닉	분석완료일	2009-09-23	단위	µg/g = ppm

## H<sup>3</sup> Hair Tissue Heavy Metal Test Doctor



성명	김정미	성별	F
생년월일	1980-07-01	모발상태	자연상태
나이	29	Sample Type	Hair

### 유독성 원소

유독성 원소	결과치(µg/g)	허용범위(µg/g)	비교
Hg(수은)	0.307	< 1	Bar chart showing 0.307 vs 1
Pb(납)	0.262	< 1	Bar chart showing 0.262 vs 1
Al(알루미늄)	7.982	< 10	Bar chart showing 7.982 vs 10
Ba(바륨)	0.375	< 5	Bar chart showing 0.375 vs 5
Cd(카드뮴)	0.008	< 0.15	Bar chart showing 0.008 vs 0.15
As(비소)	0.103	< 1	Bar chart showing 0.103 vs 1
U(우라늄)	0.013	< 1	Bar chart showing 0.013 vs 1
Bi(비스무트)	0.013	< 1	Bar chart showing 0.013 vs 1
Tl(탈륨)	0.002	< 0.01	Bar chart showing 0.002 vs 0.01
Cs(세슘)	0.002	< 0.01	Bar chart showing 0.002 vs 0.01

### 필수 미네랄

영양 미네랄	결과치(µg/g)	규정범위(µg/g)	비교
Na(나트륨)	24.5	18-85	Bar chart showing 24.5 vs 18-85
K(칼륨)	17.27	5-40	Bar chart showing 17.27 vs 5-40
Ca(칼슘)	643.9	450-1105	Bar chart showing 643.9 vs 450-1105
Mg(마그네슘)	50.47	44-98	Bar chart showing 50.47 vs 44-98
Zn(아연)	372.2	150-250	Bar chart showing 372.2 vs 150-250
S(황)	37723	30000-55000	Bar chart showing 37723 vs 30000-55000
P(인)	157.3	145-250	Bar chart showing 157.3 vs 145-250
Cr(크롬)	0.218	0.2-1.2	Bar chart showing 0.218 vs 0.2-1.2
Mn(망간)	0.203	0.2-0.8	Bar chart showing 0.203 vs 0.2-0.8
Co(코발트)	0.012	0.01-0.05	Bar chart showing 0.012 vs 0.01-0.05
Fe(철)	7.71	8-18	Bar chart showing 7.71 vs 8-18
Cu(구리)	11.71	18-50	Bar chart showing 11.71 vs 18-50
Se(셀레늄)	0.638	0.6-1.6	Bar chart showing 0.638 vs 0.6-1.6
Li(리튬)	0.012	0.01-0.2	Bar chart showing 0.012 vs 0.01-0.2
V(바나듐)	0.017	0.02-0.1	Bar chart showing 0.017 vs 0.02-0.1
Mo(몰리브덴)	0.025	0.02-0.1	Bar chart showing 0.025 vs 0.02-0.1

### 관련 비율

관련 비율	결과치	규정 범위	관련 비율	결과치	허용 범위
Na / K	1.419	2~4	Zn / Pb	1421	> 30
Zn / Cu	31.78	4~16	Se / Hg	2.078	> 0.6
Zn / Mn	1833	188~1250	P / Al	19.71	> 5

검체번호	20100105-0500018	검체접수일	2010-01-05	분석방법	ICP-MS & ICP-AES
의뢰기관	AK클리닉	분석완료일	2010-01-06	단위	µg/g = ppm





# H<sup>+</sup>3 Hair Tissue Heavy Metal Test

Hair Analysis<sup>1</sup> → Health<sup>2</sup> → Happy<sup>3</sup>

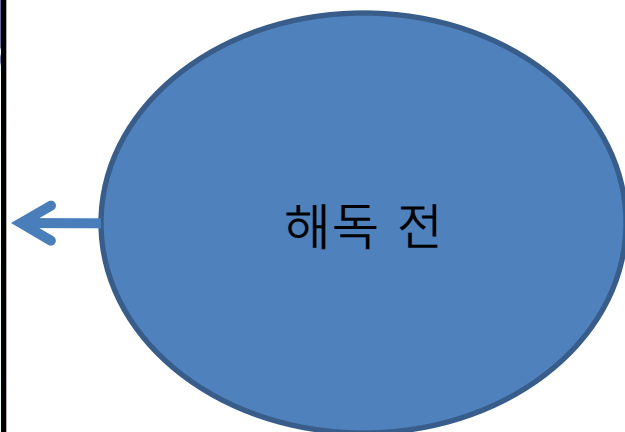
Doctor



성명	김정미	성별	F
생년월일	1980-07-01	모발상태	자연상태
나이	29	Sample Type	Hair

## 유독성 원소

유독성 원소	결과치(µg/g)	허용범위(µg/g)	허용 범위	비교
Hg(수은)	0.307	< 1	██████████	
Pb(납)	0.262	< 2	██████████	
Al(알루미늄)	7.982	< 10	██████████	
Ba(바륨)	0.375	< 1.5	██████████	
Cd(카드뮴)	0.008	< 0.15	██████████	
As(비소)	0.103	< 1	██████████	
U(우라늄)	0.013	< 1	██████████	
Bi(비스무스)	0.013	< 1	██████████	
Tl(탈륨)	0.002	< 0.01	██████████	
Cs(세슘)	0.002	< 0.01	██████████	



# H<sup>+</sup>3 Hair Tissue Heavy Metal Test

Hair Analysis<sup>1</sup> → Health<sup>2</sup> → Happy<sup>3</sup>

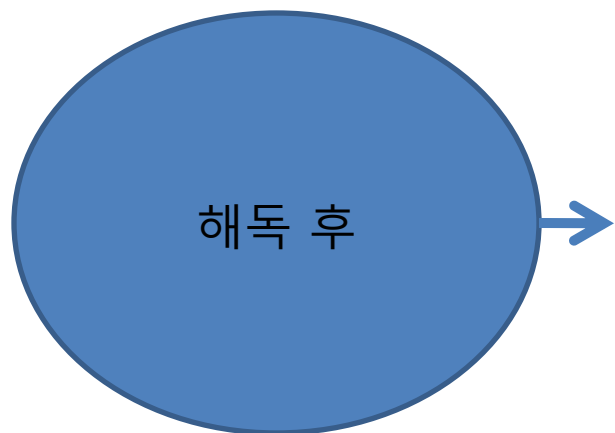
Doctor



성명	김정미	성별	F
생년월일	1980-07-01	모발상태	과마
나이	29	Sample Type	Hair

## 유독성 원소

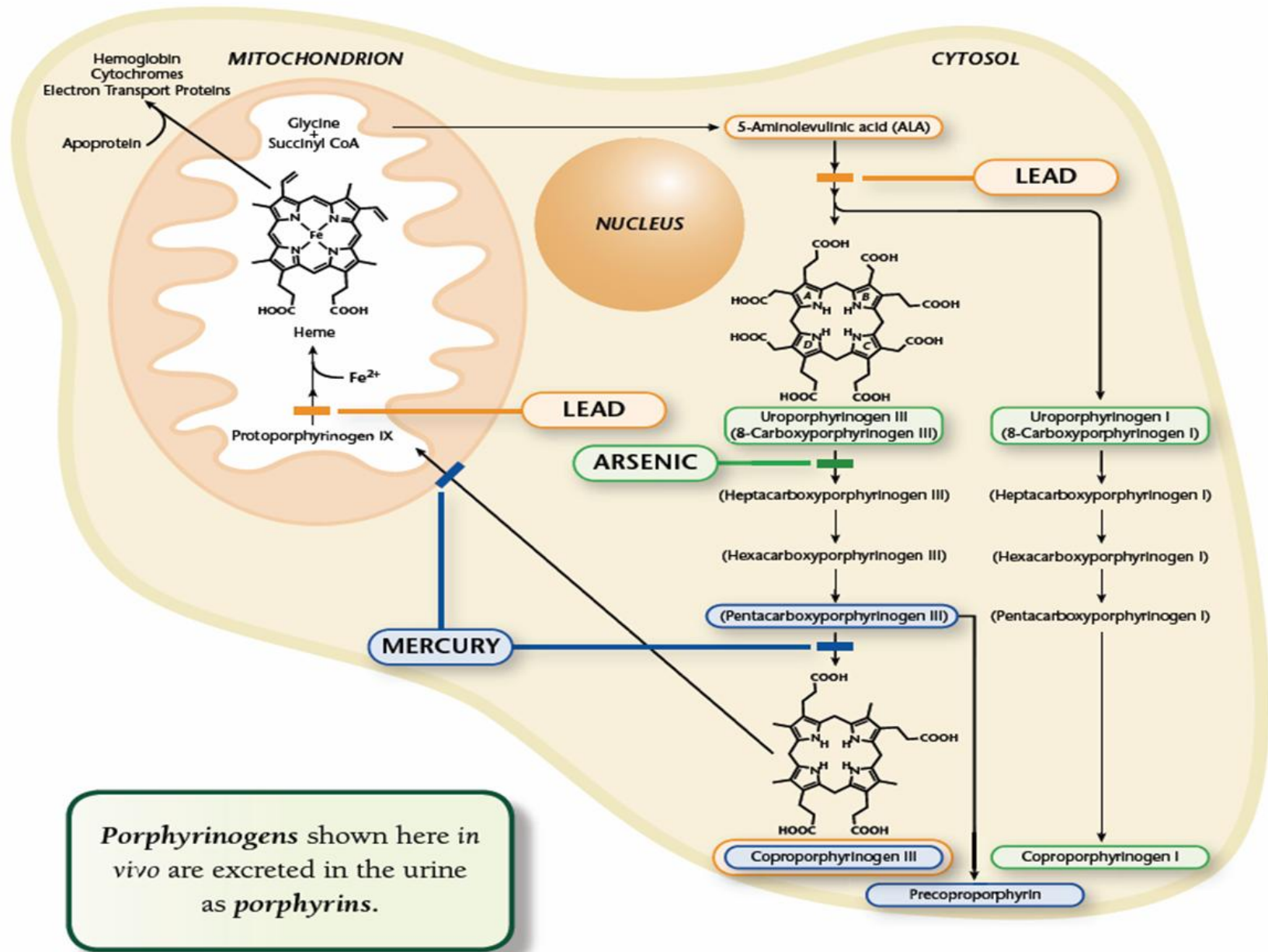
유독성 원소	결과치(µg/g)	허용범위(µg/g)	허용 범위	비교
Hg(수은)	0.407	< 1	██████████	
Pb(납)	0.227	< 2	██████████	
Al(알루미늄)	12.81	< 10	██████████	
Ba(바륨)	0.393	< 1.5	██████████	
Cd(카드뮴)	0.007	< 0.15	██████████	
As(비소)	0.1	< 1	██████████	
U(우라늄)	0.014	< 1	██████████	
Bi(비스무스)	0.009	< 1	██████████	
Tl(탈륨)	0.001	< 0.01	██████████	
Cs(세슘)	0.001	< 0.01	██████████	



# 디톡스탕

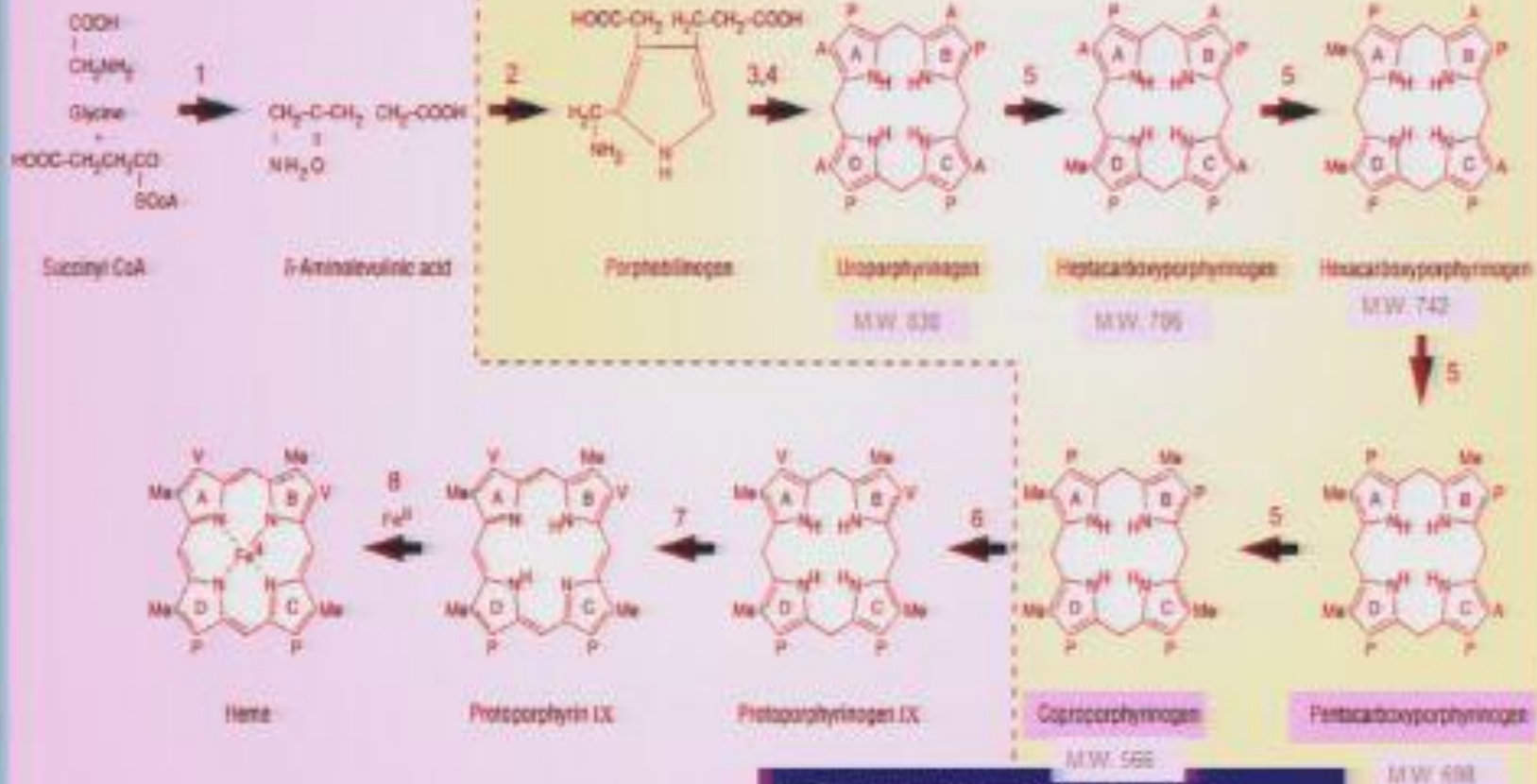
- 포공영 500g  
대계 400g  
백복령 160g  
인진 220g  
강황 220g  
오미자 120g

Figure 1: The Heme Pathway



Mitochondrion

Cytosol

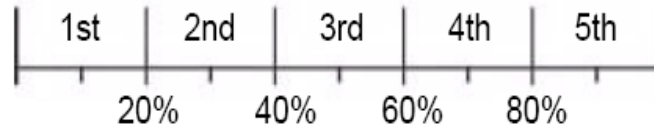


- 1 = δ-aminolevulinic acid (ALA) synthetase
- 2 = ALA dehydratase
- 3 = uroporphyrinogen I synthetase PBGD
- 4 = uroporphyrinogen III cosynthetase
- 5 = UROD (Uroporphyrinogen decarboxylase)
- 6 = COPOX (Coproporphyrinogen oxidase)
- 7 = Protoporphyrinogen oxidase
- 8 = Ferrochelatase

# Heme biosynthetic pathway

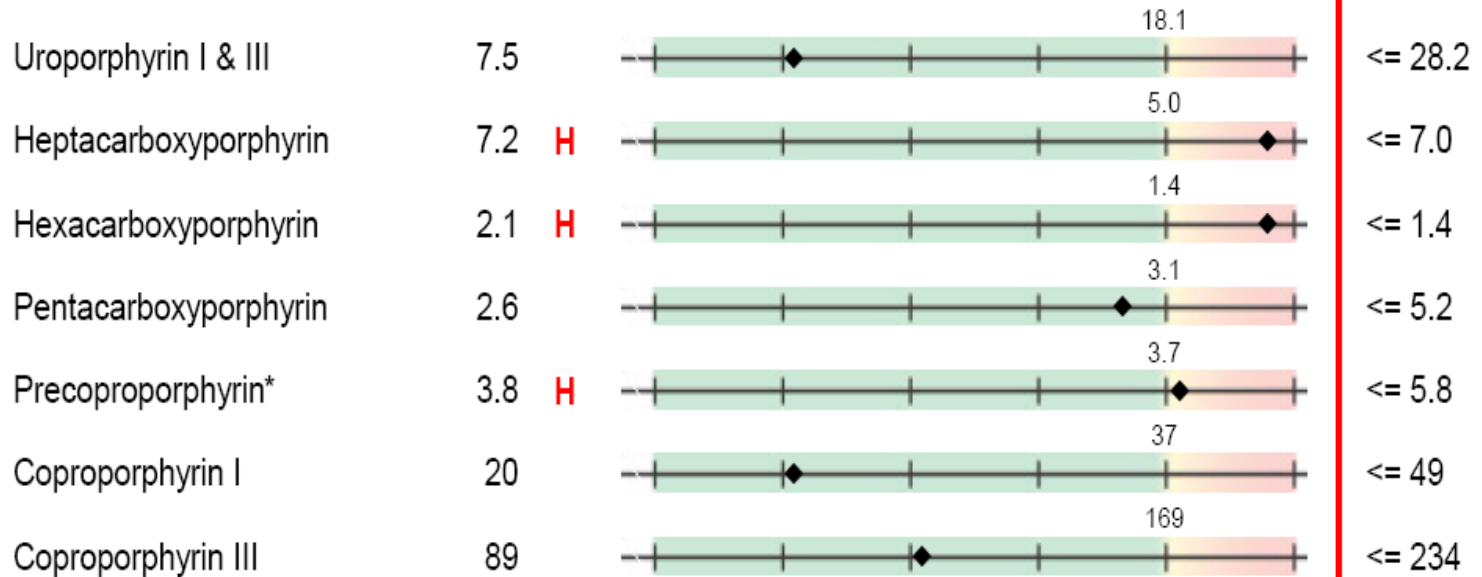
## Percentile Ranking by Quintile

Results  
nmol/g creatinine

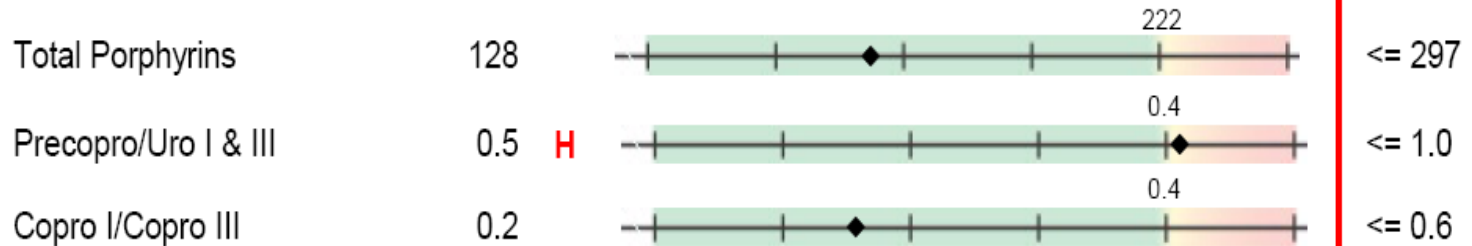


95%  
Reference  
Interval

### Porphyrin Pathway Intermediates



### Calculated Values

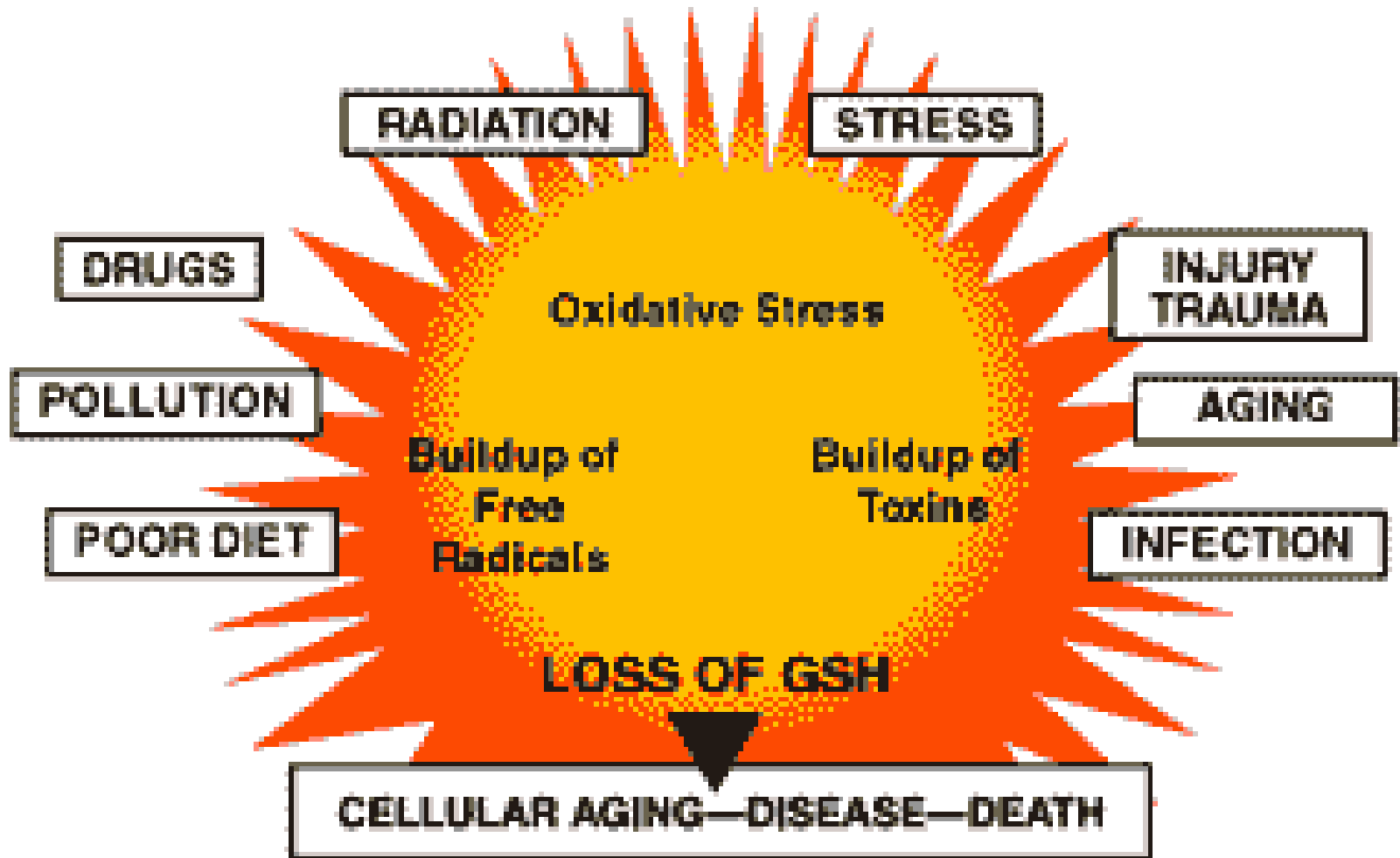


Creatinine =40 mg/dL

# 자폐와 간해독

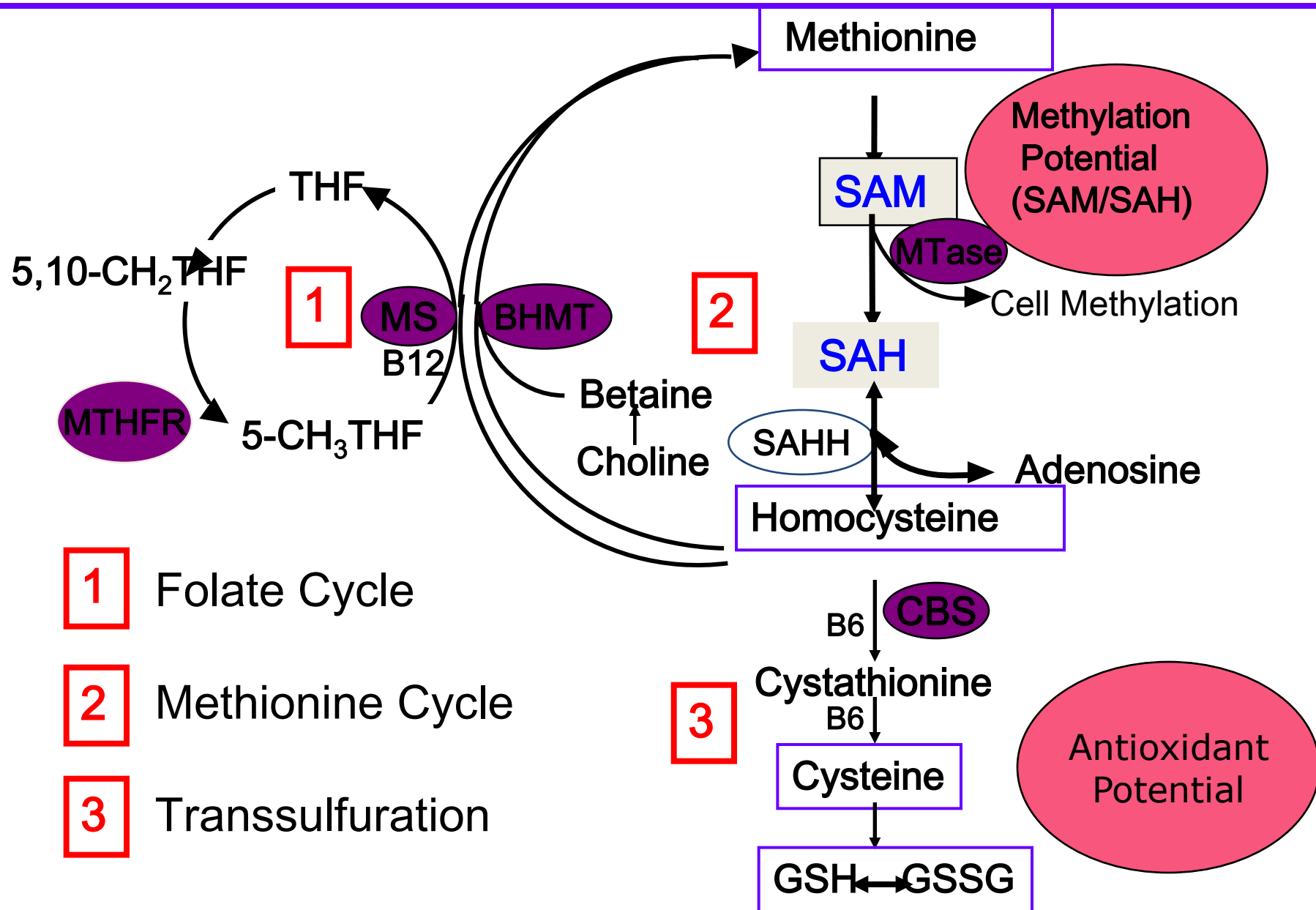
- Oxidative stress
- Methylation
- Glutathione
- Heavy metal
- Autism

# CONTRIBUTING FACTORS TO OXIDATIVE STRESS



**Glutathione is the body's Key antioxidant**

# Methionine Transsulfuration to Cysteine and Glutathione

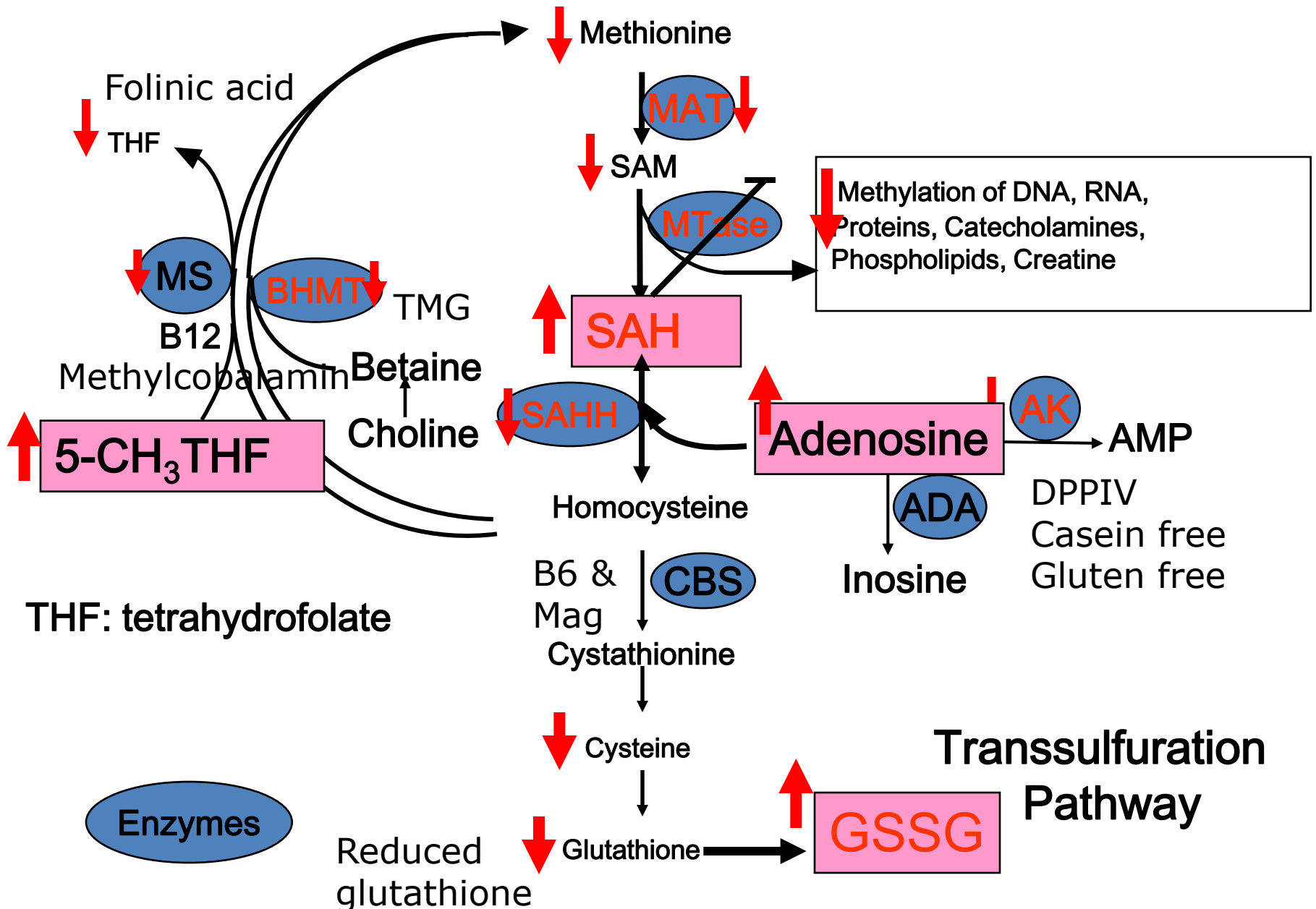




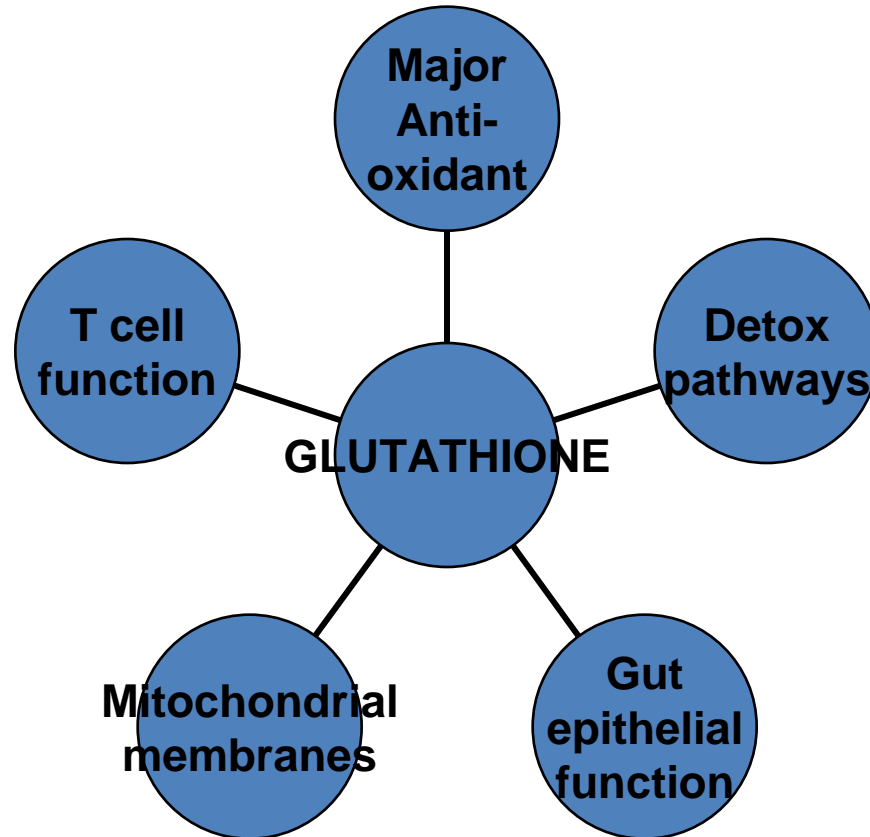
# Cellular consequences of reduced methylation capacity

- ◆ Reduced DNA methylation
- ◆ Altered activity and function of proteins
- ◆ Decreased catecholamine-O-methyltransferase activity
  - ◆ altered neurotransmitter function
- ◆ Reduced membrane phosphatidylcholine synthesis
  - ◆ altered membrane fluidity and signaling

# Treatment Strategies for Oxidative Stress



# VITAL ROLES OF GLUTATHIONE IN AUTISM



# Cellular consequences of decreased glutathione

- ◆ Decreased detoxification
  - ◆ neurotoxicity
- ◆ Degeneration of gut epithelium
  - ◆ increased permeability and autoimmunity
- ◆ Abnormal immune function
  - ◆ T cell dysfunction
- ◆ Decreased total antioxidant capacity
  - ◆ makes everything worse

# Detoxification and Oxidative Stress

- ◆ James SJ et al. Metabolic biomarkers of increased oxidative stress and impaired methylation capacity in children with autism. *Am J Clin Nutr* 2004; 80: 1611-7.
- ◆ James SJ et al. Low plasma methionine, cysteine and glutathione levels are associated with increased frequency of common polymorphisms affecting methylation and glutathione pathways in children with autism. *Experimental Biology* 2005; 19: A51-A52.
- ◆ James SJ et al. Thimerosal neurotoxicity is associated with glutathione depletion: protection with glutathione precursors. *Neurotoxicology* 2005; 26(1):1-8.

# 3 R's applied to detoxification

- Remove toxins and irritants
  - Clean rooms, environmental controls
  - Detoxification strategies & chelation
- Replenish the body's natural detoxification mechanisms
  - Treat oxidative stress and restore methylation biochemistry
- Repair damage from toxins

# Autonomic dysfunction in mercury poisoning

- Elevated heart rate
- Increased arousal - fight or flight responses
- Excessive sweating
- Poor circulation

## Porphyrinuria in childhood autistic disorder: Implications for environmental toxicity

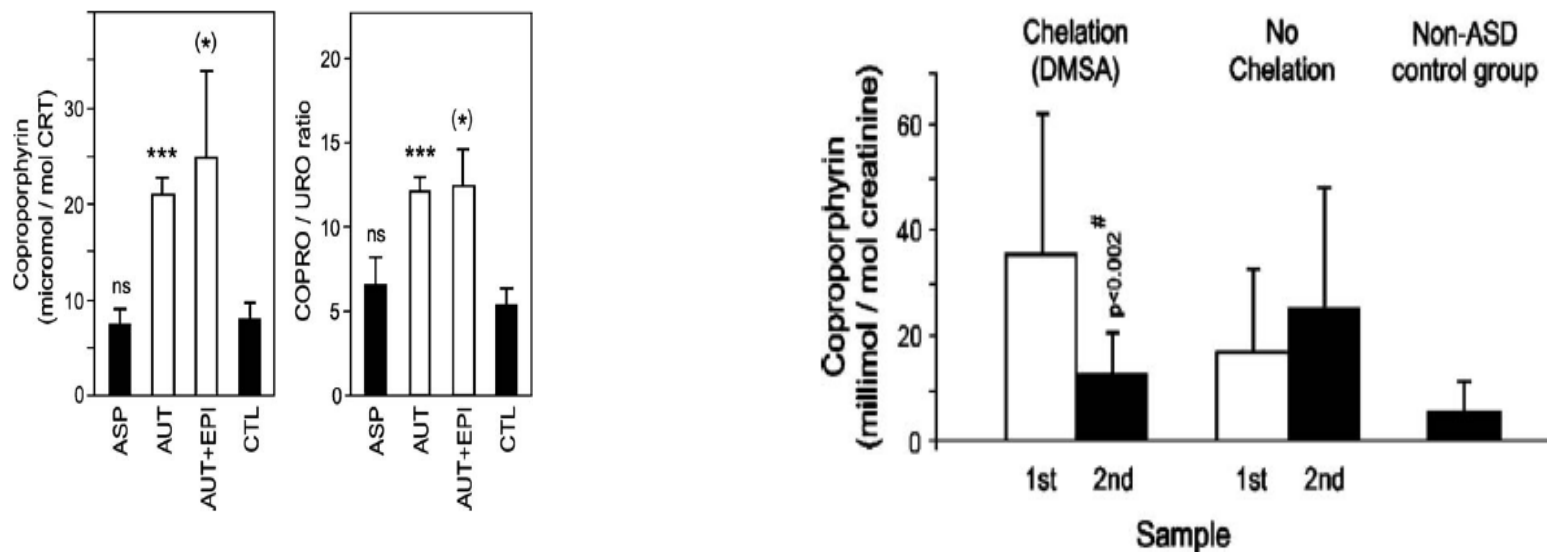
Robert Nataf <sup>a</sup>, Corinne Skorupka <sup>b</sup>, Lorene Amet <sup>b</sup>, Alain Lam <sup>a</sup>,  
Anthea Springbett <sup>c</sup>, Richard Lathe <sup>d,\*</sup>

<sup>a</sup> *Laboratoire Philippe Auguste, Paris, France*

<sup>b</sup> *Association ARIANE, Clichy, France*

<sup>c</sup> *Department of Statistics, Roslin Institute, Roslin, UK*

<sup>d</sup> *Pieta Research, PO Box 27069, Edinburgh EH10 5YW, UK*





# Detoxification Strategies

- My favorite: enhance the body's own natural detoxification mechanisms
  - Epsom's salt baths
  - Enhance methylation pathways
  - Enhance glutathione
  
- Consider far infrared sauna

# Detoxification Strategies and Individualizing Chelation Protocols

DAN!® Conference  
October 2007

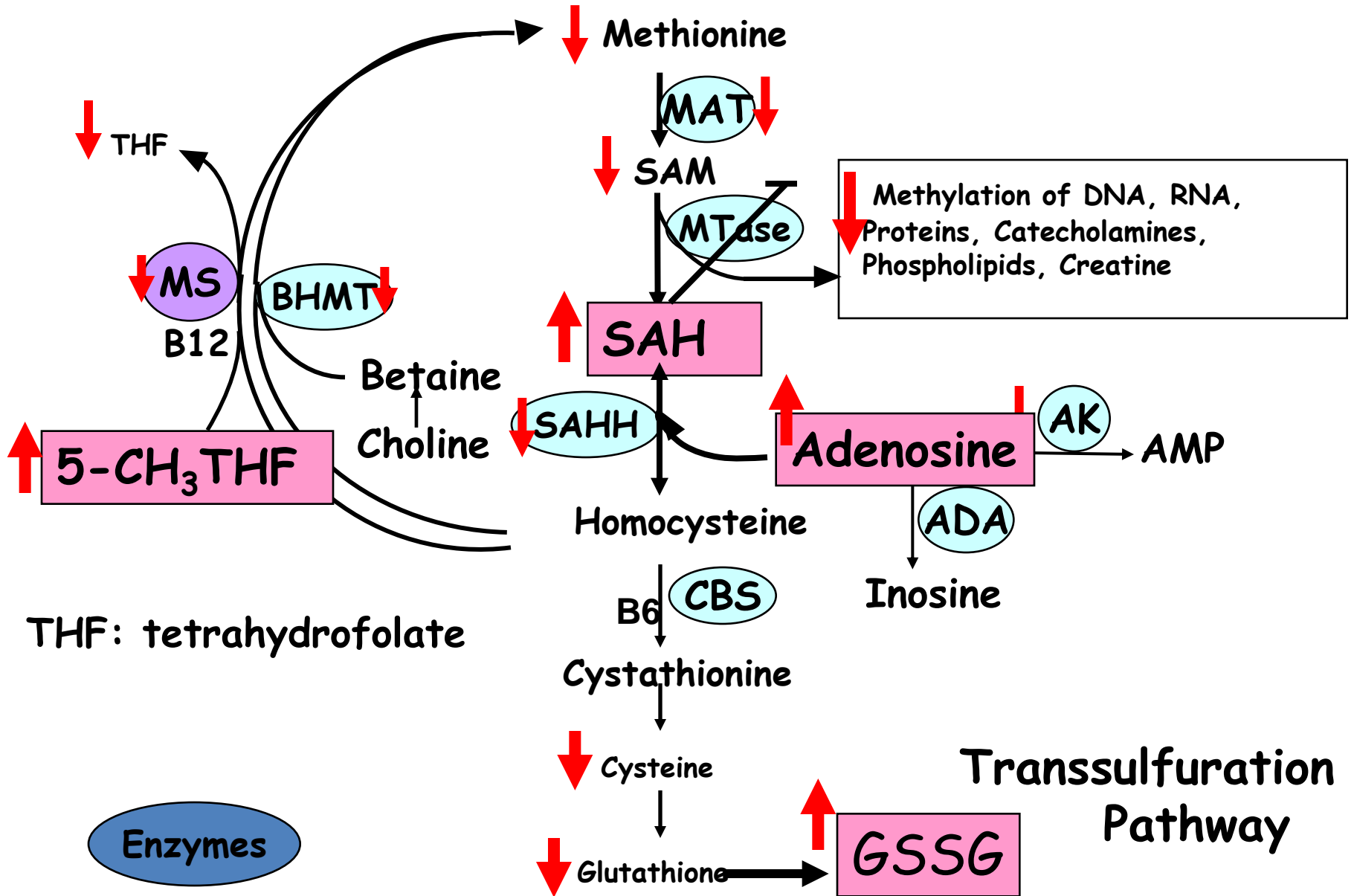
**Anju Usman, M. D.**  
**True Health Medical Center**  
**Naperville, Illinois**

# Detoxification

Process of **eliminating toxins** by converting them from fat soluble to water soluble molecules

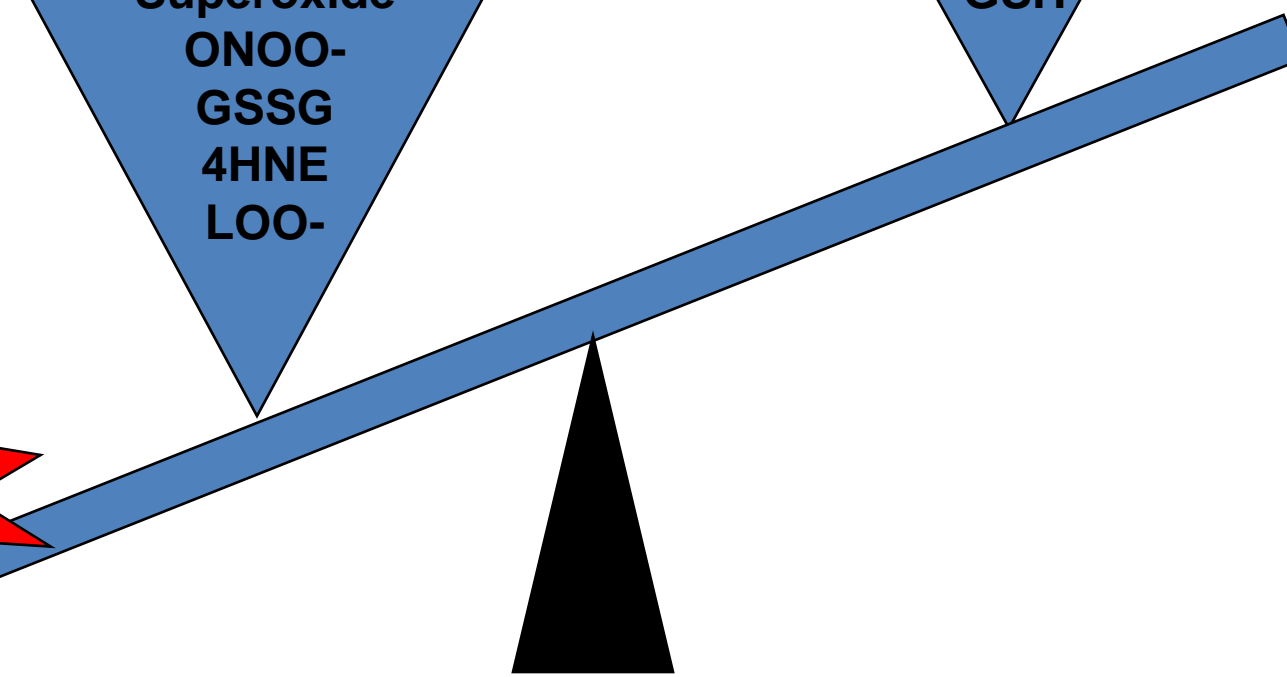
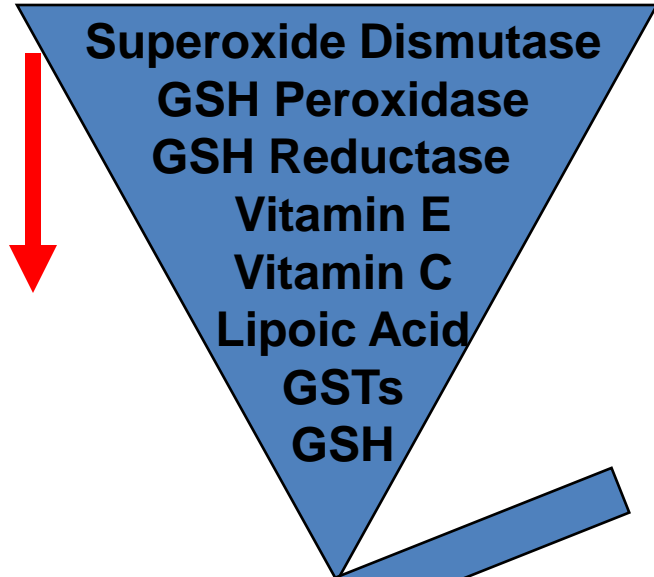
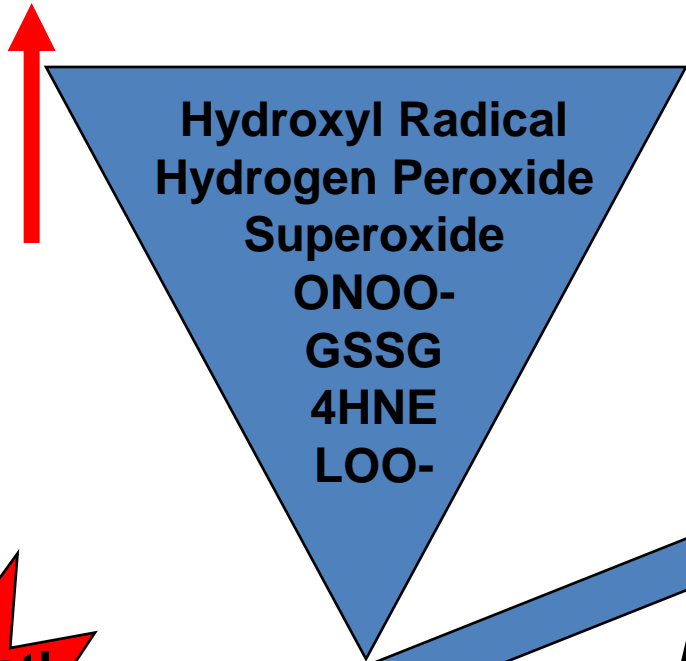
- Process requires a great deal of energy (ATP)
- Process puts a burden on the body, and requires numerous vitamin cofactors
- First line of defense is our gastrointestinal lining
- Impaired detoxification leads to an overload of toxins in the body
- Excess toxins lead to oxidative stress and chronic inflammatory conditions

# Impact of Oxidative Stress on Methionine Metabolism



**↑ Oxidative Stress** ←

→ **↓ Antioxidant Defense**



# Metabolic Aftermath

## ◆ Heavy Metal Overload - Oxidative Stress

- ◆ Thimerosal (Mercury), Arsenic, Lead
- ◆ Depletion of Antioxidants, Glutathione, and Metallothionein
- ◆ Mineral Deficiency- Zinc, Magnesium, Selenium
- ◆ Mitochondrial Dysfunction

## ◆ Impaired Detoxification

- ◆ Undermethylation, Remethylation Defects
- ◆ Sulfation Defects (phenolsulfertransferase, sulfite oxidase)
- ◆ Cysteine Deficiency
- ◆ Glutathione Deficiency (GSH)

## ◆ Gastrointestinal Dysfunction

- ◆ Dysbiosis (Yeast, Bad Bacteria, Virus...)
- ◆ Malabsorption
- ◆ Maldigestion (enzyme deficiency, IgG food sensitivities, urinary peptides)
- ◆ Autistic Enterocolitis/ Lymphonodular Hyperplasia

## ◆ Immune System Dysregulation

- ◆ Proinflammatory Cytokines
- ◆ Microglial Activation
- ◆ Th1/ Th2 skewing
- ◆ Decreased Natural Killer Cell Activity
- ◆ Increased Autoimmune Markers

# Basic Strategy

- History and Physical Examination
- Laboratory Testing
- Clean Up
  - Environmental Controls
  - Dietary Interventions
  - Address Gastrointestinal Health
- Foundational Nutrients
- Treat underlying Immune Issues and Inflammation
- Support Detoxification Pathways
- Heavy Metal Detoxification

# Support Detoxification Pathways

- ◆ Methylation- Methyl B12, DMG, TMG, SAMe, B2, B3, Folinic, Methyl Folate, Tetrahydrobiopterin (BH4)
- ◆ Sulfation- Biotin, Molybdenum, B1, Epsom Salts
- ◆ Glutathione Conjugation- NAC, glycine
- ◆ Glycine Conjugation
- ◆ Taurine Conjugation
- ◆ Acetylation- NAC, B5
- ◆ Glucuronidation- Ca d-glucarate

**Plasma Sulfate, Plasma reduced Glutathione, Glycine, and Taurine levels can be measured.**



# Methylcobalamin (methyl B12)

- ◆ Cofactor for Methionine Synthase and Methionine Synthase Reductase in the methylation cycle.
- ◆ Bypasses impairments along folate pathway.
- ◆ Methylates Dopamine-4 Receptor(DRD4).
- ◆ Shown to help cognitive ability, abstract thinking, attention, focus, awareness, language, behavior, OCD, anxiety, ....(Neubrandner, 2004).
- ◆ Given by injection, highly concentrated, injected subcutaneous in gluteal tissue, slow release, painless, no toxicity associated with high dose vitamin B12.
- ◆ May give intranasal, sublingual, transdermal preparations, but not as effective
- ◆ No test for methylB12 deficiency.
- ◆ Side effects – increased energy, hyperactivity, agitation, headache, insomnia.

# Glutathione Support

- ◆ TMG, Folinic, Methyl B12
- ◆ Glutathione precursors
  - ◆ N- Acetyl Cysteine
  - ◆ Glycine
  - ◆ Glutamate (do not give)
- ◆ Vitamin C, Vitamin E, Selenium, Zinc, Metallothionein, Alpha Lipoic Acid, Antioxidants, Milk Thistle, Melatonin
- ◆ Reduced L-Glutathione
  - ◆ transdermal, oral, intranasal, nebulized, suppository, lipocetical, intravenous preparations
- ◆ Careful, may increase stims

# Evaluation of Chronic Heavy Metal Burden

- ◆ Provocative Testing is often unconvincing in ASD due to impaired detoxification.
- ◆ Urine Toxics, Fecal Toxics, and Hair Analysis show excretion of toxic metals. We have no way to determine total body burden.
- ◆ RBC Blood testing is a poor measure of chronic heavy metal burden. However, blood may show acute exposure.
- ◆ There are no standards for diagnosing chronic toxicity.
- ◆ There are no tests to determine body burden of metals.
- ◆ Lead is a bone seeker and can only be measured in blood 12 hrs after exposure, therefore blood Pb is not an adequate indicator of low level chronic toxicity.
- ◆ Mercury has an affinity for fatty tissue and a developing brain, and is very rarely seen in blood.
- ◆ Urinary porphyrin testing promising.

# Heavy Metal Detox Options

- Pharmaceutical Chelators
- Clathrating agents/Zeolites
- TTFD/Allithiamine
- Glutathione
- Alpha Lipoic Acid
- N-Acetyl Cysteine
- Metallothionein Promotion
- Methylcobalamin Injections
- Herbals- garlic, cilantro, chlorella, spirulina
- RNA Therapy
- Homeopathics
- Far infra-red Sauna

# Pharmaceutical Chelation

## ◆ Chelators- DMSA, EDTA, DMPS

- ◆ Bind a free metal ion into a ring structure thereby neutralizing its reactive state.
- ◆ Chelators have varying affinities for different heavy metals.
- ◆ Do not cross Blood Brain Barrier.
- ◆ Heavy Metal/Chelator Complex is excreted thru kidney and liver thereby placing a burden on these organs.
- ◆ Side effects include abnormal kidney and liver functions, leukopenia, mineral depletion, gut dysbiosis, rashes, nausea, and fatigue.
- ◆ Monitor cbc, liver, kidney, electrolytes, mineral stores, iron stores, thyroid function and GI status during chelation process every 2 – 3 months

# Pharmaceutical Chelators

## ◆ DMSA (dimercaptosuccinic acid)

- ◆ Good affinity for Mercury and Lead, Poor for Aluminum
- ◆ Excellent safety record
- ◆ Oral, Transdermal, and Suppositories
- ◆ Contraindicated in Sulfa allergy or G6PD deficiency
- ◆ 30 mg/kg/day max daily dose
- ◆ Most common regimen 10mg/kg every 8 hours, 3 days on 11 days off
- ◆ Most regimens do not exceed 500mg in a single dose
- ◆ May be dosed every 4-8 hours oral or transdermal
- ◆ May be dosed once per day as suppository

## ◆ ALA (alpha lipoic acid)

- ◆ Antioxidant, Regenerates Glutathione, Donates Sulfur
- ◆ Not for initial use, or if severe dysbiosis
- ◆ Potential for crossing blood brain barrier
- ◆ Oral or Transdermal

# Pharmaceutical Chelators

- ◆ CaEDTA (ethylenediaminetetraacetic acid)
  - ◆ Low affinity for Mercury, good affinity for Lead, fair affinity for Aluminum, and Copper
  - ◆ CaNa<sub>2</sub> EDTA FDA approved for Lead Toxicity, only chelator proven to improve IQ
  - ◆ MgNa<sub>2</sub> EDTA when given IV is used predominantly for arteriosclerosis, may cause fatal hypocalcemia if given rapidly
  - ◆ Consider initially in patients with severe dysbiosis and hyperactivity
  - ◆ Preparations:
    - ◆ Oral (ionized, lipoceutical), Transdermal, Intravenous, Suppository

# Pharmaceutical Chelators

- ◆ DMPS (dimercaptopropanesulfonic acid)
  - ◆ Excellent chelator of Mercury, poor affinity for Lead, fair affinity for Aluminum
  - ◆ U.S. FDA approved for prescription compounding
  - ◆ Excretion is predominantly thru kidney
  - ◆ Transdermal DMPS
    - ◆ Dr. Rashid Buttar Protocol:
      - ◆ 1.5 mg/kg every other day
      - ◆ No minerals given on DMPS days
  - ◆ Oral, Suppository, Intramuscular, Intravenous



# Heavy Metal Detox Options

## ◆ Clathrating Agents

- ◆ Trap heavy metal into a colloidal mesh, rendering the heavy metal innocuous.
- ◆ Many are found naturally, ex. Chlorella and Spirulina.
- ◆ Affinity is very strong, therefore agents can become contaminated with heavy metals easily.
- ◆ May help detox POPs.

## ◆ Zeolites

- ◆ Natural volcanic minerals with a unique, complex crystalline structure.
- ◆ Honeycomb framework of cavities and channels (like cages) works at the cellular level trapping, heavy metals and toxins.
- ◆ Few negatively charged minerals in nature
- ◆ Zeolites act as magnets drawing toxins to it

# Heavy Metal Detox Options

- Far Infra-Red Sauna
  - Deep penetration of heat
  - Increases core temperature
  - Enhances circulation, lymphatic flow, and natural release of stored toxins
  - Increases release of toxins thru sweat, liver, and kidney
  - Helpful for detox of POPs (persistent organic pollutants)
  - Useful as an adjunct to other detox protocols

# Detox Reactions

- Symptoms
  - Sleep disruption, waking between 3-5 am
  - Irritability, Aggression, Behavioral Issues
  - May resemble yeast flare-up
  - Increased stimming
  - Loose stools, frequent urination
  - Diaper rashes, Skin rashes
  - Fever
- Treatment Approach
  - Activated charcoal, bentonite, alginate and/or Alka Seltzer Gold
  - Decrease supplement doses by  $\frac{1}{2}$  for 1-2 weeks, then increase dose slowly
  - Milk Thistle at bedtime or other Liver Tonifiers
  - If lasts longer than one week, notify physician

# Prior to Detox

- ◆ Clean up strategies in place
- ◆ Nutrients- Antioxidants and Minerals
  - ◆ Zinc levels adequate
  - ◆ Calcium and Magnesium a must
- ◆ Gut Dysbiosis addressed
  - ◆ Regular bowel movements a must
  - ◆ Maintenance probiotics
  - ◆ Consider prophylactic antifungal/antibacterial agents
- ◆ Adequate Hydration

# Support Detox

## ◆ Support Natural Detoxification Pathways

- ◆ Methylation
- ◆ Sulfation
- ◆ Glutathione Conjugation

## ◆ Support Organs of Elimination

- ◆ Liver/ Gallbladder
- ◆ Kidney
- ◆ Gut

## ◆ Support Organs that show signs of stress

- ◆ Adrenal
- ◆ Thyroid
- ◆ Gut

# Individualize Detox

- Individualize
  - Choice of Pharmaceutical Agent
  - Mode of Delivery
  - Frequency of Delivery
  - Use of Adjuvant Chelators
- Monitor
  - CBC, liver enzymes, BUN, Creatinine, electrolytes, mineral stores, iron stores, thyroid function and GI status during pharmaceutical chelation
  - Initially, and then every 2 – 3 months

# Negative Reactions

## ◆ Symptoms

- ◆ Irritability, aggression, behavioral issues
- ◆ Increased stimming, hyperactivity

## ◆ Possible Causes

- ◆ Side effect of supplement or allergy to drug
- ◆ Yeast or Bacterial Flare-up
- ◆ Too rapid of a detox effect leading to vitamin or mineral deficiency, oxidative stress, and inflammation

## ◆ Treatment Approach

- ◆ Rate severity, if severe stop supplement and rule out dysbiosis, treat accordingly
- ◆ If reaction persists consider anti-inflammatory agent

# Amino D tox

- Glutamine 500 mg
- Glycine 500 mg
- Methylsulfonylmethane 400 mg
- N-Acetyl L-Cysteine 250 mg
- Taurine 250 mg
- Alpha Ketoglutarate 200 mg
- Glutathione 200 mg
- Methionine 200 mg
- Ornithine 200 mg
- Calcium-D-Glucarate 200 mg



# • Paleocleanse

- Vitamin A (as mixed carotenoids from algae) 5,000 IU
- Vitamin C (as sodium ascorbate) 500 mg
- Vitamin D3 (as cholecalciferol ) 50 IU
- Vitamin E 20 IU
  - d-gamma tocopherol 40 mg
  - d-delta tocopherol 17 mg
  - d-alpha tocopherol 9 mg
  - d-beta tocopherol 1 mg
- Vitamin B1 (as thiamine HCl) 3 mg
- Vitamin B2 (as riboflavin-5-phosphate) 3 mg
- Vitamin B3 (as niacinamide) 8 mg
- Vitamin B6 (as pyridoxal-5-phosphate) 4 mg
- Folic Acid 100 mcg
- Vitamin B12 (as methylcobalamin) 4 mcg
- Biotin (as d-biotin) 140 mcg
- Pantothenic Acid (d-calcium pantothenate) 25 mg
- Calcium (as dicalcium malate) 200 mg
- Phosphorous (dipotassium phosphate) 200 mg
- Iodine (as potassium iodide) 50 mcg
- Magnesium (as Magnesium Buffered Glycinate Chelate) 200 mg
- Zinc (as Zinc Chelazone Bis-Glycinate Chelate) 7 mg
- Selenium (as selenomethionine) 50 mcg
- Copper (as Copper Chelazome Bis-Glycinate Chelate) 1 mg
- Manganese (as Manganese Chelazome Bis-Glycinate Chelate) 1 mg
- Chromium (as Chromium Chelavite Nicotinate-Glycinate Chelate) 50 mcg
- Molybdenum (as Bis-Glycinate Chelate) 50 mcg
- Glycine 1,500 mg
- L-Threonine 550 mg
- L-Lysine 550 mg
- L-Cysteine 250 mg
- Calcium D-Glucarate 250 mg
- Quercetin 200 mg
- Taurine 200 mg
- Milk Thistle (*Silybum marianum*) (seed) [standardized to contain 80% silymarin] 200 mg
- Chlorine 100 mg
- DL-Methionine
- Inositol 100 mg
- N-Acetyl-Cysteine (NAC) 100 mg
- Methylsulfonymethane (MSM) 100 mg
- Sodium Sulfate 100 mg
- Green Tea (*Camellia sinensis*) (leaves) [standardized to contain 50% catechins] 50 mg
- Celandine (*Cheilonium majus*) 50 mg
- Dandelion Root (*Taraxacum officinale*) (root) (4:1) 50 mg
- Fringe Tea Bark (*Chionanthus virginicus*) 50 mg
- L-Glutathione 25 mg
- Vanadium (as Vanadium Chelavite Nicotinate-Glycinate Chelate) 50 mg

# Detox Antiox

- Vitamin C 500 mg Vitamin E 47 IU
- Biotin 150 mcg
- Zinc 15 mg
- Selenium 100 mcg
- Manganese 3 mg
- Molybdenum 100 mcg
- N-Acetyl Cysteine (NAC) 250 mg
- Leucine 150 mg
- Alpha Lipoic Acid 90 mg
- Green Tea 50 mg
- Turmeric Extract 50 mg
- Leucoselect® Phytosome® Grape Seed Extract
- phosphatidylcholine 50 mg

# Ultimate antiox full spectrum

- Vitamin A 8300 IU, Alpha Carotene 2.5 mg, Beta Carotene 5 mg, Acerola 400 mg (vitamin C), High Gamma Mixed Tocopherols 120 mg
- Grape Seed Extract 90 mg
- Curcumin 80 mg
- Garlic 60 mg
- Tocotrienols 30 mg
- Ginkgo Biloba 25 mg
- Quercetin 25 mg
- Rutin 25 mg
- Sweet Basil 25 mg
- Sage 25 mg
- Rosemary 22 mg
- resveratrol, Lutein, Lycopene 7.5 mg