

Scoliosis Awareness Booklet

June is Scoliosis Awareness Month

Dr. Firas Alobidi





This booklet (**for health care providers**) contains the basic information about scoliosis to raise awareness. **June** was chosen as the **international scoliosis awareness month**, because scoliosis screening and surgeries usually start in this month, as this disease usually affects children , and they are in a school vacation in this month , the (**26th of June**) is the **scoliosis day**, where the school vacation starts !

I hope that the basic knowledge in this booklet will help to raise awareness about scoliosis.

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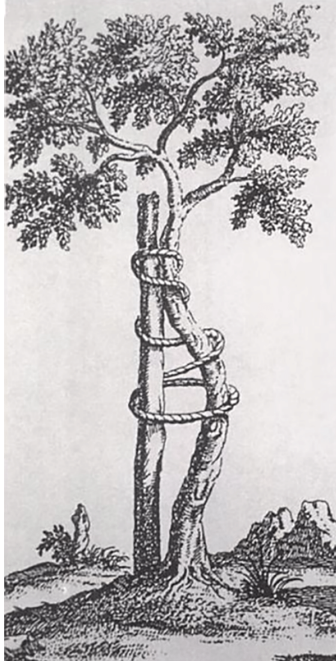
What is Scoliosis ?

Scoliosis is a complex rotational ,three dimensional deformity of the spine with apparent lateral deviation of the spine by more than (10°) degrees in the coronal plane (posterior-anterior) standing X - Ray (1,2)



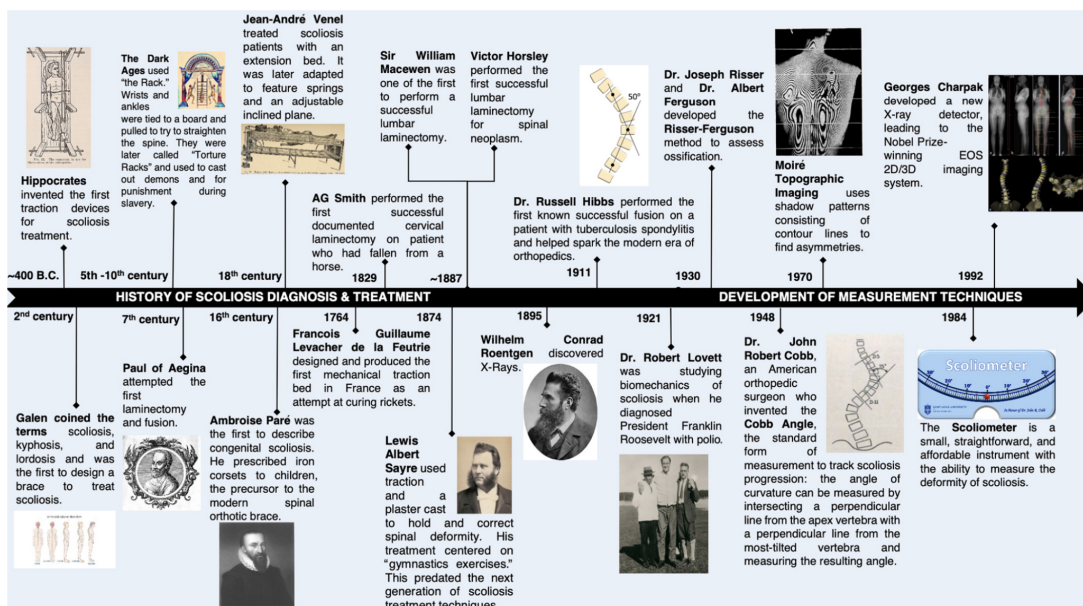
Ortho = **Straight**
Paidion = **Child**

Orthopedic = **Straight Child**



Orthopedic International Symbol
(3)

Nicolas Andry from France ,derived
 (Orthopedic) from Greek phrase
 (straight child : correct and prevent
 child bone deformities) at 1741 **(3)**



(4)

What are the types of Scoliosis ?

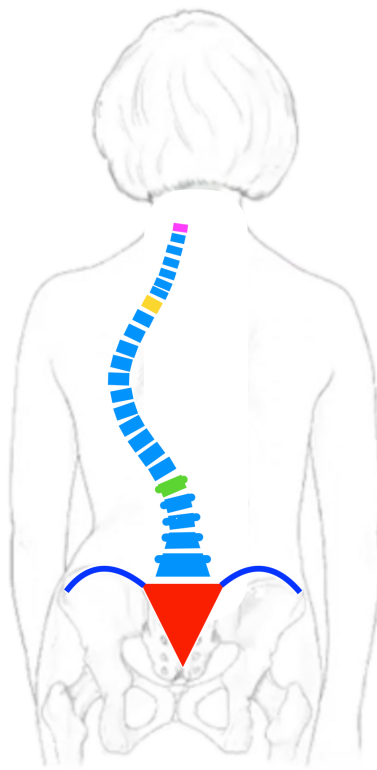
Postural (non structural) scoliosis :

The deformity is secondary or compensatory to some conditions outside the spine such as, short leg , pelvic tilt due to hip contracture. when the patient sits (canceling the leg length asymmetry) the curve disappears.

Sciatic scoliosis, due to muscle spasm in acute disc prolapse.

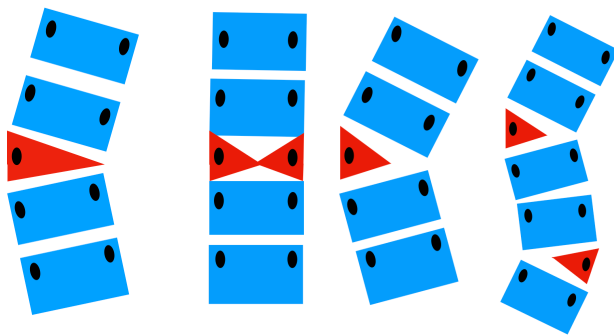
Structural Scoliosis :

There is non correctable deformity (by posture),an essential component of which is vertebral rotation (1)

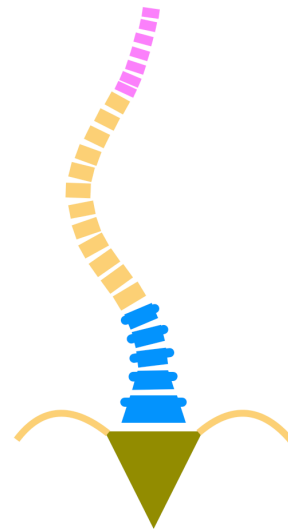


What are the causes of Scoliosis ?

- 1- Idiopathic scoliosis (no obvious cause) : most common (80 %)
 - Infantile idiopathic scoliosis (0 - 3 year)
 - Juvenile idiopathic scoliosis (4 - 9 year)
 - Adolescent idiopathic scoliosis (≥ 10 year) most common (90 %)
- 2- Congenital bone abnormalities
- 3- Neuropathic cause
- 4- Myopathic cause , associated with muscular dystrophy
- 5- Degenerative (De novo scoliosis)
- 6- Others like syndromes and Miscellaneous group of connective tissue disorders (1)



Congenital scoliosis



Idiopathic scoliosis

What is the prevalence of scoliosis ?

Most of the current epidemiological data about scoliosis are from the school screening programs.

Scoliosis can affect all ages, it is the most common deformity of spine , idiopathic type affects only humans.

The overall prevalence of adolescent idiopathic scoliosis is estimated to be (0.45 - 5.2 % , approximately 2-3% of population), about (10 %) of them need surgery, (30 %) need bracing.

The overall female to male ratio of adolescent idiopathic scoliosis is 2 : 1 , this can be increased with increasing age.

Larger curves and curve progression are more in girls than boys.

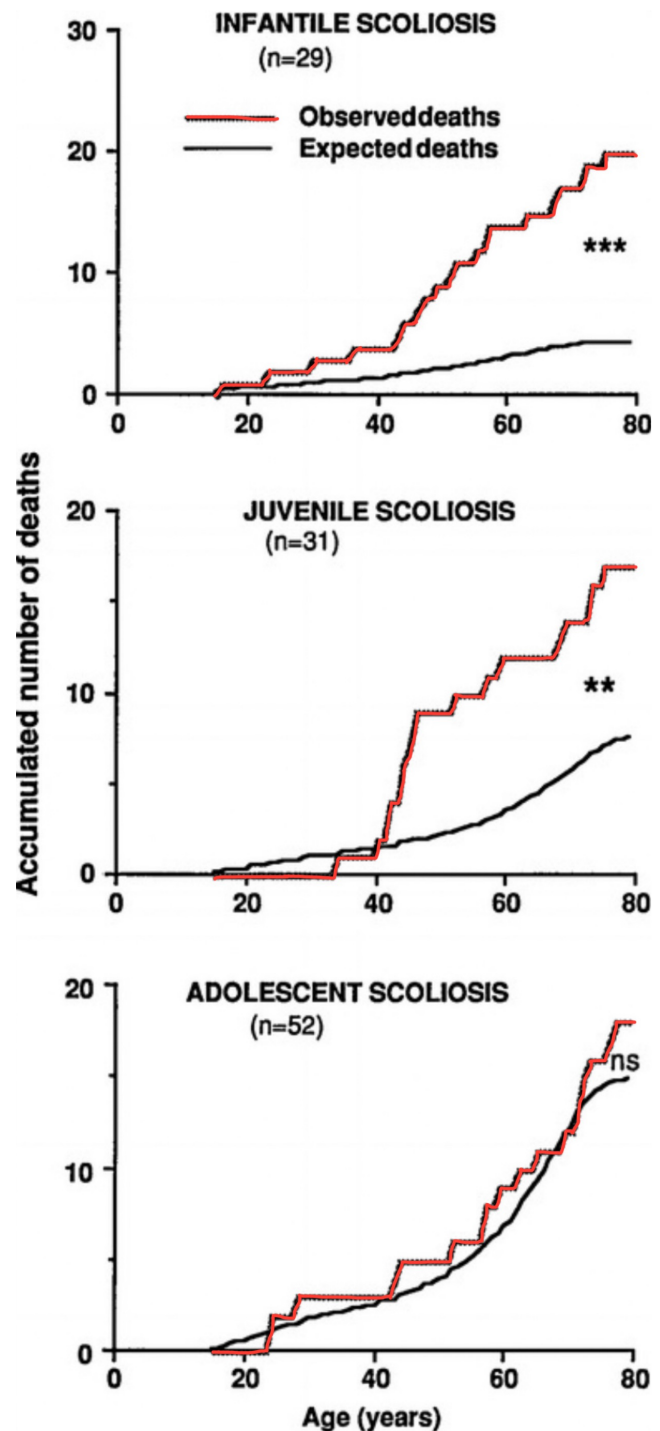
Thoracic curves are most common , followed by thoracolumbar/ lumbar curves. (5)



What is the natural history of scoliosis ?

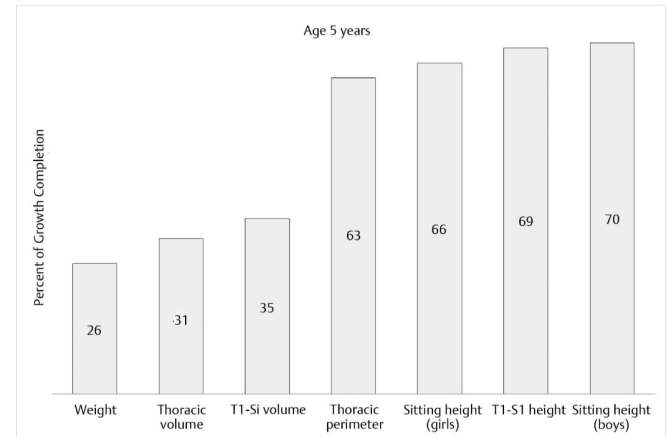
This figure shows the cumulated number of **observed** deaths in patients with infantile , juvenile and adolescent idiopathic scoliosis without treatment , and **expected** deaths (7)

So the early diagnosis and treatment of early onset scoliosis (< 10 year of age) is crucially important

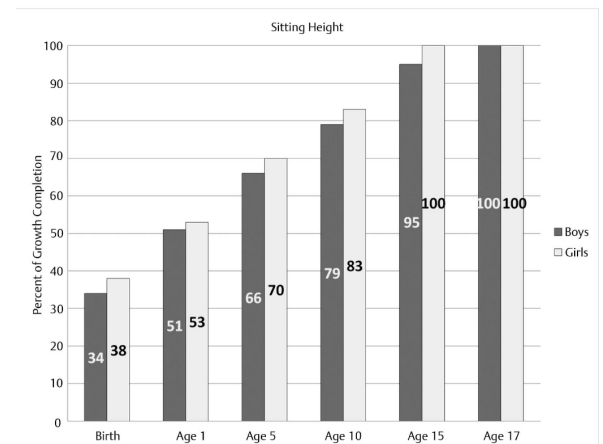


Abnormal spine growth causes abnormal lung , alveolar growth and abnormal thoracic cage growth (8)

Developmental stage	Chest dimensions Millimeters			Chest shape
	Chest depth	Chest width	Ratio of depth to width	
Birth	79	72	1.1	Round-ovoid
5 years	132	150	0.9	Ovoid
10 years	160	220	0.7	Elliptical
Skeletal maturity	210	280	0.7	Elliptical



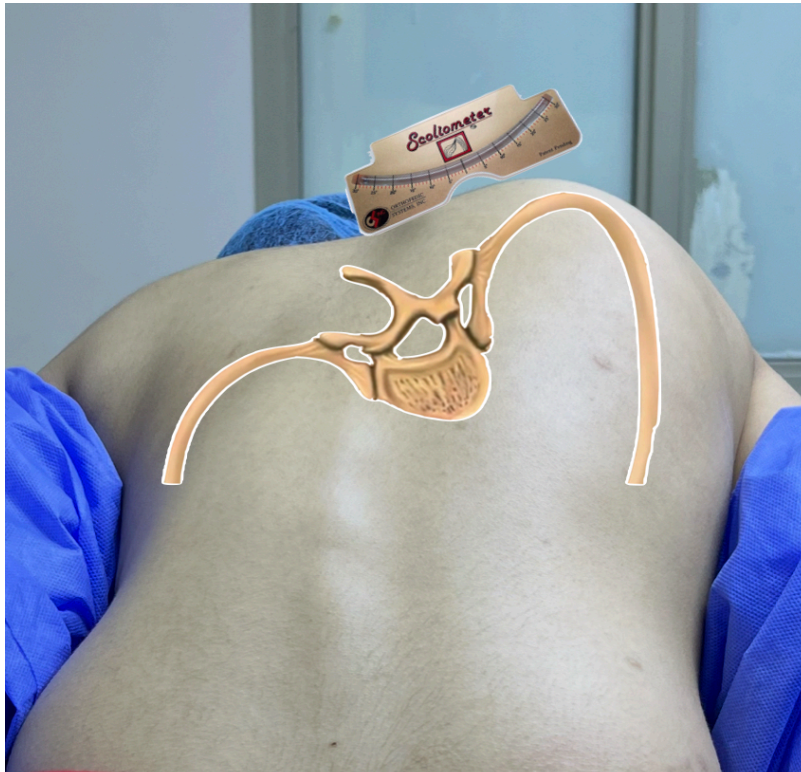
Developmental stage	Spinal segment Centimeters			
	Males		Females	
	T1-T12	L1-L5	T1-T12	L1-L5
Newborn	11	7.5	11	7.5
Child	18	10.5	18	10.5
Pre-Adolescent	22	12.5	22	12.5
Adult	28	16	26	15.5



Developmental stage	Sitting height		Lower extremities
	Head	Trunk	
Fetus (early pregnancy)	50%	32%	18%
Fetus (late pregnancy)	35%	40%	25%
Newborn	25%	40%	35%
Infant	23%	37%	40%
Child	20%	35%	45%
Pre-Adolescent	18%	34%	48%
Adult	13%	40%	47%

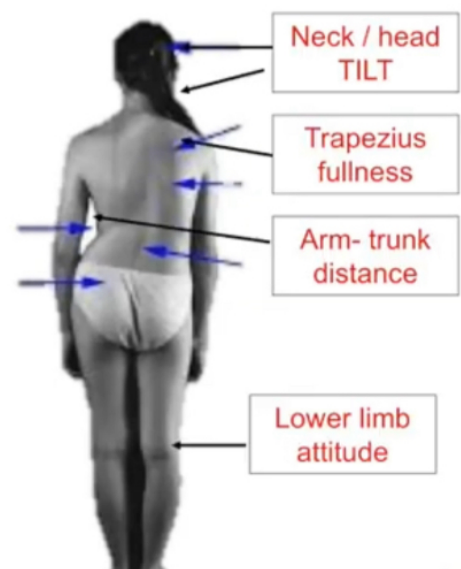
(8)

Diagnosis of Scoliosis ?



Examine for :

- 1- Neck tilt
- 2- Trapezius fullness
- 3- shoulder height - medial and lateral
- 4- chest deformity - from back (rib hump) and front
- 5- Arm trunk distance
- 6- Flank crease
- 7- Pelvic tilt
- 8- Truncal shift
- 9- Limb - LLD
- 10 - Complete Neurology - Abdominal reflex - gait





Scoliosis is generally **painless** , often goes undetected in adolescents .

X - rays :

Cobb angle

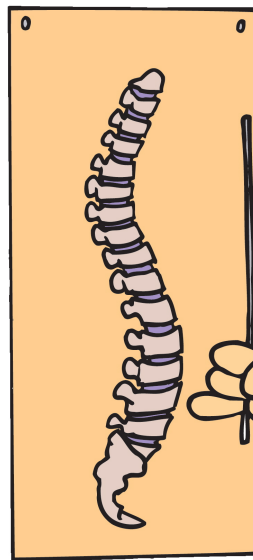
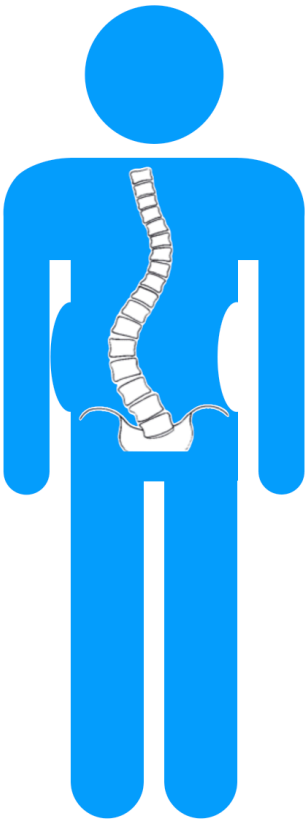
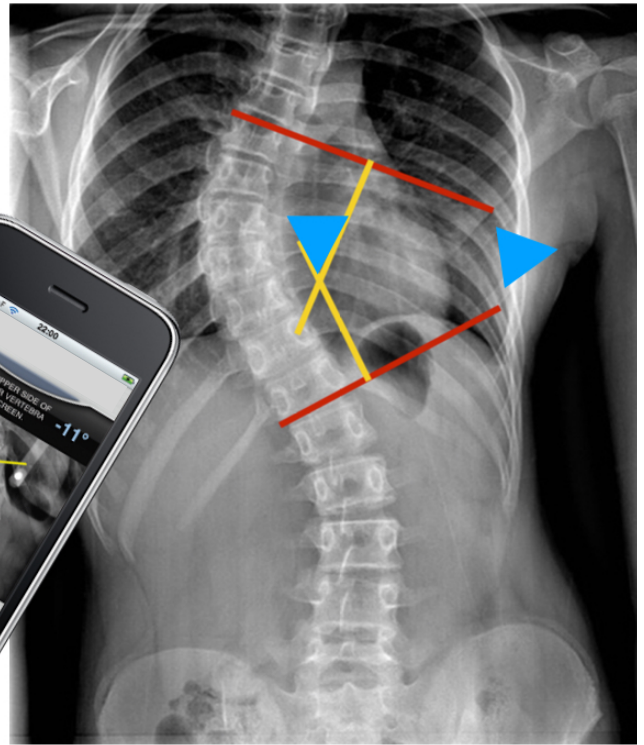
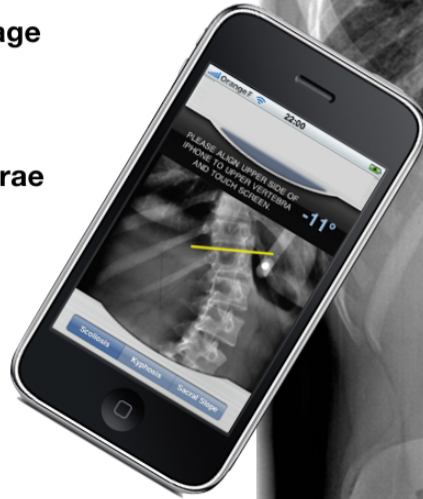
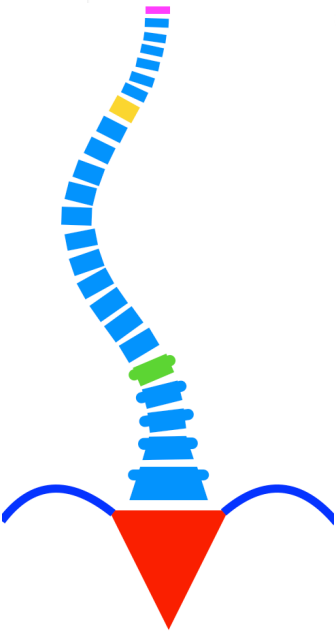
Rotation of vertebrae

Risser sign

Triradiate cartilage

Stable zone

Strategic vertebrae

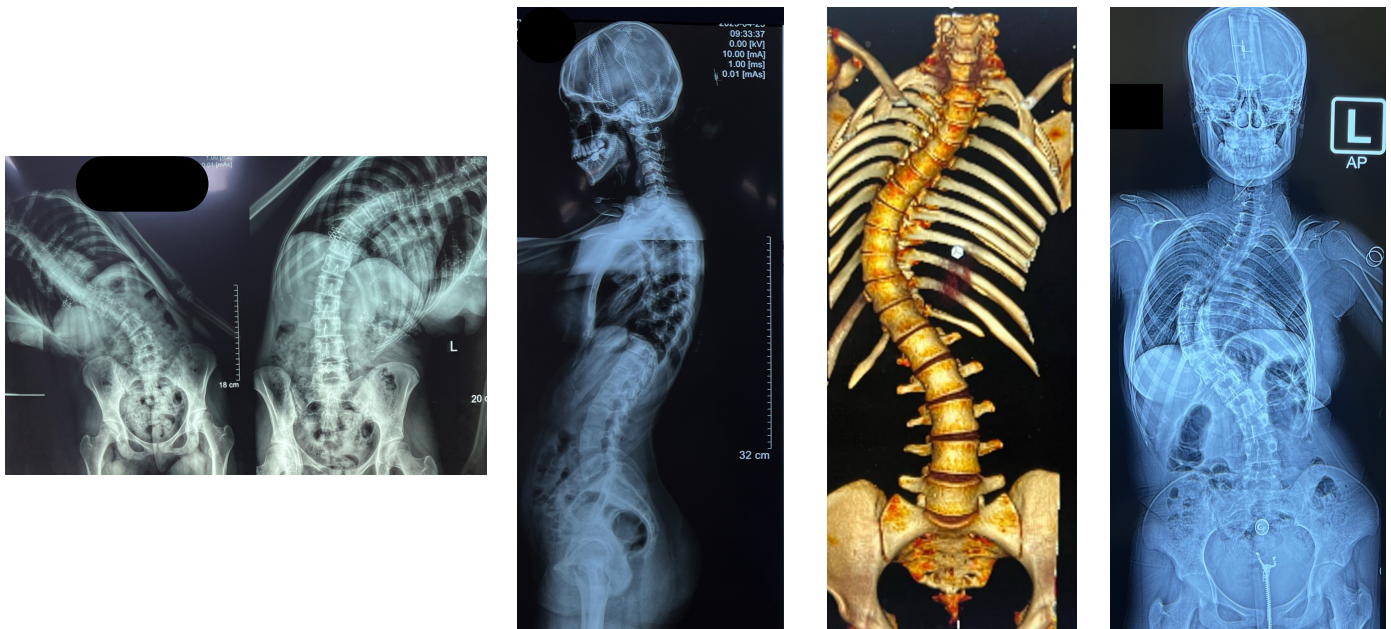


(9)

Radiation hazards in patients with scoliosis :



The overall all cancer rate in Adolescent idiopathic scoliosis patients was 4.3 % which is five times higher than compared to the age - matched population in this study (10)



Prevent over radiation of patients with scoliosis
Do NOT add another problem to them !

The close (every 3-4 months) follow up is needed only in the peaks of the growth (e.g. pre menarche), otherwise the follow up will be every 6 months or more until skeletal maturity

Larger curves ($> 50^\circ$) at skeletal maturity are likely to continue to progress (about 1° per year) even after maturity (5)

Treatment of scoliosis :

Do scoliosis patients benefit from bracing ? what is the evidence ?

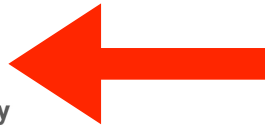


(11)

Terminated



Stopped for efficacy



Bracing in Adolescent Idiopathic Scoliosis Trial (BrAIST) (BrAIST)

ClinicalTrials.gov ID  NCT00448448

Sponsor  Stuart Weinstein

Information provided by  Stuart Weinstein, University of Iowa (Responsible Party)

BrAIST (12), was a multi-centre , prospective randomized, partially blinded clinical trial, to determine if the use of scoliosis brace lowers the risk of curve progression in patients with adolescent idiopathic scoliosis (level one evidence)

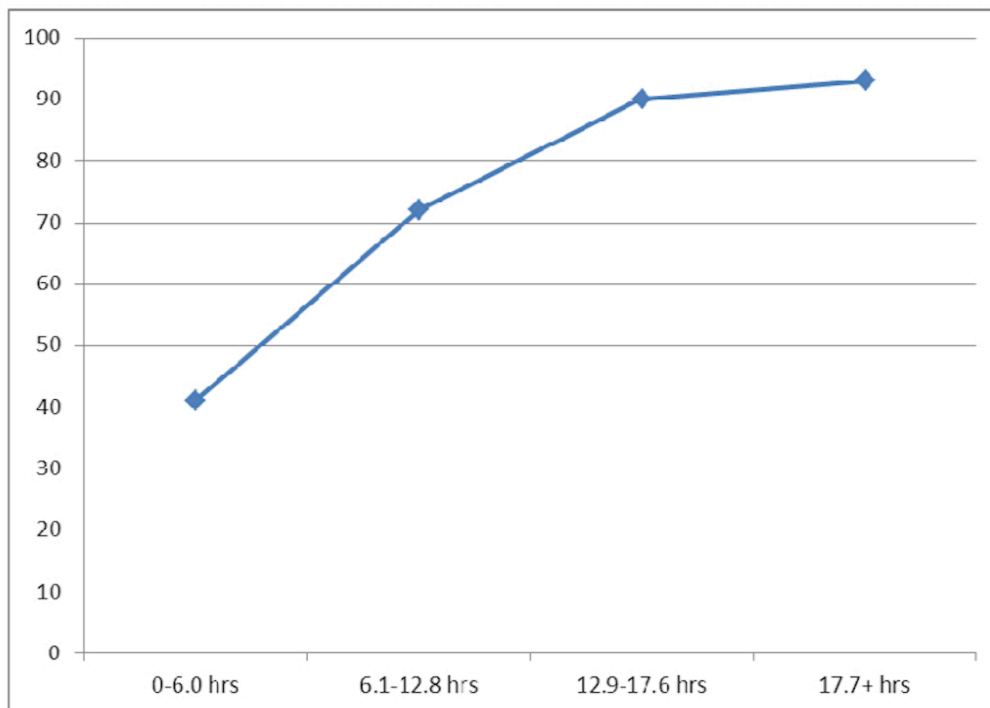
It was conducted between 2007 and 2013, included over 200 patients (10 - 15 years) , and Cobb angle (20 - 40 degrees)

The bracing group (wearing brace for **18 hours per a day**) were compared with the observational alone group .

The (treatment failure) of this study was defined as the curve progression to 50 degrees, and the (treatment success) as reaching skeletal maturity without curve progression to 50 degrees

This TRIAL was terminated early due to the significant efficacy of bracing , so it would be unethical to continue it

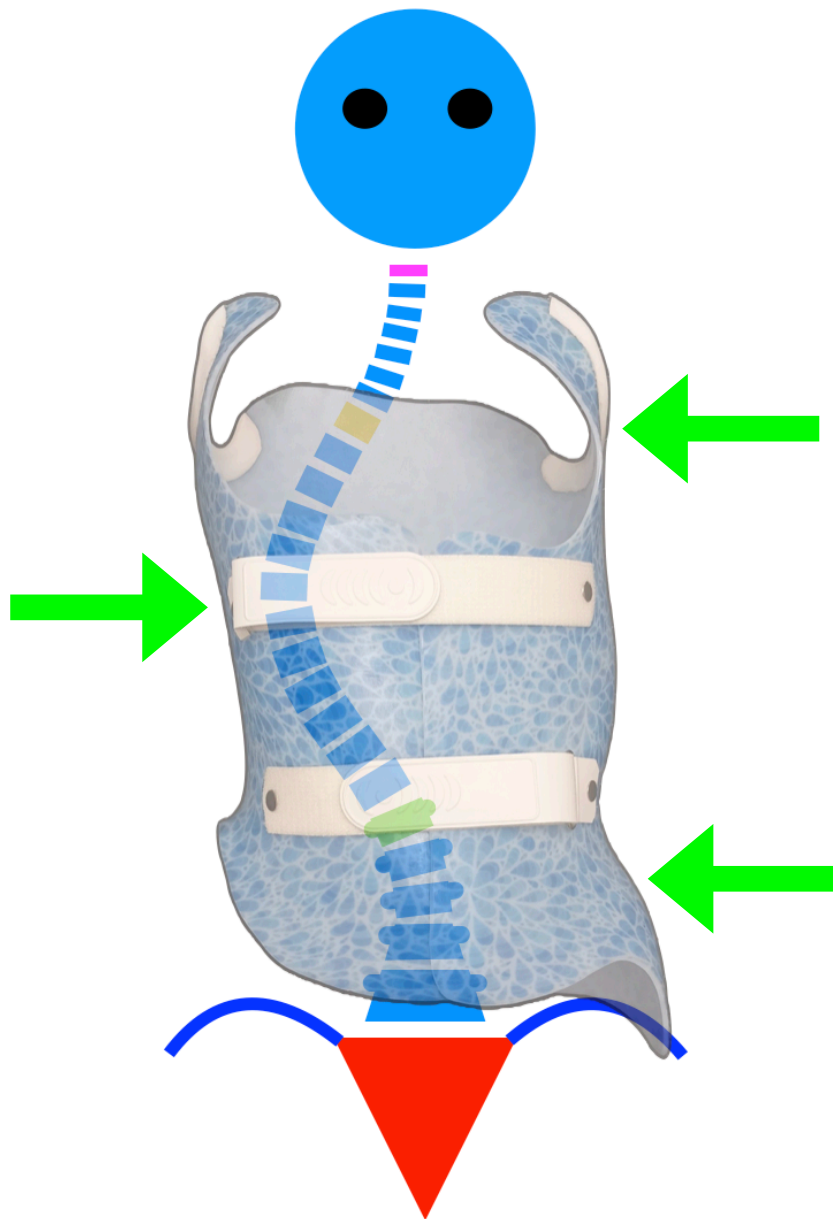
On average, subjects wore the brace 12 hours per day (range 0 to 23)



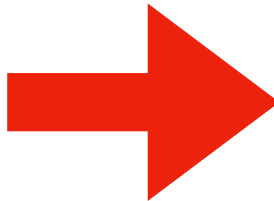
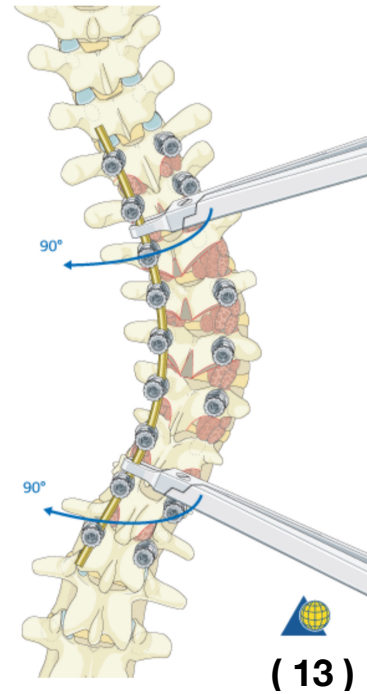
Success rate

Brace hours
per day

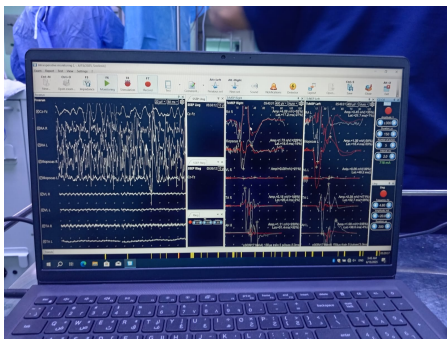
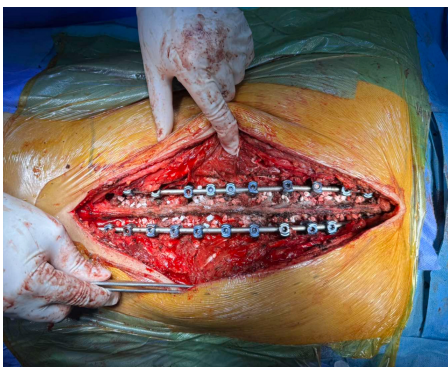
Note : Brace will **not** decrease the curve angle
Brace will **not** stop the curve progression
But it can reduce the speed of progression
It is used mainly for idiopathic types



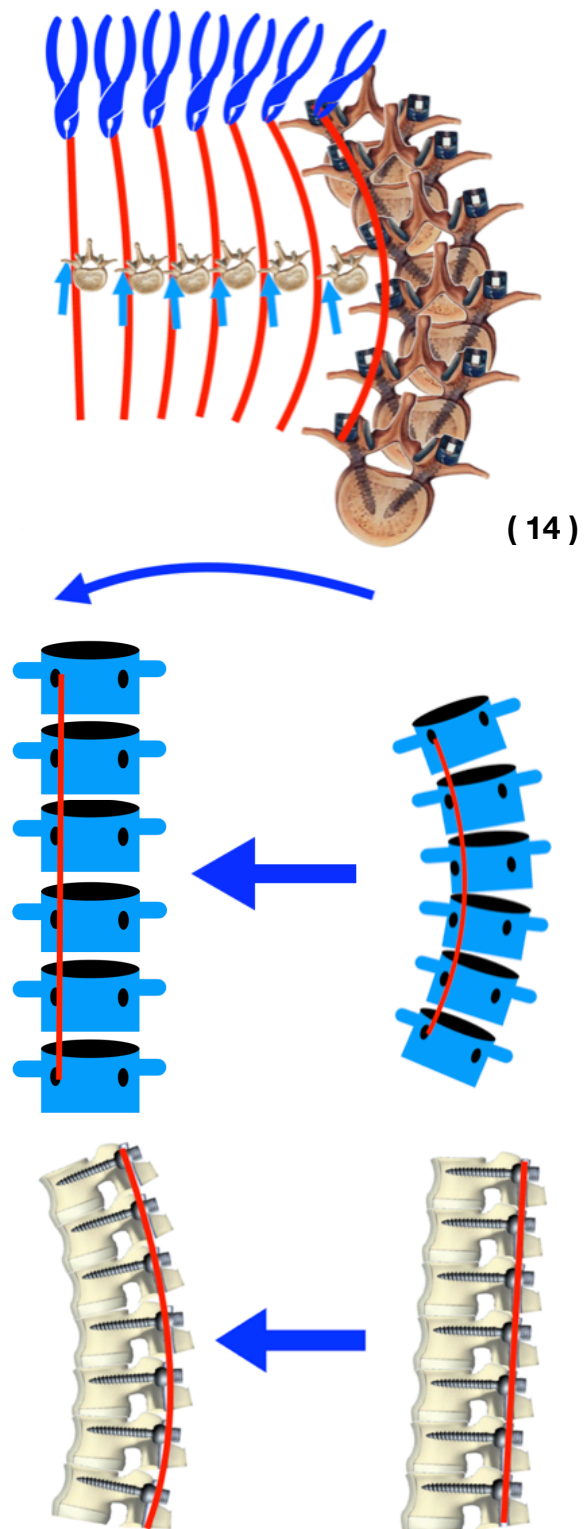
Surgery for scoliosis : many techniques

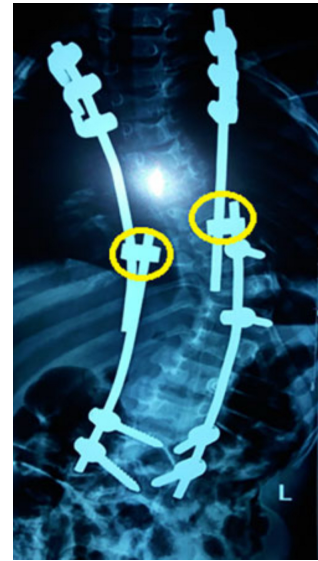
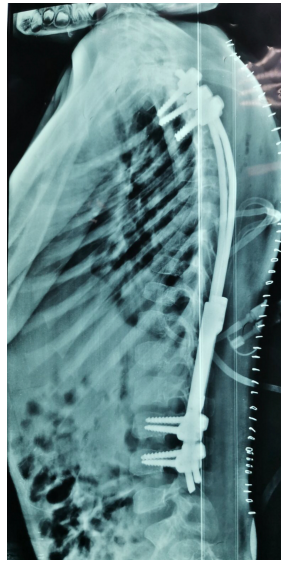
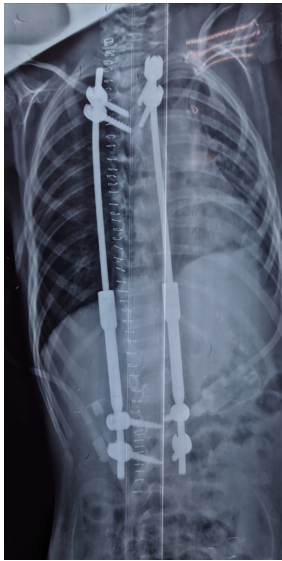


Thoracic spine de-rotation technique



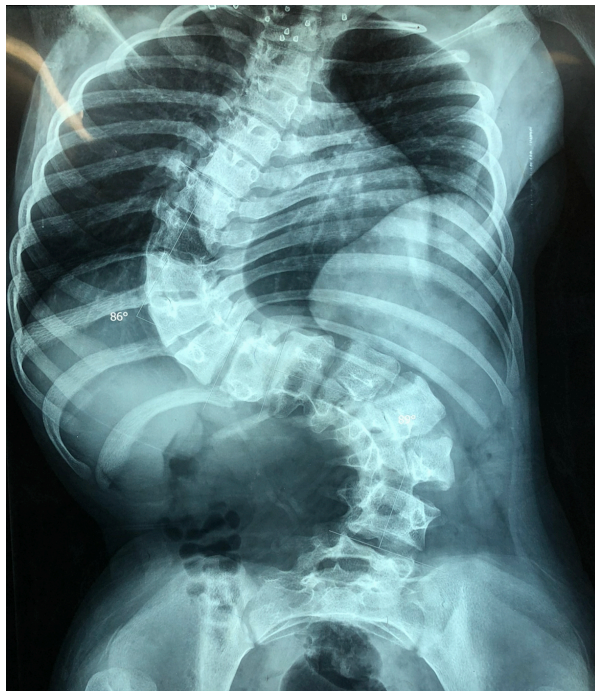
These surgeries are usually performed under intra-operative neuromonitoring



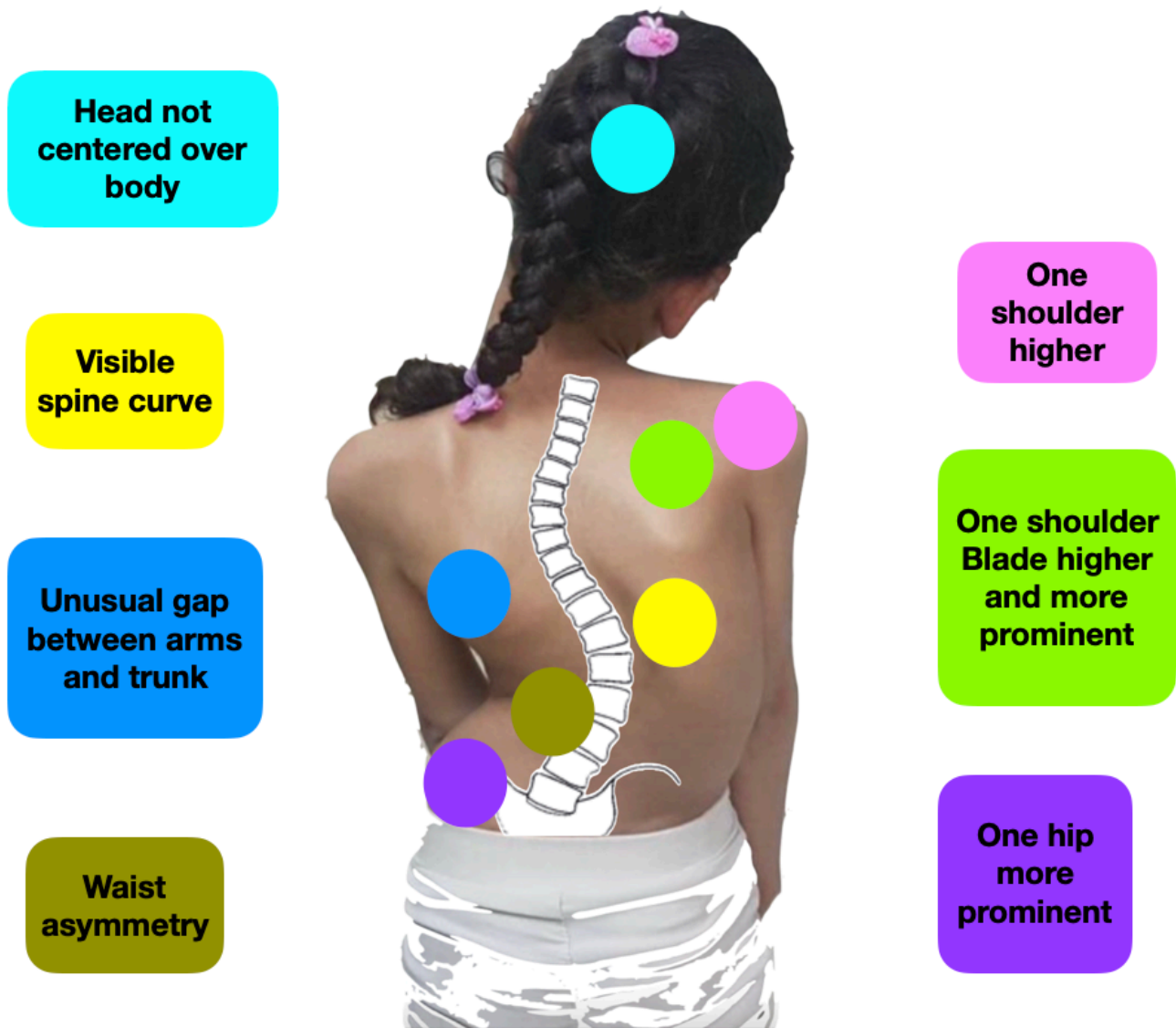


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Scoliosis Screening is crucially important for early detection of the curves , thus prevention of severe curves , so the treatment will be earlier with less risk of complications and less cost !



School Scoliosis Screening -SSS



School Scoliosis screening (SSS) started in 1963 in Minnesota , USA, then spread world wide (Japan since 1979, China , Sweden ,Spain ,Hong Kong , Malta , Malaysia, Singapore, Greece ,Belgium ,Croatia ,Hungary, Brazil , Chili and others).

Many countries have mandatory nationwide school scoliosis screening , certain countries discontinued the compulsory SSS, changed it to optional type , and still debating its cost , effectiveness and over treatment (16) , however after the level one evidence research about effectiveness of brace treatment was published (12), scoliosis screening program was reconsidered in certain countries like Australia.

In Japan nationwide school scoliosis screening is mandatory by law. In USA , about half of the states mandate the SSS.

The lack of scoliosis screening will result in delayed diagnosis thus may make the surgery the only left treatment option ! , the early detection of scoliosis will reduce the cost ,as the brace may decrease the speed of curve progression and avoid costly surgeries, in addition the SSS will help in spreading scoliosis awareness in the community.

In countries where the family doctor care or primary health care is deficient, with the loose fitting type of dresses , the scoliosis curves may be easily overlooked, so scoliosis screening will be of crucial importance in these countries.

In Iraq ,the implementation of a nationwide mandatory scoliosis screening is of great importance , it can start as an optional program, and it may involve not only schools , but also pediatric hospitals , primary health care centers , and selected rural areas.

A formal request for the establishment of the **Iraqi SSS** has been submitted to the Prime Minister of the Republic of Iraq on 18th - June - 2025 , this Iraqi SSS will come as part of a broader national effort to strengthen preventive healthcare and public health education in Iraq under the patronage and support of the Prime Minister of the Republic of Iraq.



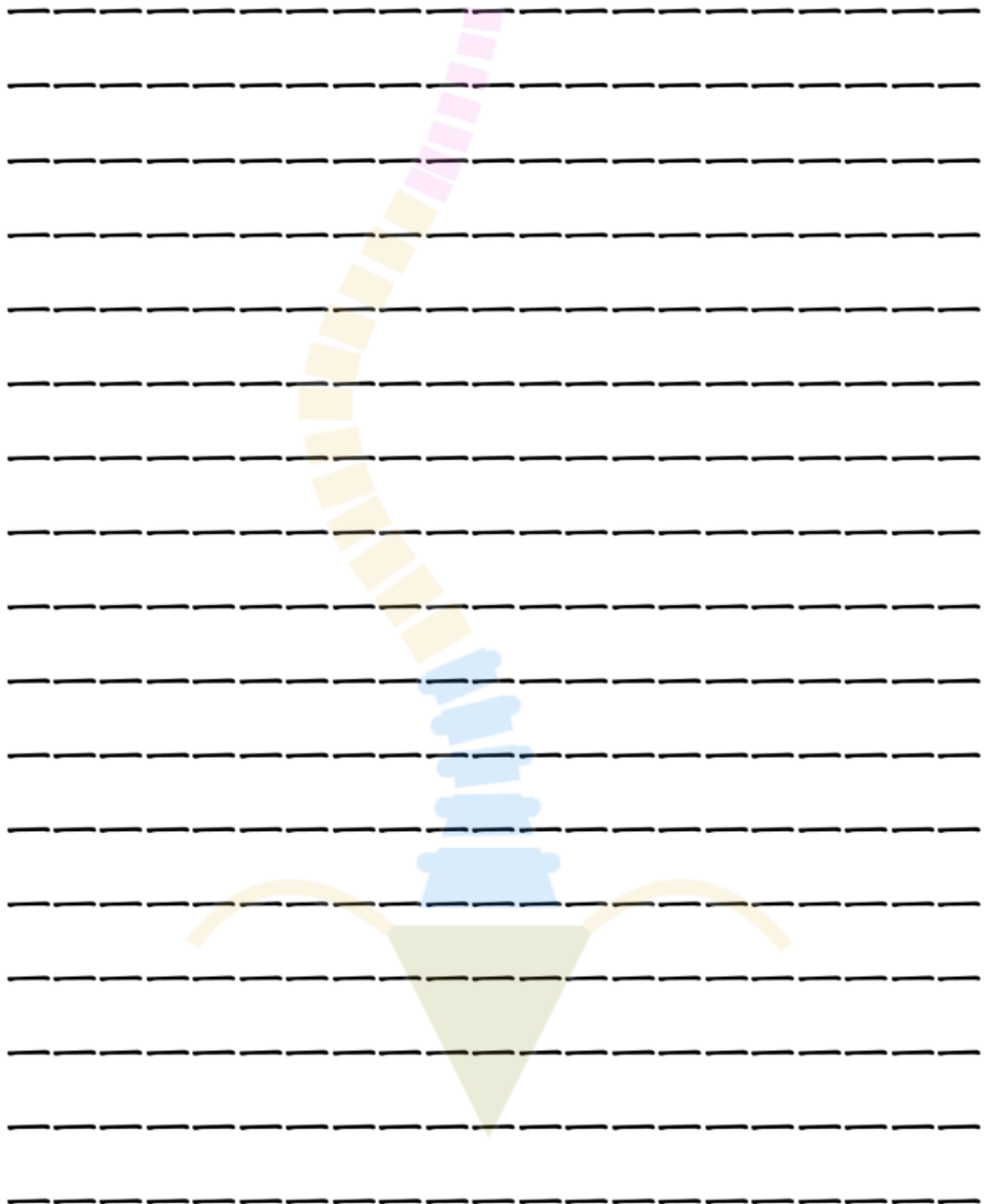
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Notes :



June is Scoliosis Awareness Month



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