PSSE For Scoliosis

By

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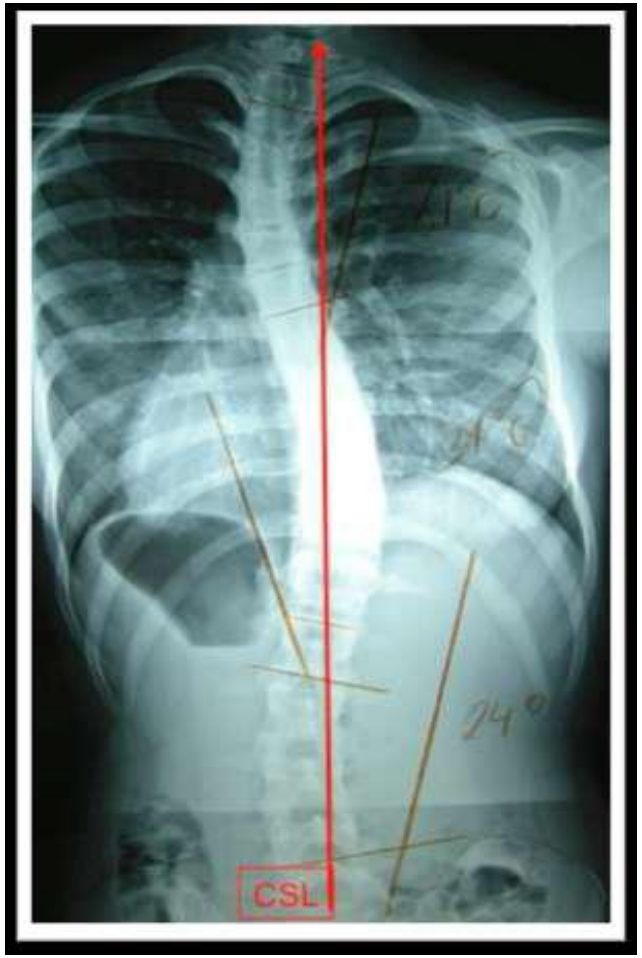
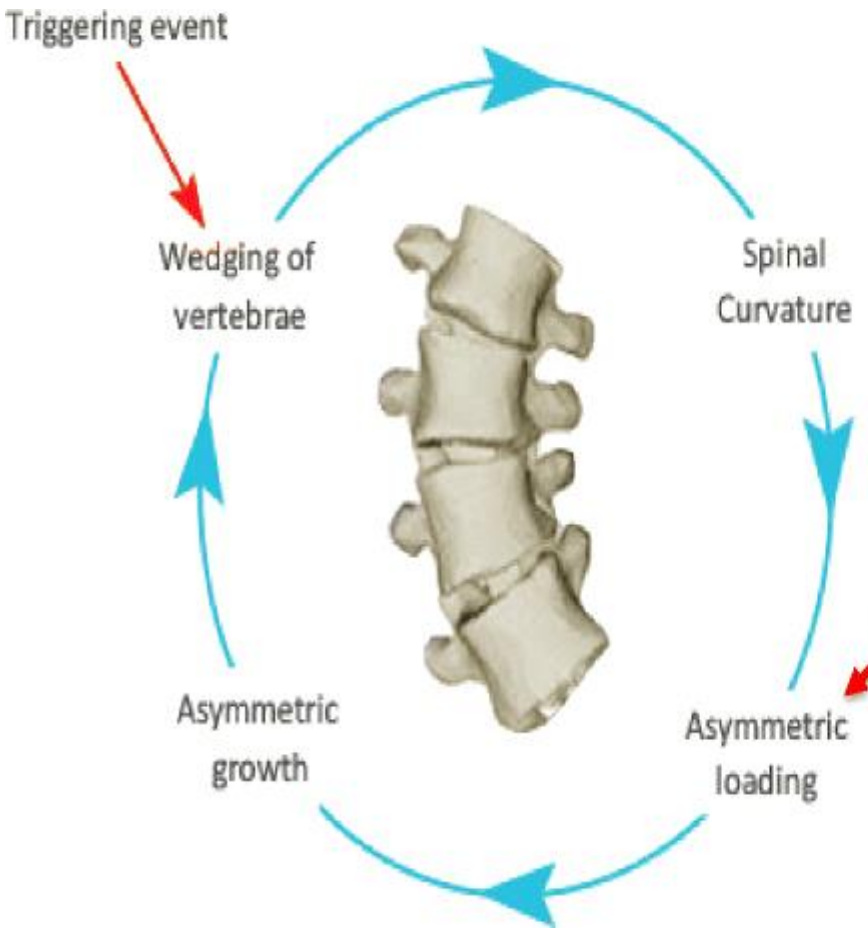
2005 SOSORT Consensus, PSSE is defined as

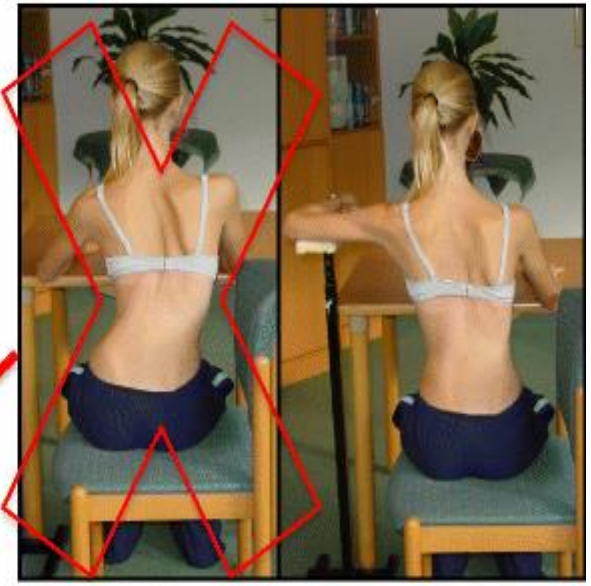
– Auto-correction in 3D
– Restoration of the sagittal alignment
– ADL-training
– Theoretical information to the patient
– Stabilization

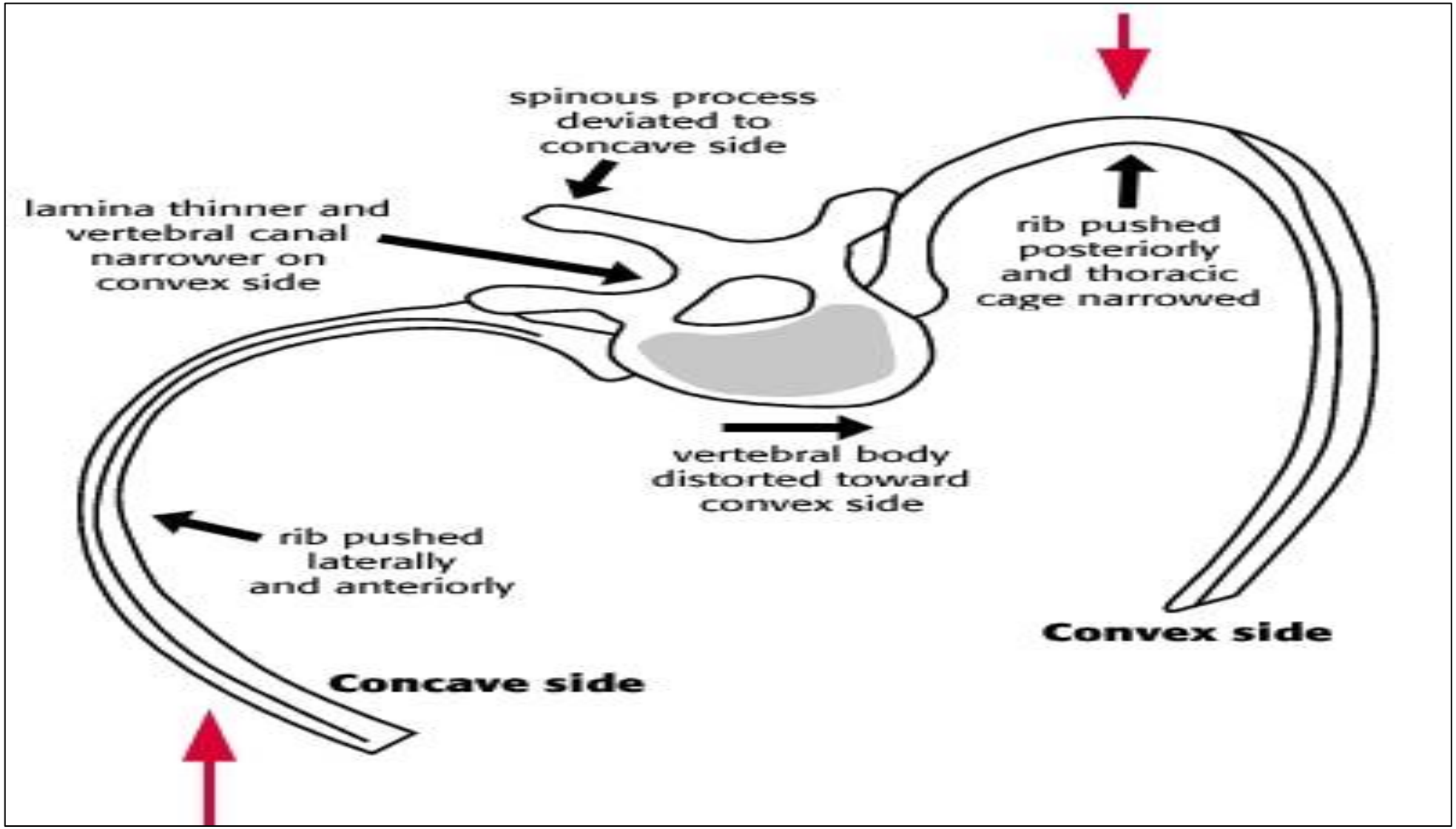
Biomechanical spinal growth modulation (the 'vicious cycle' pathogenetic hypothesis).

Creating a 3-D Torsion in the Spinal Column:









as the vertebral bodies rotate toward the convex side and the spinous processes rotate toward the concave side.

01

Clinical exam

02

Radiological exam

03

Functional scales

Scoliosis Classification according to apex

- Thoracic: T2-T11 (Disc T11-12)
- Proximal Thoracic: T3-4-5
- Main Th = T8; High Th: T6-7
- Low Th T9-11 (Rigo)
- Thoracolumbar: T12-L1
- Lumbar: L2-L4 (Disc L1-2)
- Lumbosacral: L5-S1 (Disc L4-5)

PSSE Schools

Physical Therapy Schools (PSSE) (Berdishevsky et al., 2016).

Italy	France	Germany /Spain	Poland	United Kingdom
SEAS	Lyon	Schroth BSPTS-Schroth Based	DoboMed /FITS	Side-Shift

Education + 3D Self correction + Stabilization in correction + ADL‘s training

Goals of scoliosis management

1. 3D treatment of the 3D deformity
2. Halt progression or even partially correct
3. Improve clinical appearance / aesthetics
4. Train for Activities of Daily Living (ADL)
5. Decrease pain
6. Improve breathing function
7. Improve Quality of Life

SEAS: Italy

- A therapeutic modality to obtain postural control and spinal stability
- The Active Self-Correction with “distracting” situations that challenge the
- auto-correction, thereby "strengthening" the neuromotor behaviour

Functional Individual Therapy of Scoliosis (FITS): Poland

- **Inclusion of many elements selected from a variety of other therapeutic approaches**
- **includes education, mobilization to prepare for active correction, 3D stabilization**

Side Shift Royal National Orthopaedic Hospital United Kingdom (RNOHT)

- Side trunk movements to correct the lateral shift in the coronal plane based on the theory that a flexible curve can be stabilized with lateral movements
- Also uses mobilization, rotational breathing and stabilization

Lyon: France

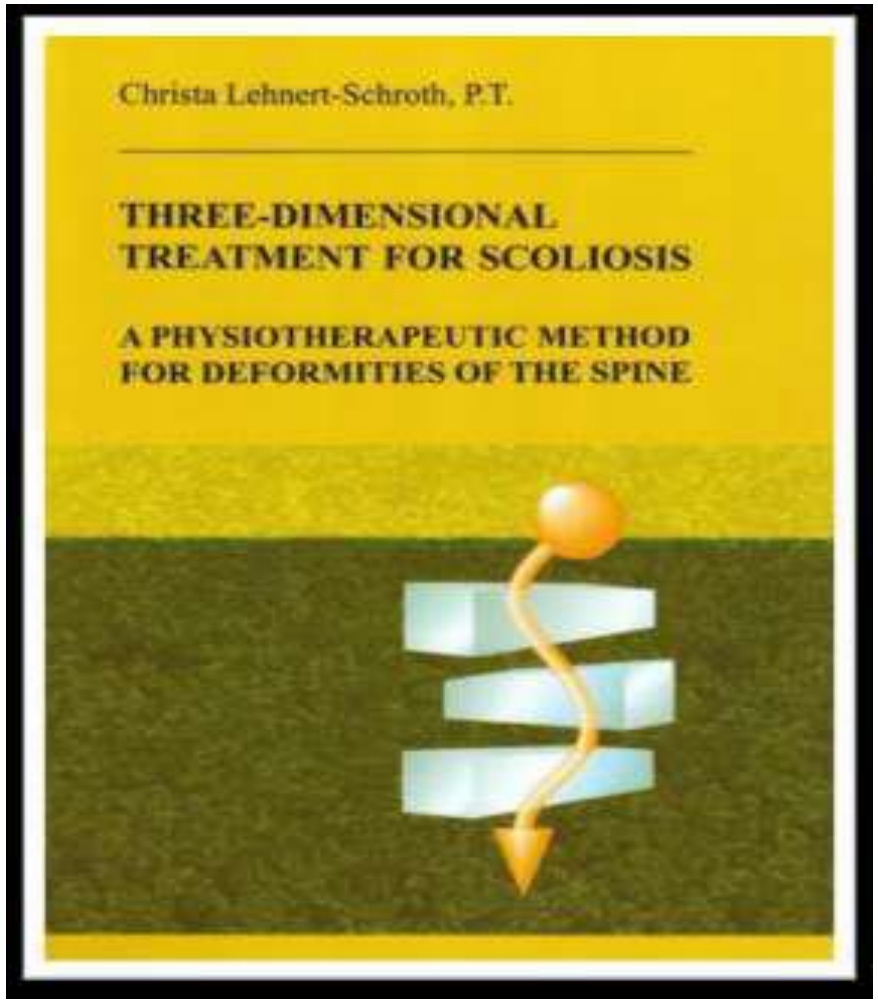
- **The Lyon method combines PT plus Lyon brace; the brace is always preceded by a plaster cast. Visualization,**
- **mobilization, stabilization, education**

DoboMed: Poland

- “Klapps Position”
- “Muscle activation: Isometric contraction during expiration to stabilize
- Asymmetric Breathing - Rotational

Barcelona Scoliosis Physical Therapy School

- General Principles of BSPTS – Specific Principles of Correction are based on the original principles from K. Schroth and Ch. Lehnert-Schroth, further developed by Dr. Manuel Rigo, based on clinical experience and evidence



Development of Schroth

Now

The Schroth Best Practice Program

Maksym Borysov

Dr. Marc Moramarco

Xiaofeng Nan

Dr. Budi S. Widjaja

2003
SBP

Dr. Hans-Rudolf Weiss

1979
Intermediate

Christa Lehnert-Schroth

Dr. Rigo

1990s

A.Hennes

BSPT BARCELONA SCOLIOSIS PHYSICAL THERAPY SCHOOL

ISST

1921
Original

Katharina Schroth

Since 1921

Which PSSE school to recommend??

Dr. Manuel Rigo, MD, PhD- BSPTS;

1) It would be better not to define yourself according to the name of a specific school (Schroth Therapist, BSPTS Therapist, SEAS Therapist etc.)

2) Be proud to be just Physiotherapists, but learn about as many as possible Scoliosis Specific Physiotherapy Techniques

3)Work integrated in a multidisciplinary team

4)Do not create false expectations and do not expect magical results

SOSORT guidelines

According to the present SOSORT guidelines (2018):

There is a need for standardization of research methods of conservative treatment effectiveness, as recognized by SOSORT researchers, thus include bracing, physiotherapeutic scoliosis-specific exercises (PSSE)

Society on Scoliosis Orthopaedic and Rehabilitation Treatment (SOSORT)

	SOSORT GUIDELINES FOR SCOLIOSIS TREATMENT (2011)
Observation	• Cobb angle <15° , Risser 0-3 • Cobb angle <20° , Risser 4-5 • Adults, Cobb angle <50° , without pain
PSSE	• Cobb angle 15° – 25° , Risser 0-3 • Braced patients, independent of curve magnitude • Cobb angle 20° – 40° , Risser 4-5 • Adults with any Cobb angle, with pain
Brace	• Cobb angle 20° – 45° , Risser 0-3 • Adults with very progressive and painful scoliosis (?)
Surgery	• Cobb angle > 45° , residual growth, fail of non-operative treatment • Adults, Cobb angle >50° , fail of non-operative treatment

SOSORT guidelines

- **PSSE are the first step to treat scoliosis and prevent progression of bracing.**
- **Individualized program according to curve type, patient's needs and treatment phase.**
- **Brace treatment should be accompanied by PSSE**
- **Sport activities cannot be considered as alternative treatment, but patients are encouraged to participate in sports for their general benefits.**

For a scoliosis patient;
Every time Bracing is recommended, PSSE should be included

For a scoliosis patient; Especially in children with scoliosis, It is recommended to shift the old strategy "wait and see" into " treat and see" even in small curves.

General P.T exercises Vs PSSE??

1. Pain is it a goal ?
2. 3D approach?
3. ADL –training ?
4. Individuality of exs?
5. Side bending exs
6. Rib prominence ?
7. Double curves ?
8. Core strengthening?
9. Stretching exs?
10. Manipulation & mobilization?
11. Heel lift?
12. Accommodation of the deformity, e.g (sleeping, filling the concavity)

Muscle “Imbalance”:

In EMG studies, it has been shown that convex muscles are more constantly activated (working) whilst concaves muscles are more silent.

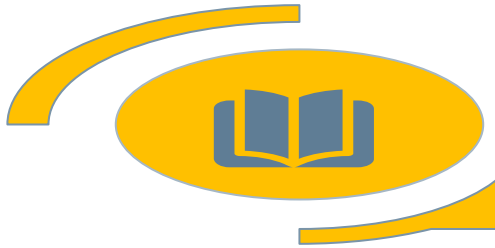
Overworked and underworked: both sides are inefficient.

– Muscles are weak in both the shortened and lengthened positions; thus muscle co-activation is needed to address bilateral weakness.

– So:

“Always train patients to promote symmetry in neutral spine”

- **Core strengthening exs are not PSSE**
- **Stretching exs are not PSSE**
- **Willium flexion are not PSSE**
- **Muckhenzie extension are not PSSE**

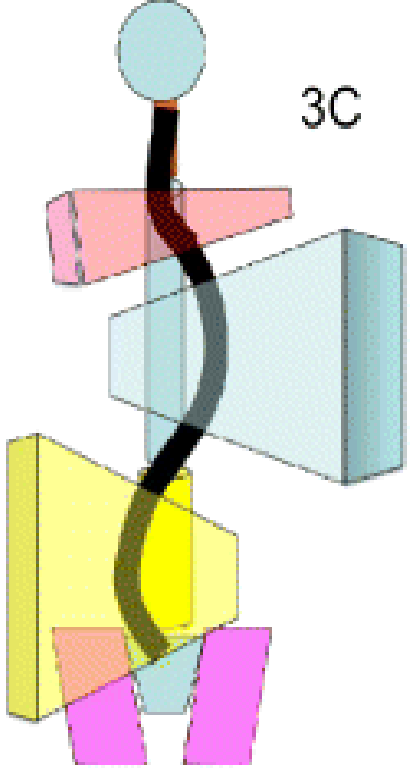


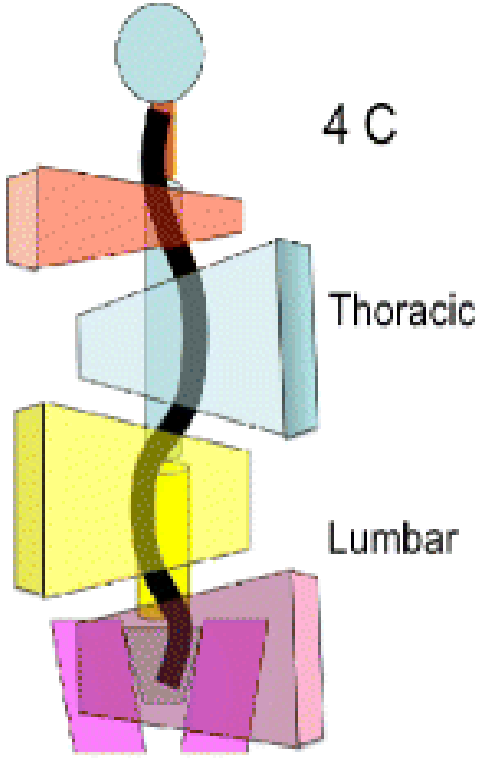
PSSE – Schroth method

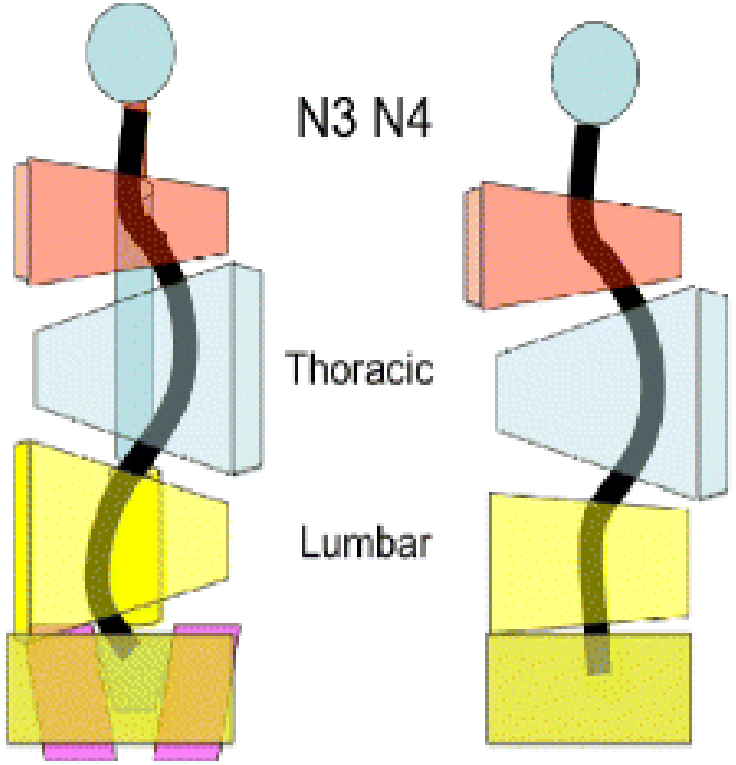
BSPTS Statement about PSSE;

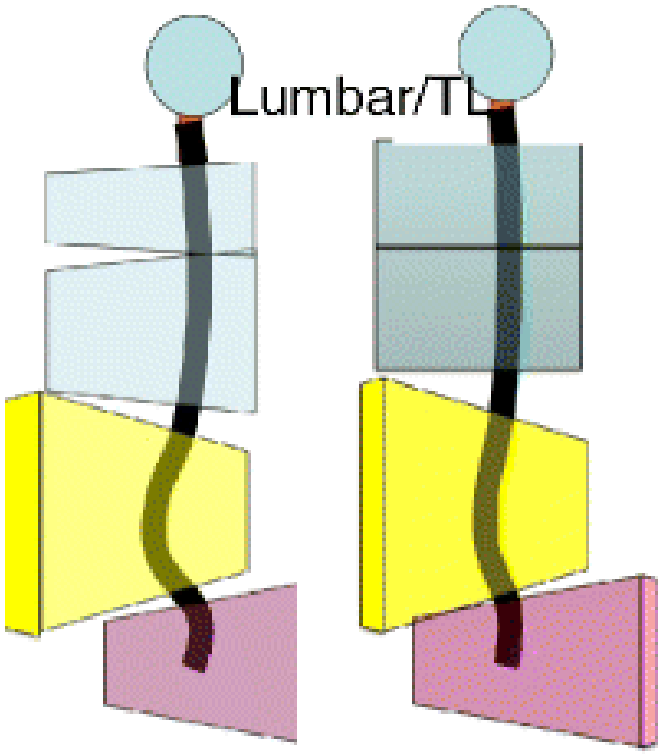
‘We cannot expect that PSSE will prevent progression during the riskiest period of growth (around the peak) in an otherwise progressive scoliosis with potential to go over 45º,

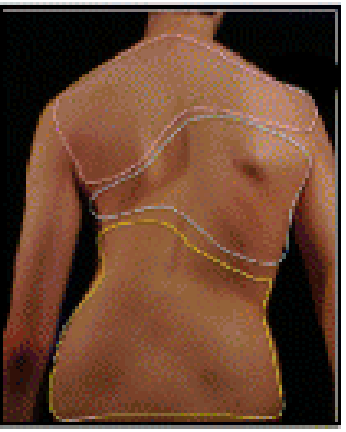
so **we cannot recommend PSSE as an alternative of bracing,** but as **supplementary-to-bracing, when bracing is indicated’**



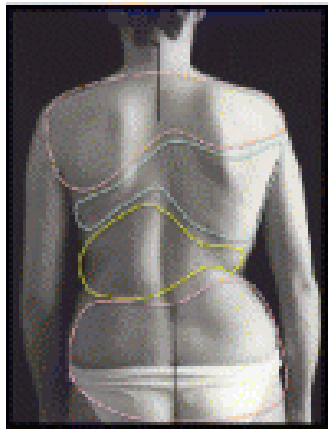








A



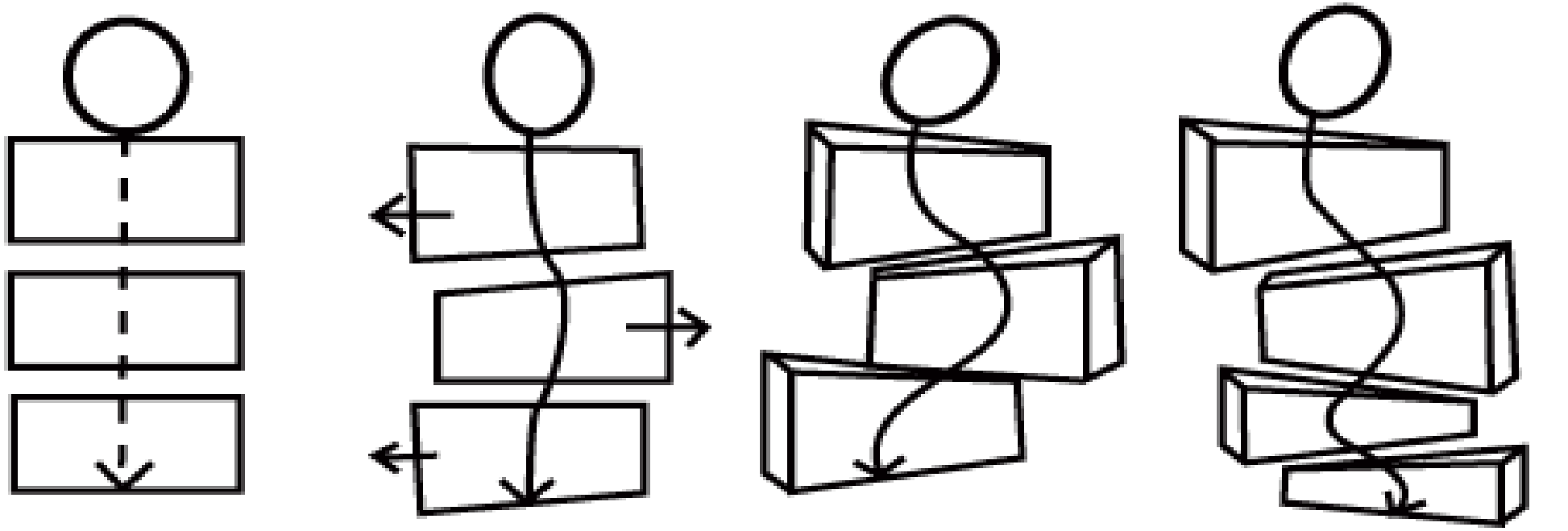
B

C

D

(**a**, **b**, **c**, **d**): **The BSPTS system of scoliosis curve classification** illustrated with photographs and body block diagrams. The four scoliosis curve types in this classification system are 3C (**a**), 4C (**b**), N3N4 (**c**), and single lumbar or thoracolumbar (**d**).

- The 3C curve is a major thoracic scoliosis curve with a compensatory lumbar and pelvic shift (**a**).
- The 4C curve is a major lumbar scoliosis curve with a thoracic and lumbar shift (**b**).
- The N3N4 curve is a major thoracic scoliosis with or without a lumbar curve but with the pelvis in a neutral position (**c**).
- The single lumbar or thoracolumbar curve is a single curve scoliosis with an uncoupled pelvic shift and no thoracic curvature (**d**)



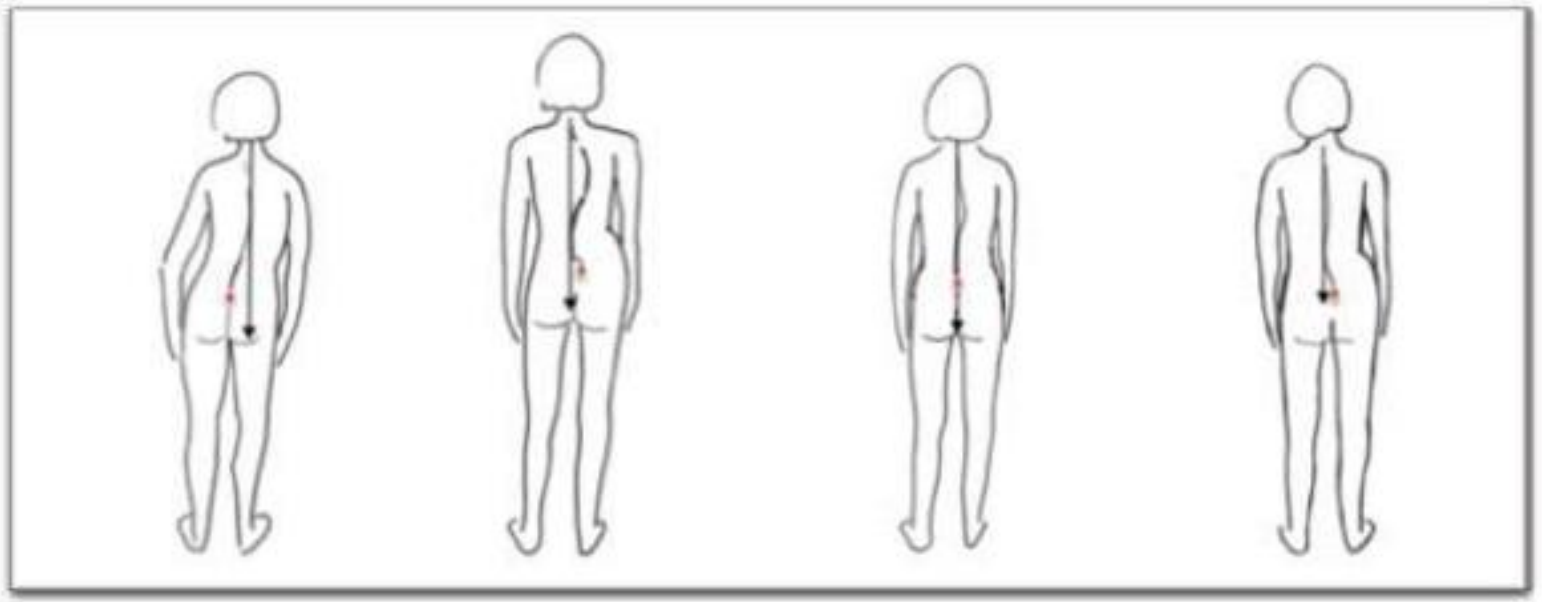
<u>Blocks</u> Shoulder Rib Cage Pelvic	Blocks deviating from vertical line	**3-curve** Blocks begin to wedge & rotate around vertical axis	**4-curve** Additional lumbosacral block

General Classification BSPTS-Schroth Based PSSE

Group 1

Group 2

Group 1-2



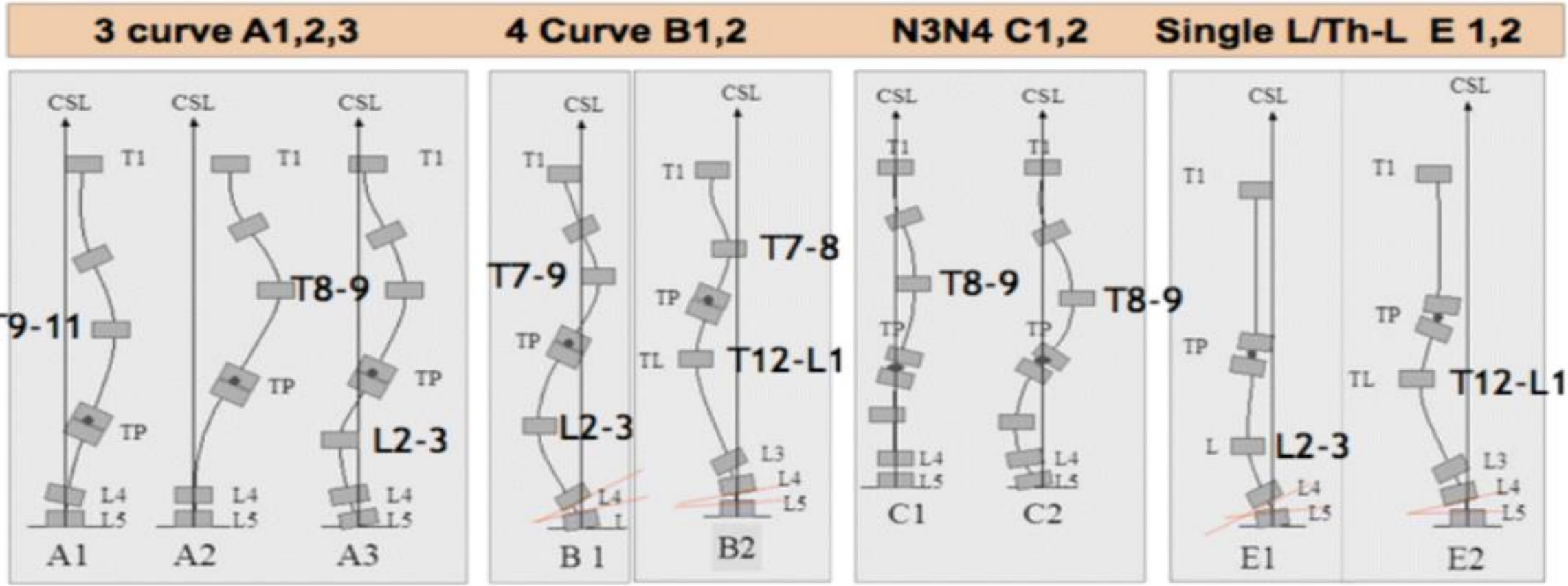
Sagittal deformities

3 curve pattern

4 curve pattern

N3N4 curve pattern

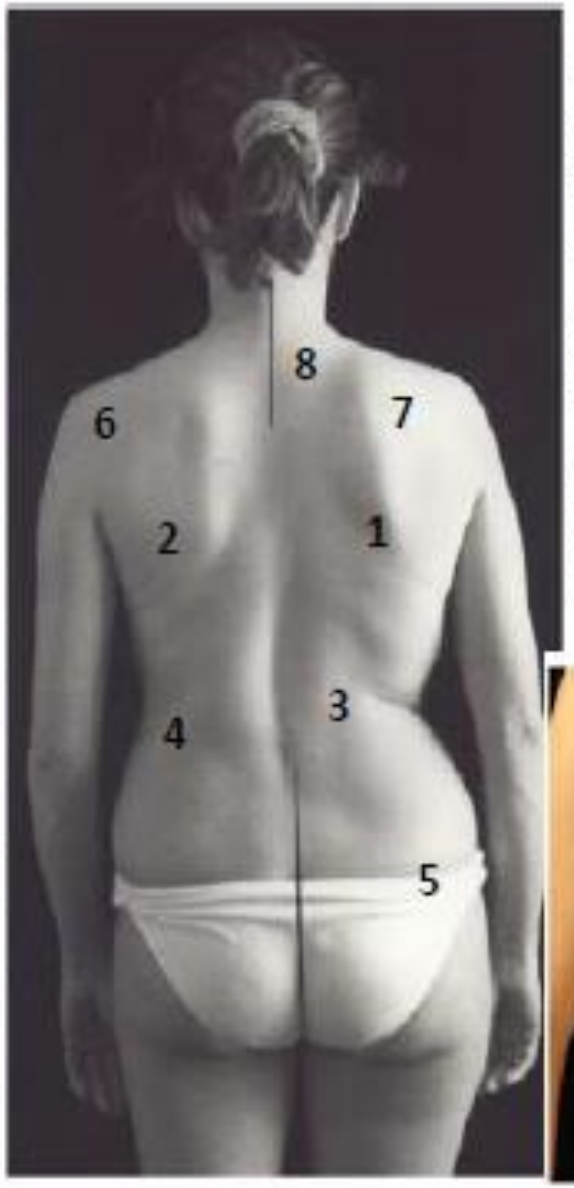
Lumbar/Th-Lu curve pattern



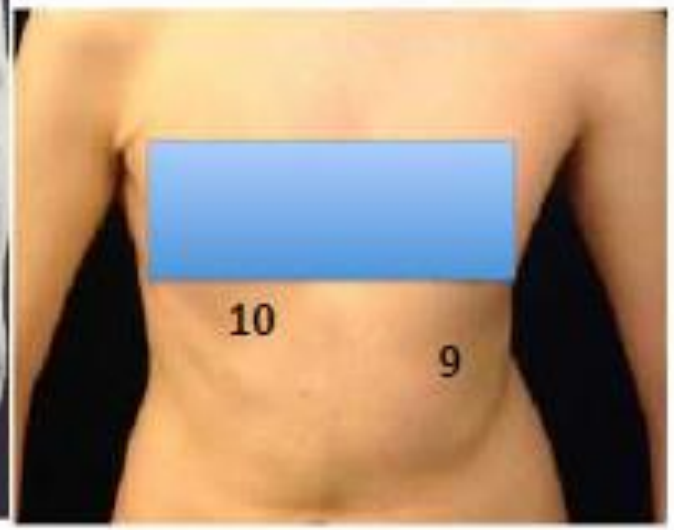
Rigo and Weiss. Conservative Scoiosis Treatment. IOS press. 2008 page 303-319. Rigo et al. Scoliosis 2010, 5:1 http://www.scoliosisjournal.com/content/5/1/1.

Fig. 47

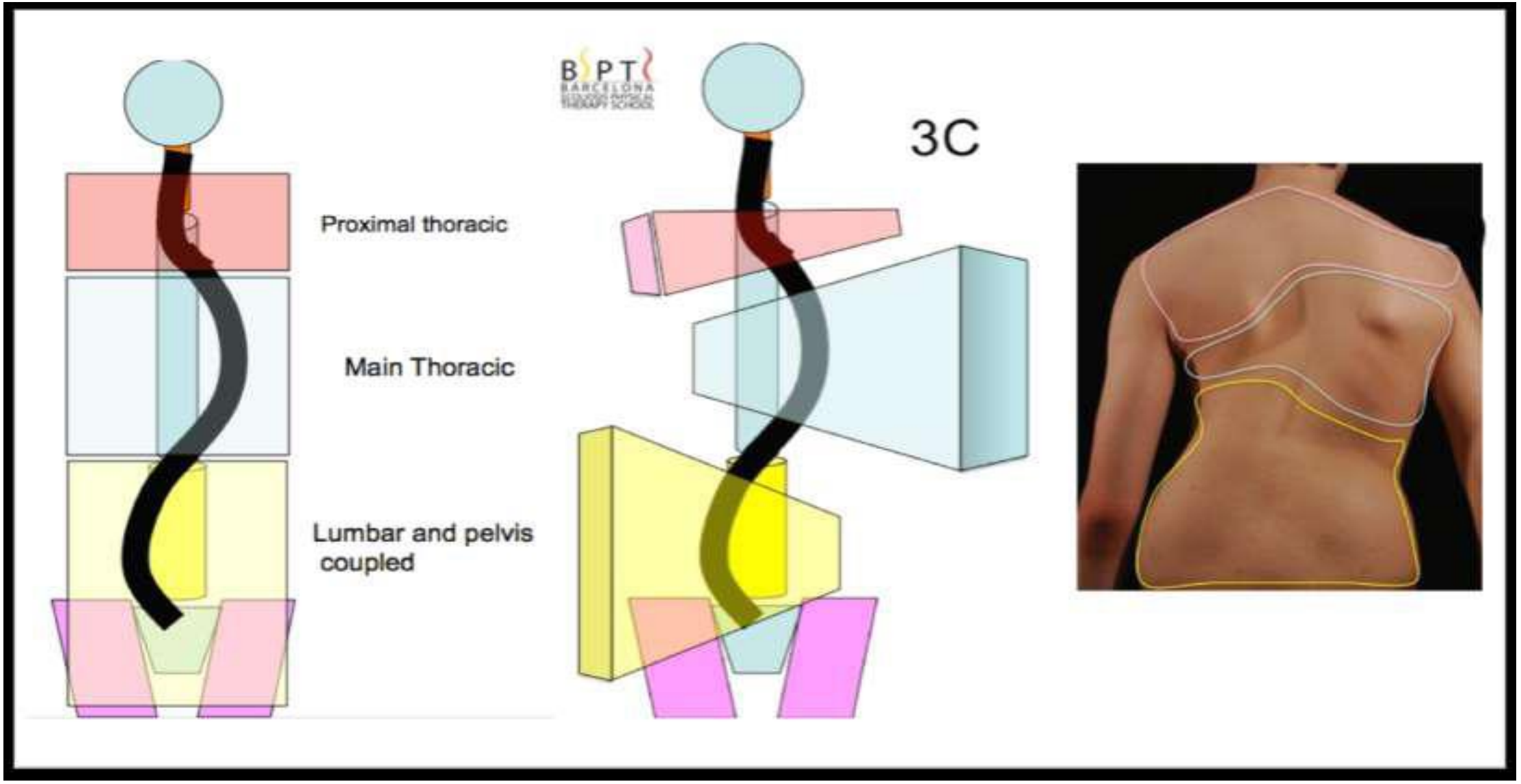
Rigo classification for BSPTS bracing and physical therapy

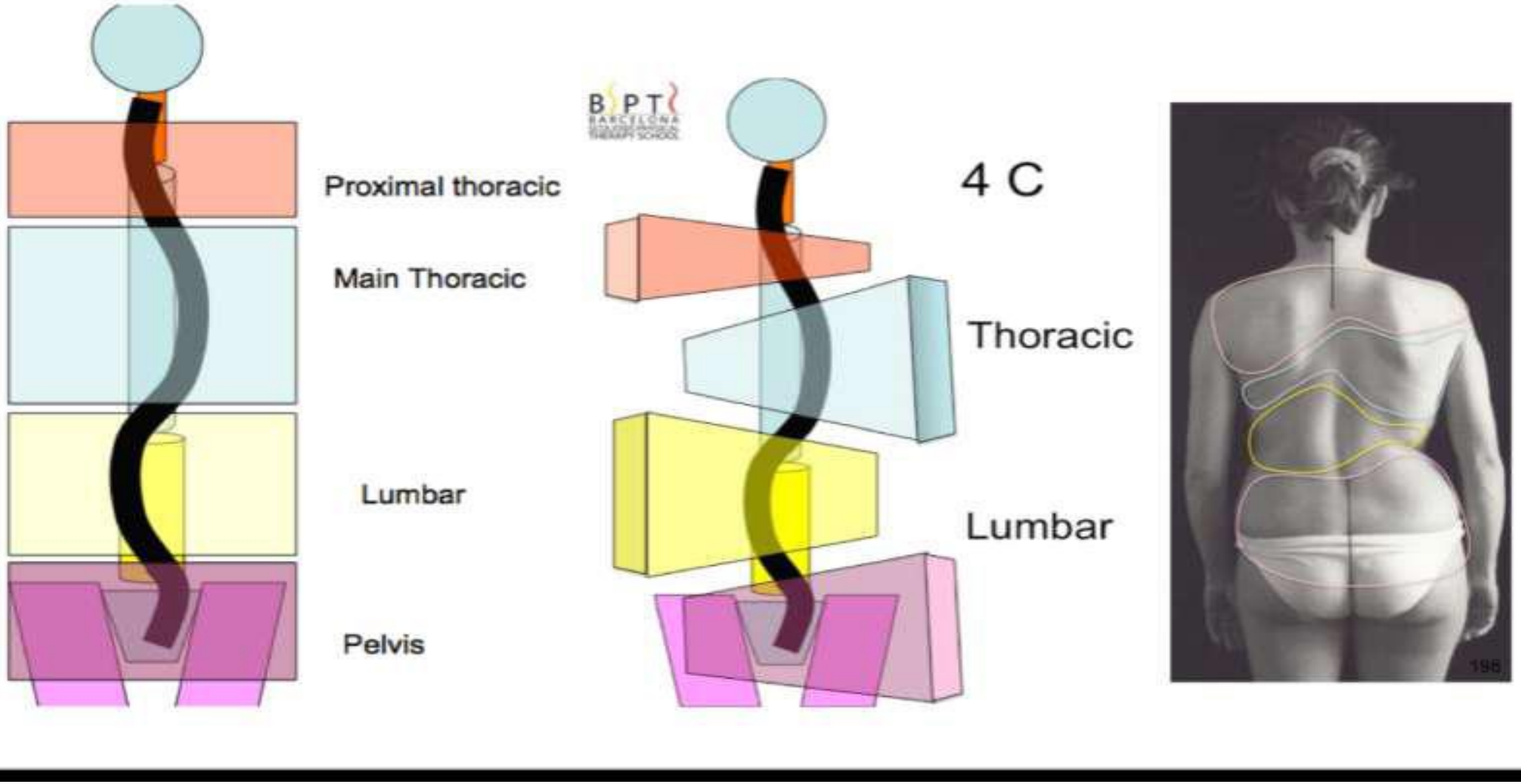


1. Packet	*T Prom (TPr)*
2. Weak Side	*WS*
3. Weak Point	*WP*
4. Lumbar prominence	*L Prom (LPr)*
5. Prominent Pelvis	*WSP/TPSP*
6. Weak Side Shoulder	*WSS*
7. Packet Side Shoulder	*TPSS*
8. Upper Concavity	*UC*
9. Anterior rib hump	*VRH*
10. Anterior flat zone	*VFZ*



Curve Pattern Classification (The Block Classification)




Proximal thoracic
Main Thoracic
Lumbar
Pelvis
4 C
Thoracic
Lumbar

The goals of the BSTPS method

1. correct the ‘scoliotic posture’ and improve aesthetics
2. stabilize the spine and arrest the curve progression,
3. educate patients and families about the condition and treatment options
4. improve breathing function,
5. increase activity, including activities of daily living and functional mobility,
6. improve overall self-image and self-esteem, and
7. decrease pain.

The higher the risk of curve progression, the more intense the conservative treatment plan should be in order to meet the goals of therapy.

Schroth BSPTS Indications

Main indications

- **Idiopathic Scoliosis in Adolescents and Adults**
- **Juvenile Kyphosis (Scheuermann)**

Other indications

- **Idiopathic Scoliosis pre-adolescence**
- **Congenital Scoliosis**
- **Syndromic and Neuromuscular Scoliosis with «idiopathic curve type»**
- **Other sagittal plane deformities**

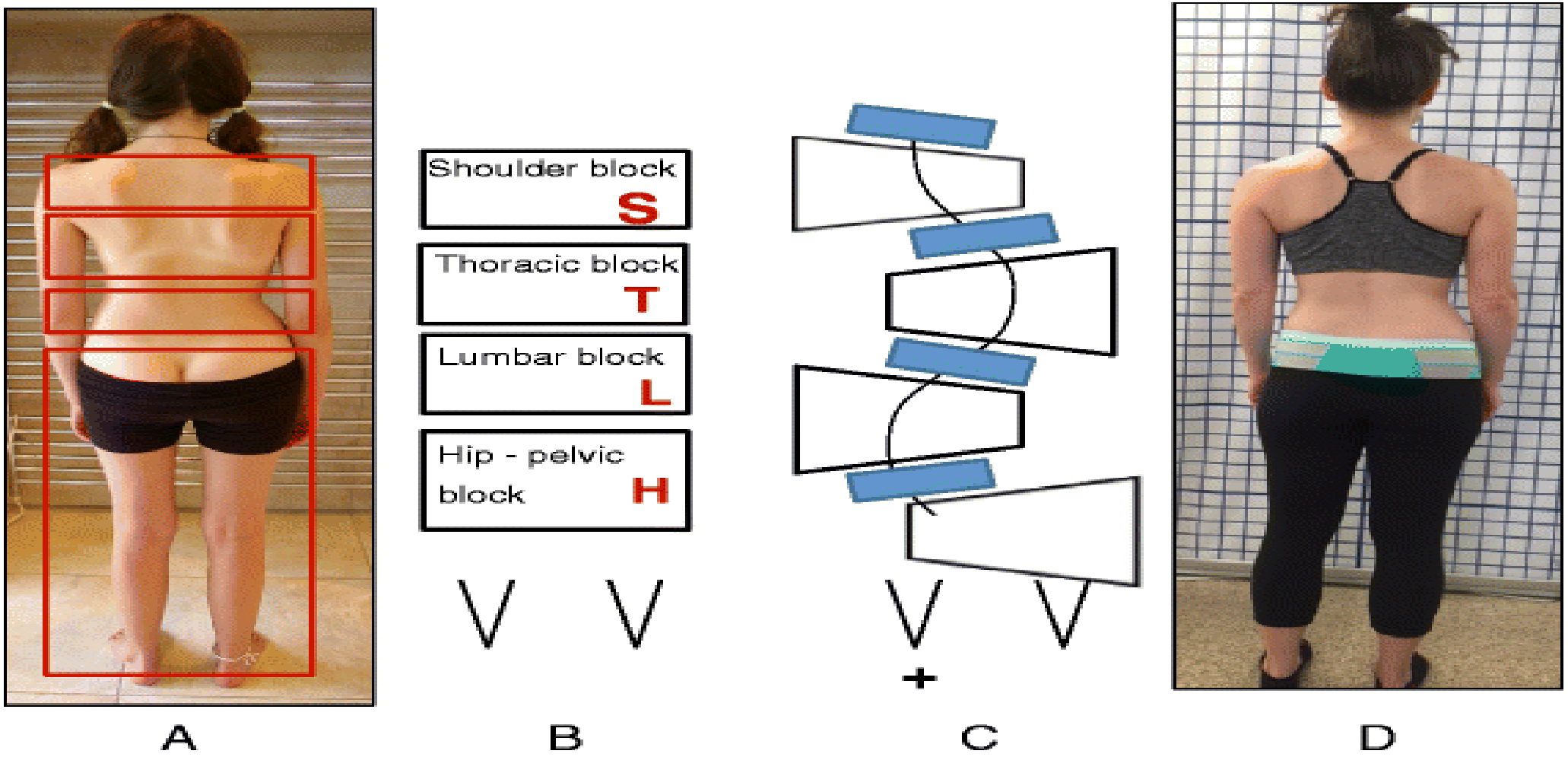
Schroth- BSPTS

Limitations

- **Syndromic and Neuromuscular Scoliosis**
- **Painful Degenerative / De-novo Scoliosis**
- **Age<10 years**
- **Osteoporosis**
- **After spinal fusion**
- **Spondylolisthesis**

Contra-indications

- **Reactive /Antalgic Scoliosis (Tumor, Disc Hernia etc.)**
- **Psychiatric problems (psychosis, hysteria)**
- **Spasticity**
- **Anorexia nervosa**



(a, b, c, d): Schroth Body Blocks. The Schroth system of scoliosis curve classification is derived from the Schroth principle of dividing the body into “body blocks” as pictured anatomically (a) and schematically (b). Scoliosis causes the body blocks to become deformed, changing their geometric shape from a rectangle (b) to a trapezium (c). A patient with a major lumbar scoliosis left convex curve has a lumbar block shifted to the left and a hip-pelvic block shifted to the right (d)

H – Hip-pelvic block including the lower limbs reaching the lower end vertebra (LEV) of the lumbar curve.
L – Lumbar block enclosed by upper end vertebra (UEV) and LEV of the lumbar curve or thoracolumbar curve respectively.
T – Thoracic block between UEV and LEV of the thoracic curve.
S – Shoulder block represents the cervical thoracic (proximal thoracic) curve located between UEV of the thoracic curve and UEV of the proximal thoracic curve.

3D- principles of correction- PSSE – Schroth method

3D- Auto correction

- self elongation
- pelvic corrections
- symmetrical and asymmetrical sagittal straightening
- frontal plane corrections

corrective and rotational breathing

- inhalation 3 dimensional expansion technique for collapse areas
- exhalation maintain expansion and 3D correction

muscle activation

- maintain expansion /3D correction
- more activation in every exhalation
- shoulder tractions/ shoulder counter traction/ thoracic countertraction

stabilization

- activities of daily living training

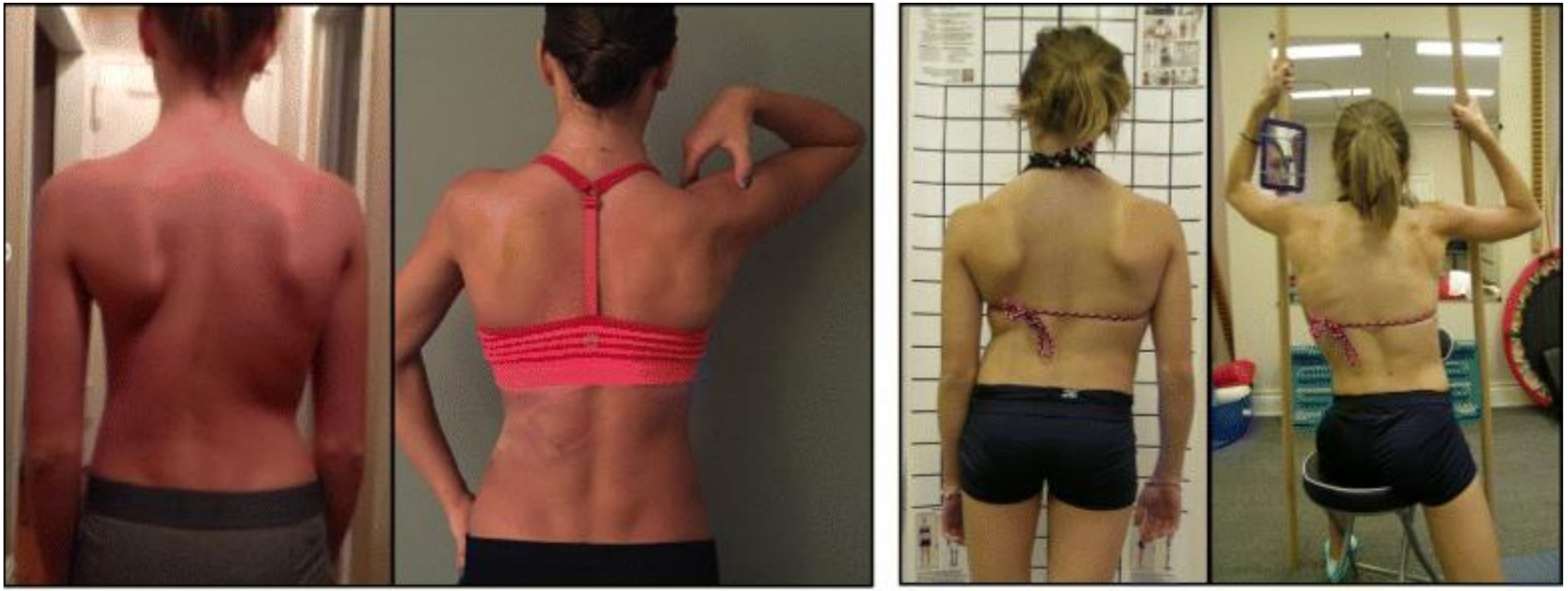
Scheuermann Kyphosis – Treatment

Non-operative treatment

Brace and Exercise (SRS – SOSORT guidelines)

Brace indications (SRS recommendations): Cobb angle 55 – 80 , Risser 0-3, Scheuermann findings on x-ray, 16-22 hrs/day, in conjuction with exercises

Operative treatment ??



(**a**, **b**): Active 3D self-correction exercises. During active 3D self-correction, patients expand the collapsed areas and open the concavities by performing rotational angular breathing (RAB) and specific arm positions (**a**). During the Schroth-derotation sitting exercise (**b**), the patient sits on a chair, with a pole in either hand planted on the ground, while performs corrections 1– 5, while stabilizing her curve specific corrections.

General Principles of BSPTS

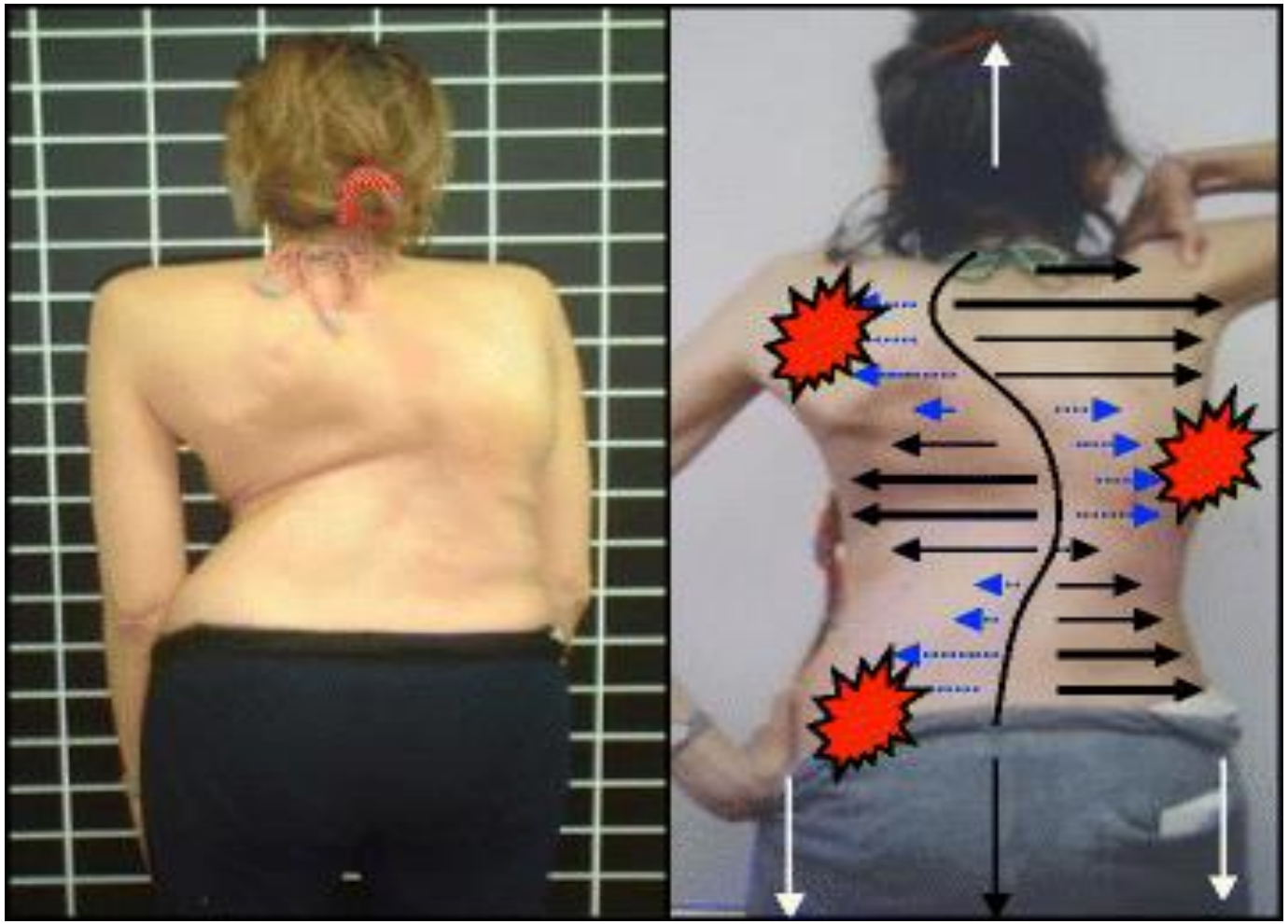
1) **3D Postural Correction** made first

2) **Expansion/Contraction technique,** to reach the best possible 3D trunk shape and spinal alignment.

- Self-control of the internal volumes (breathing mechanics)

3) **Muscle activation** maintaining a stable 3D correction (involving isometric as well as an isometric eccentric and concentric tension)

4) **Integration**



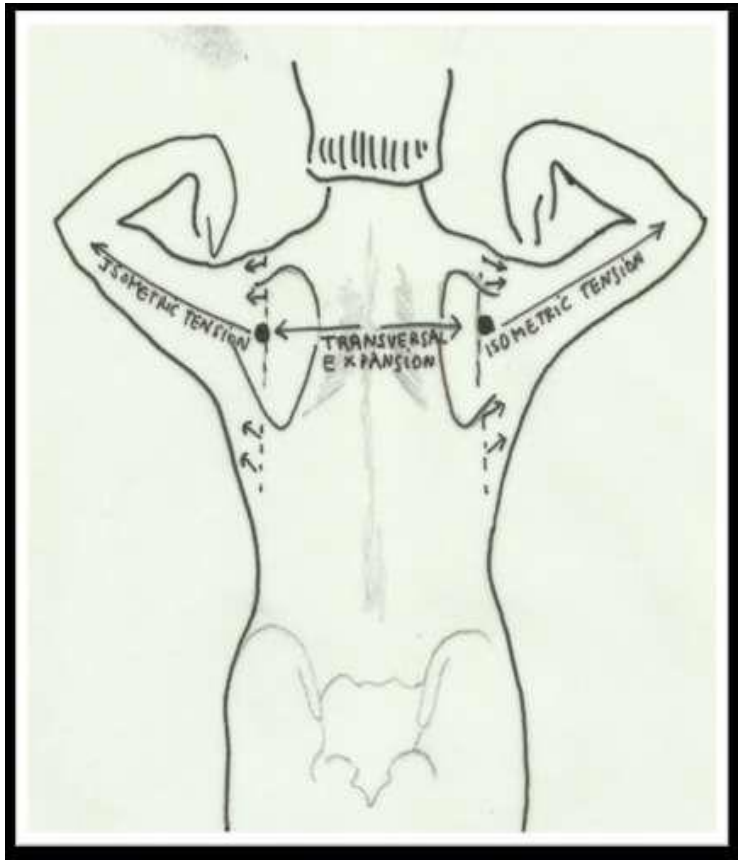
Patient using postural correction and the corrective expansion/contention technique to achieve the best possible correction. The *blue* and *black arrows* represent trunk expansion during the first principle of correction. Later, the *blue arrows* are converted into forces represented by the *red shapes*, which work around the prominences to move the prominences forward and inward

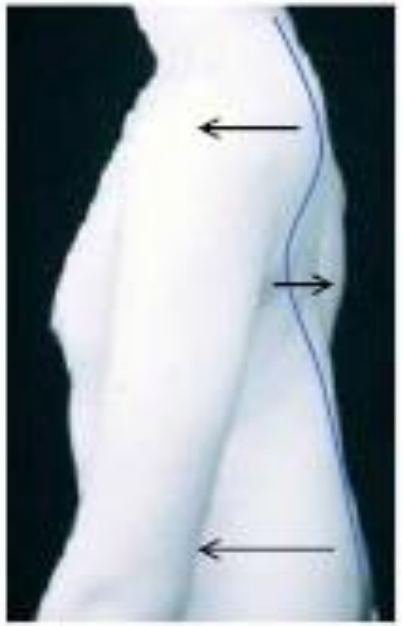
Muscle Activation by;

- **EXPANSION** (maintaining expansion of the collapsed areas during exhalation, following the corrective directions)
- **TENSION** (Isometric Tension following the direction of expansion). Tension is increased during exhalation but, although slightly released, still maintained during inspiration.
- **PRESSURE** (Increasing tension by using external aids)

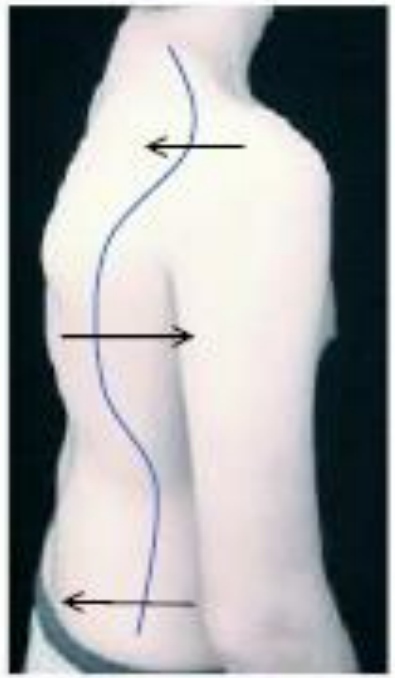
The so called «SHOULDER-TRACTION».

It is defined as a Symmetric Isometric Tension, generated at the shoulder region, with the scapulae fixed in the best neutral-physiological position, with a medial to lateral direction, as a continuation of the Transversal Expansion. Nowadays, it should be better called 'SHOULDER EXPANSOTENSION'

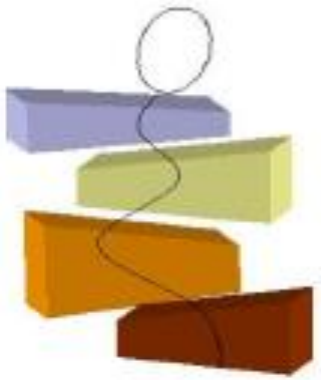


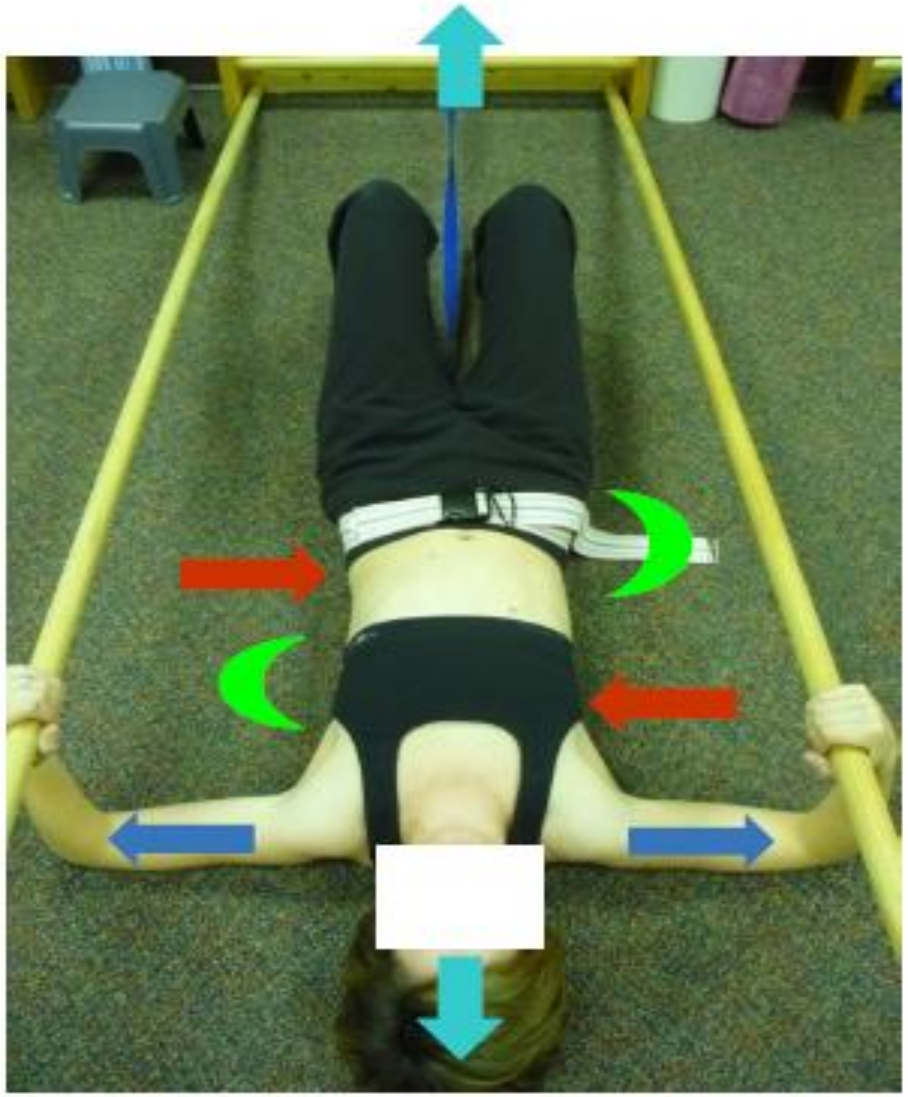


Asymmetrical Sagittal Straightening



Postural derotation of the blocks made synchronically with self-elongation can be seen and is also defined **Asymmetrical Sagittal Straightening**.



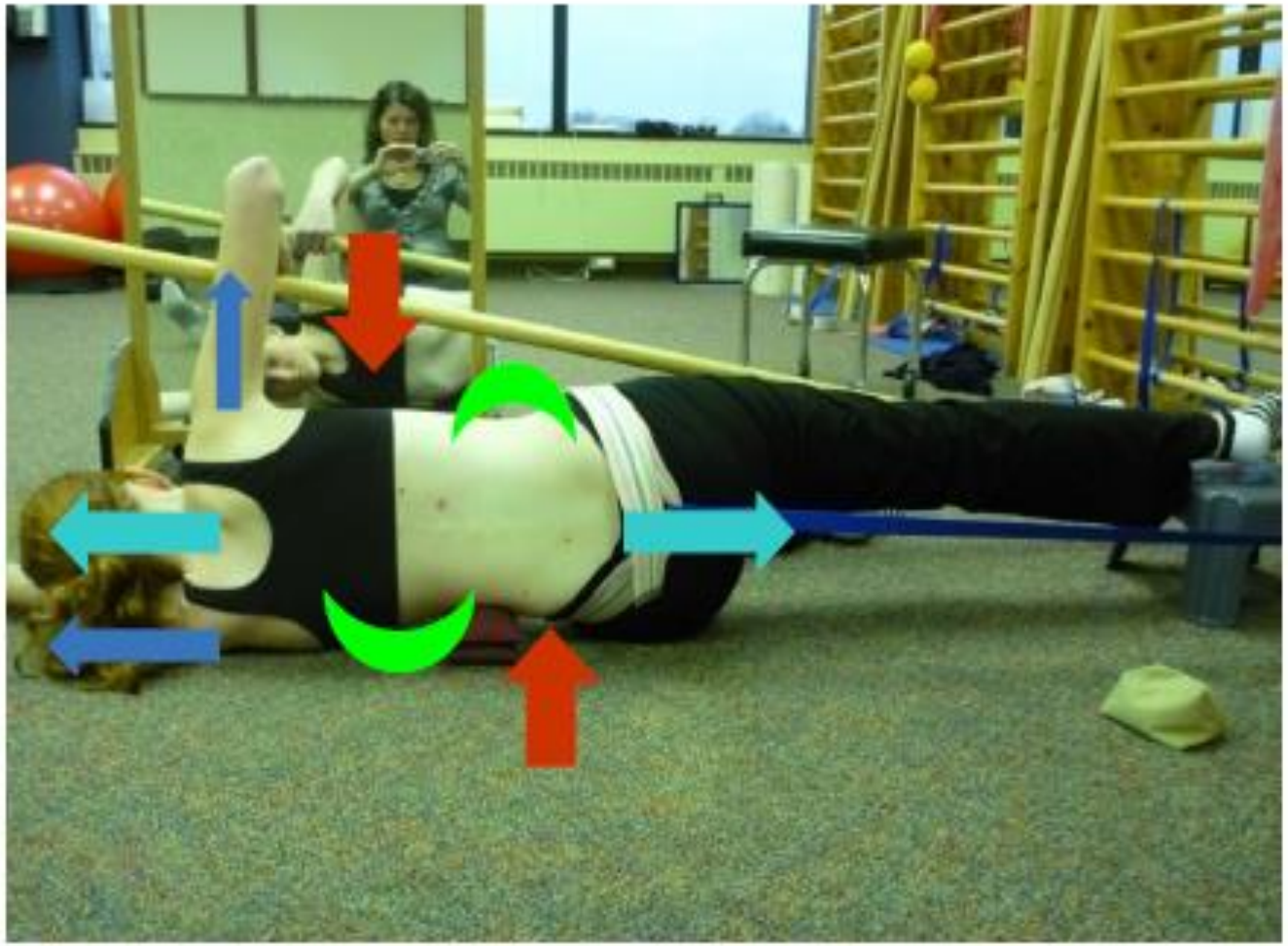


Elongation

Convexities
(forward - inward)

Concavities
(outward - backward)

SCT



Elongation

Convexities
(forward - inward)

Concavities
(outward - backward)

SCT

Elongation

Convexities
(forward - inward)

Concavities
(outward - backward)

SCT

Elongation

Convexities
(forward - inward)

Concavities
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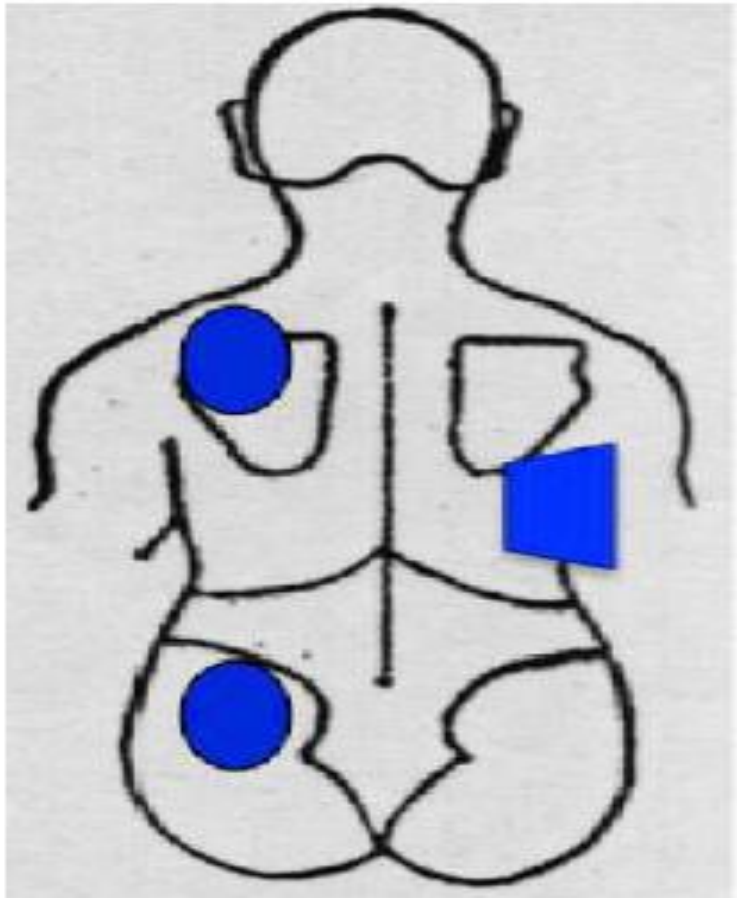
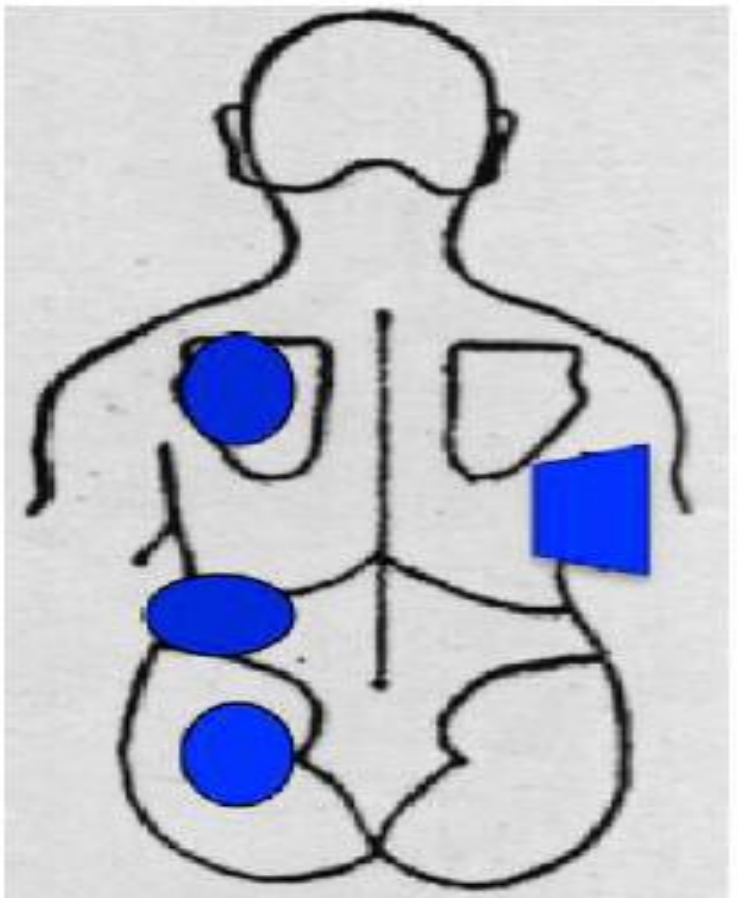
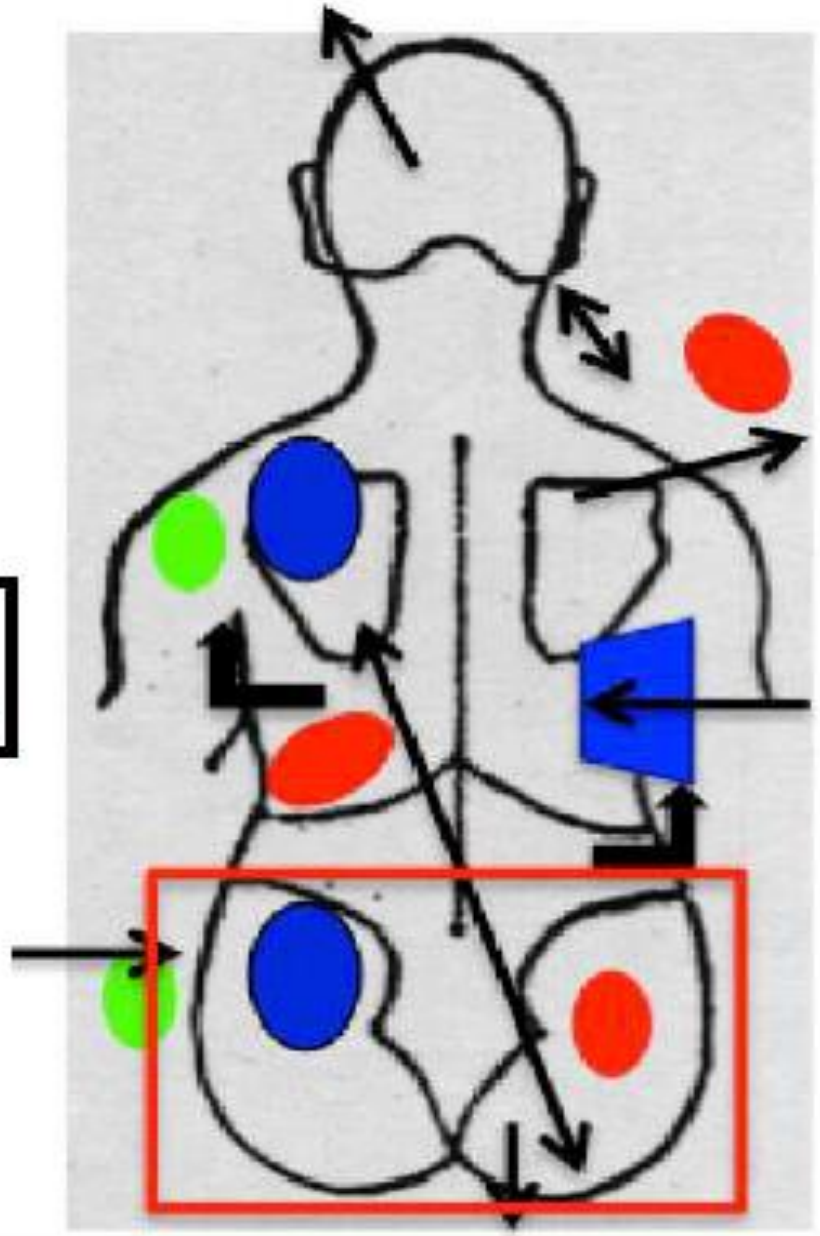
Passive Corrections

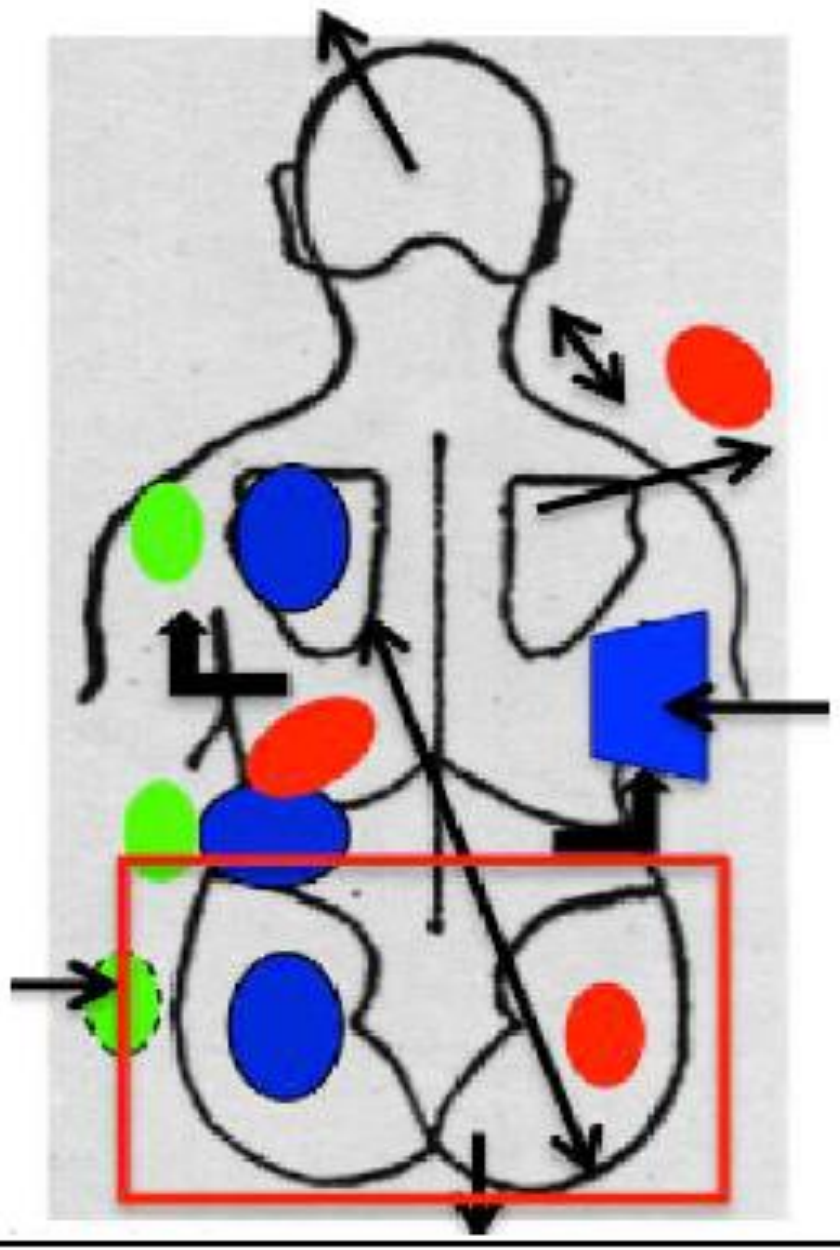




Schroth Scoliosis & Spine Clinic

BLUE = Supine
RED = Prone
GREEN = Side-lying

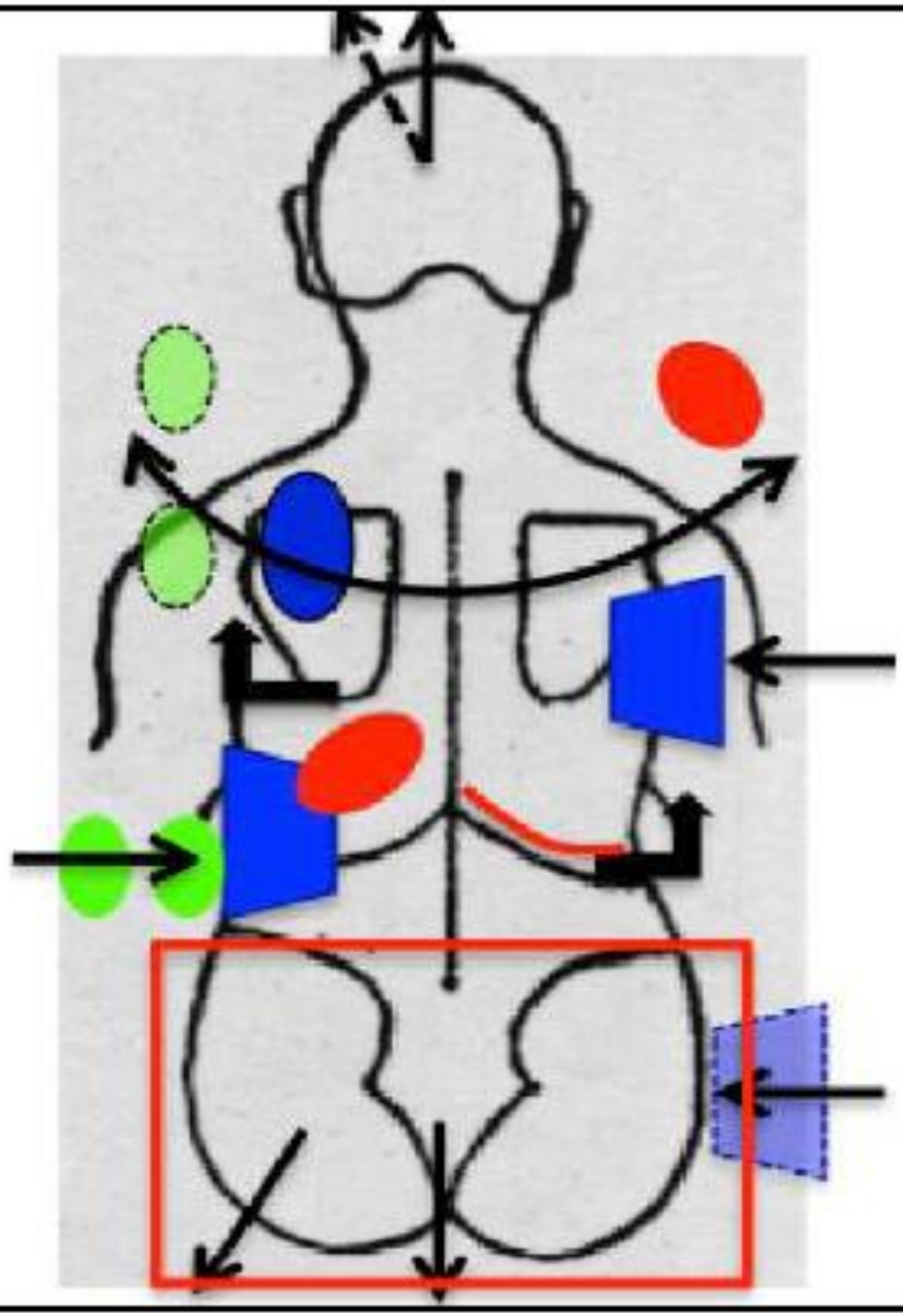




BSPT BARCELONA SCOLIOSIS PHYSICAL THERAPY SCHOOL

Schroth Scoliosis & Spine Clinic

BLUE= Supine
RED = Prone
GREEN = Side-lying



BSPT 254 BARCELONA SCOLIOSIS PHYSICAL THERAPY SCHOOL

- STEP 1 : Gradual introduction of the 4 general principles in unloading positions

Semi-Hanging

Prone on knees

Supine

Prone on stool

Side Lying

- STEP 2 : After Integration, with a subject able to do an acceptable performance (correction) we can progress to loading positions

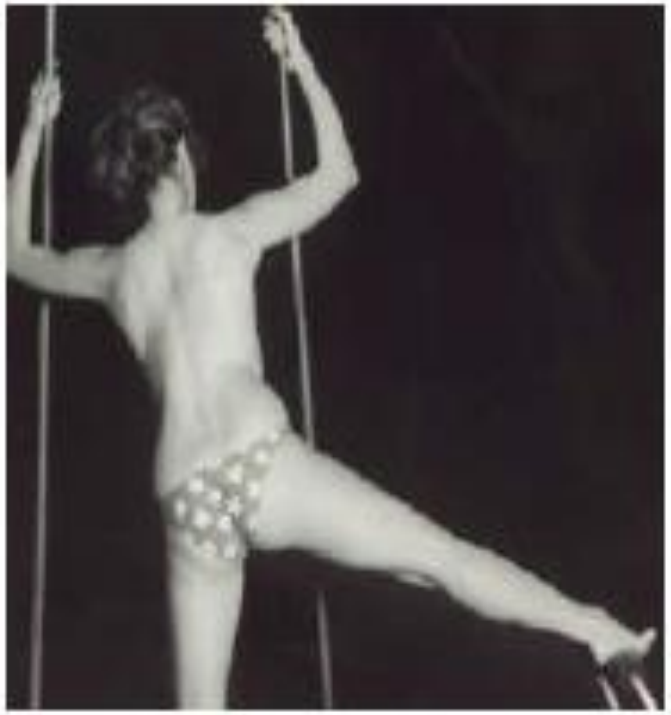
50 per exercise

Sitting tension with poles

Standing tension with poles

Side-sitting

- STEP 3 : Progression to special exercises only with subjects able to perform correction with high level technique

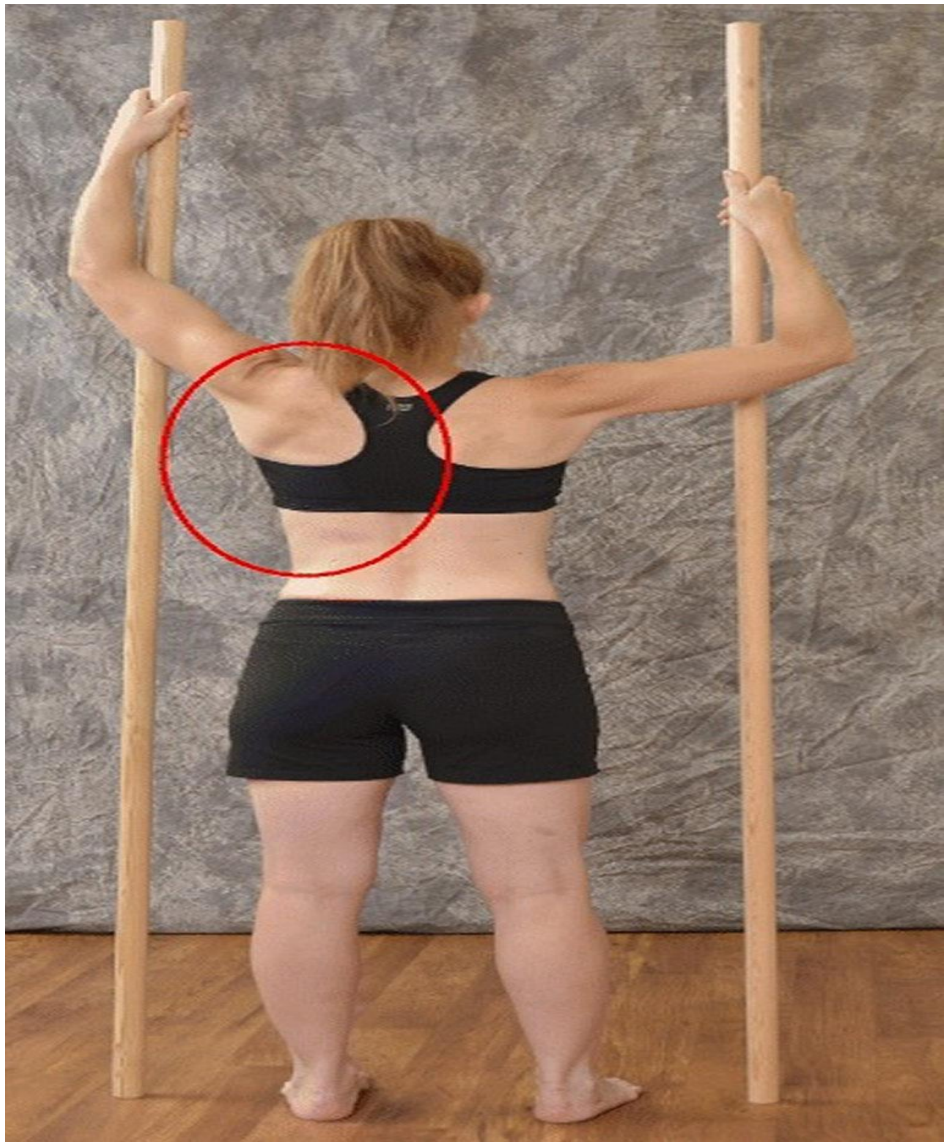


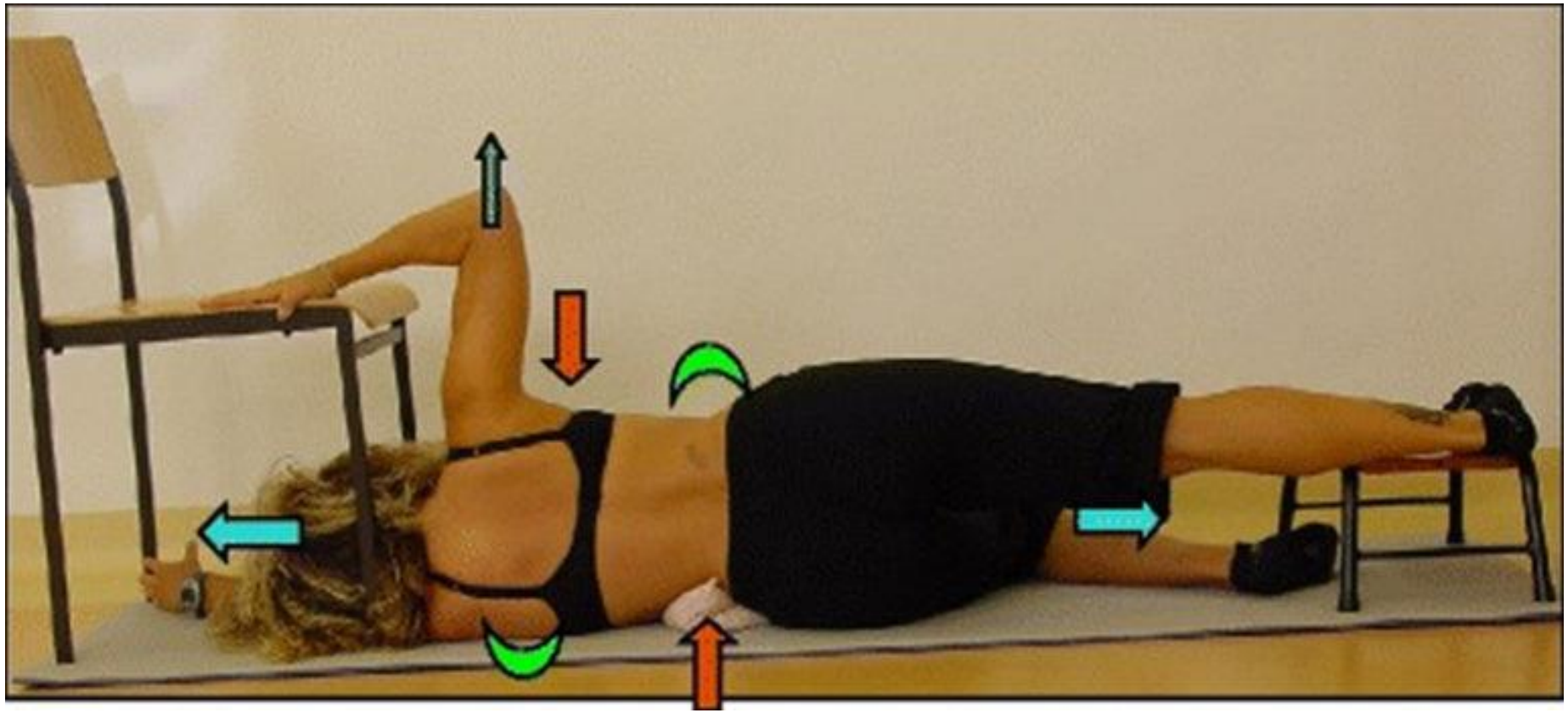
Muscle Cylinder

Antrea's Cross on air


140
130
120
110
100
90
80
70
60
50
OTTONIL

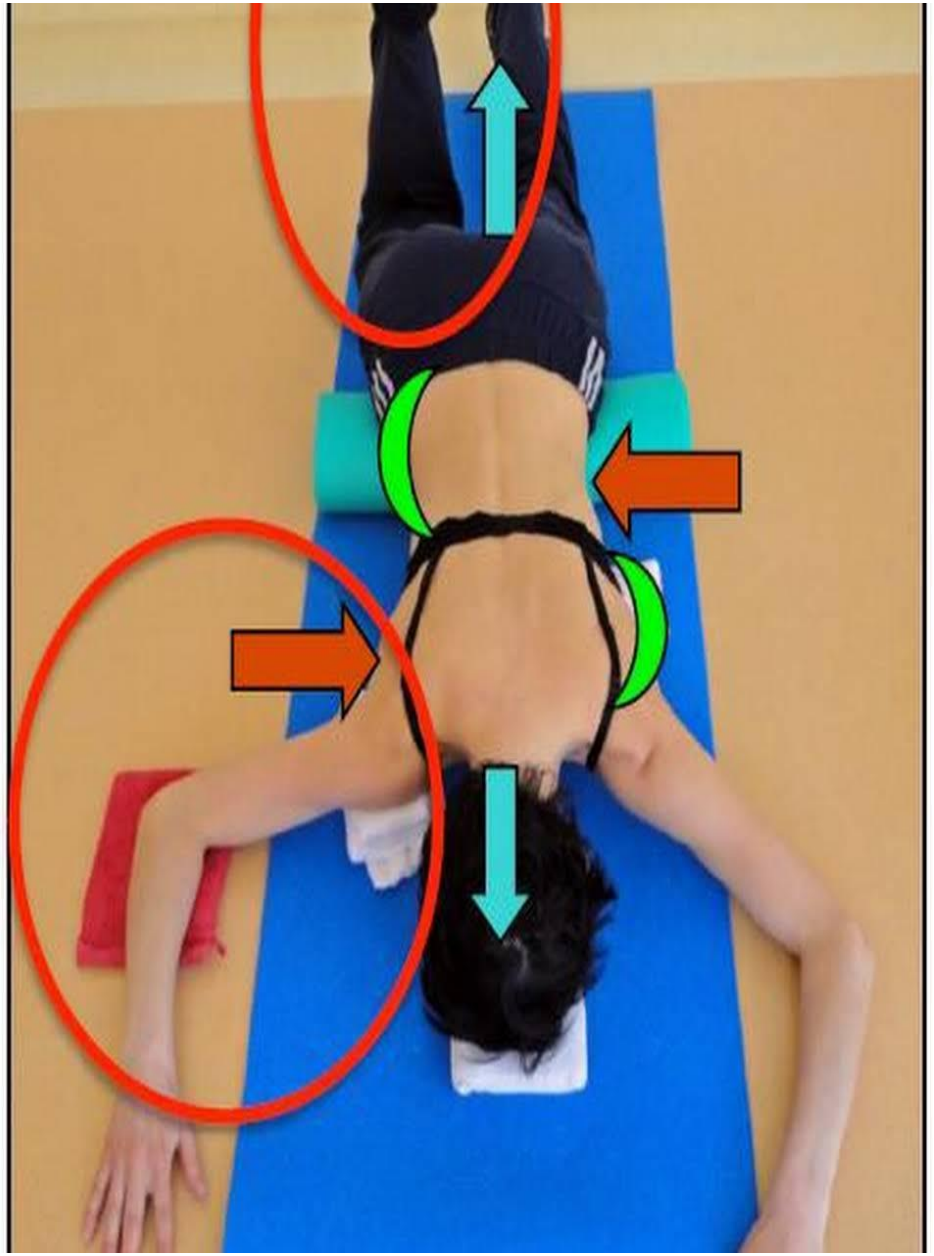
The Schroth “Sail” exercise

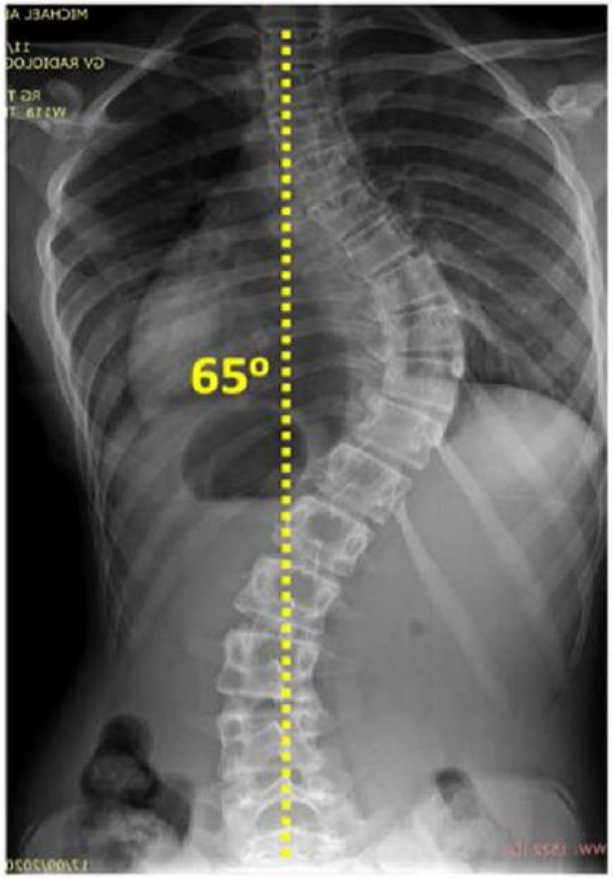




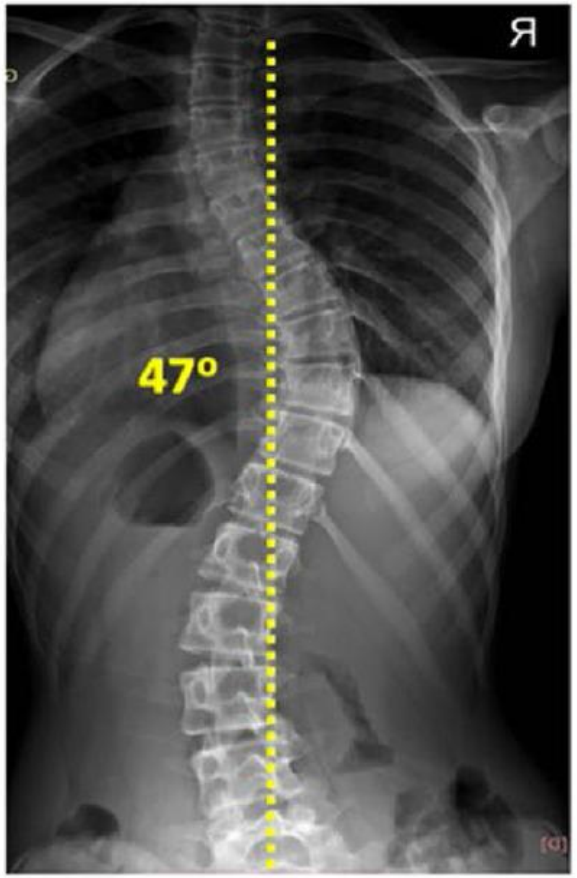
The “Muscle-cylinder” exercise
(also known as the “Side-lying” exercise),

The Schroth-prone exercise





Before treatment



After treatment

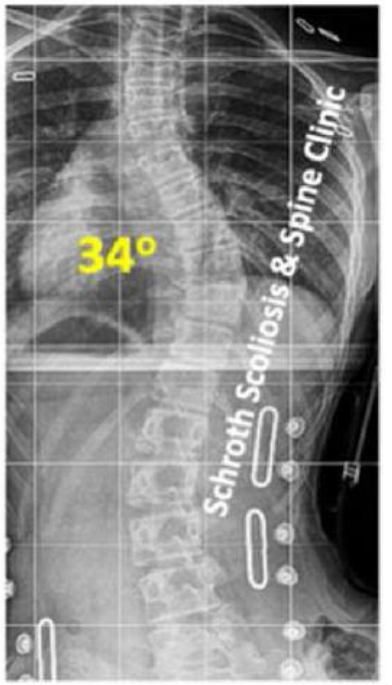
Before treatment

Before treatment

In-brace

After treatment

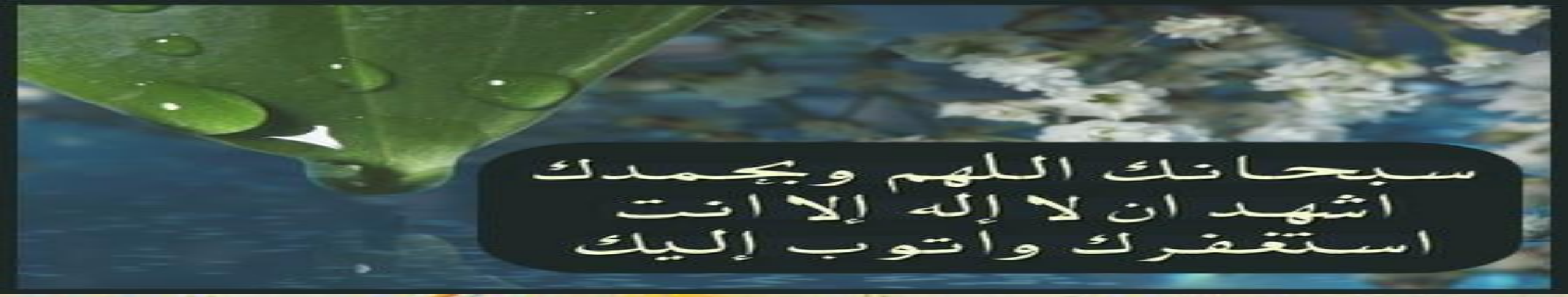
After treatment



A home message:

“Do not create false expectations and do not expect magical results”.

Dr. manuel Rigo


سبحانك اللهم وبحمدك
اشهد ان لا إله إلا انت
استغفرك واتوب إليك

Thank
You