

# How does the scoliotic deformity affect the sagittal spine in adolescent idiopathic scoliosis?

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# Adolescent Idiopathic Scoliosis (AIS)

## Altered spinal alignment:

- Frontal plane → deviating spine
- Axial plane → Intervertebral rotation
- Sagittal plane → Thoracic hypokyphosis mostly

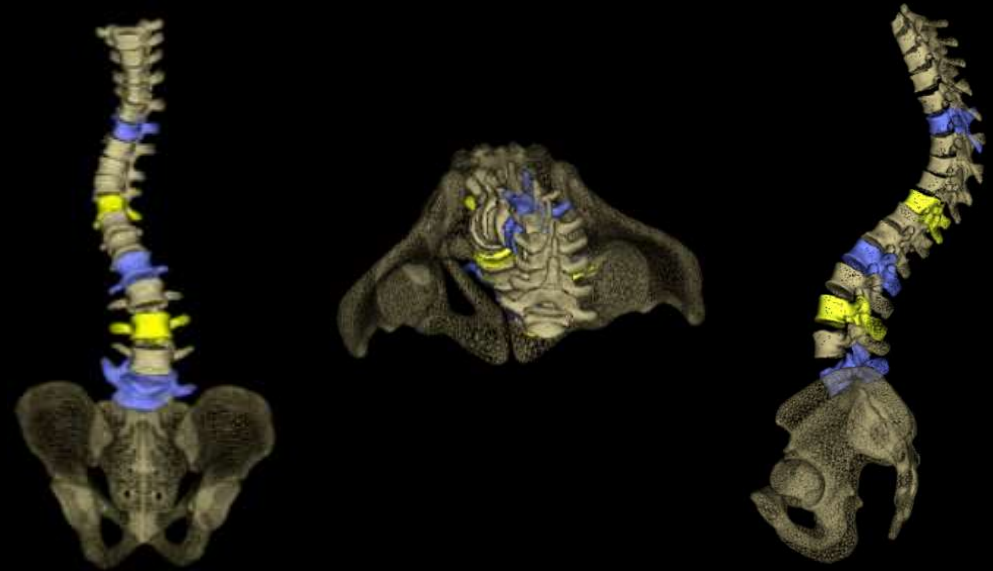
*Depending on the type of curvature*

3D deformity of the spine

FRONTAL

AXIAL

SAGITTAL



Realignment surgery aims to mainly correct the coronal deformity but also restore subjects' sagittal alignment.

It is still unknown how the thoracic and lumbar segments are affected in the sagittal plane in AIS with different types of curvature

**AIM**

**Asses how the proximal and distal levels in the thoracic and lumbar segments contribute to the thoracic kyphosis and lumbar lordosis in subjects with AIS with different types of curvature**

# Methods

## EOS<sup>®</sup> 3D biplanar Xrays

**249 non-op AIS patients**  
**207F, 42M**  
**Age 15 years [13-17]**

**40 controls**  
**29F, 11M**  
**Age 15 years [12-18]**



**Low dose**

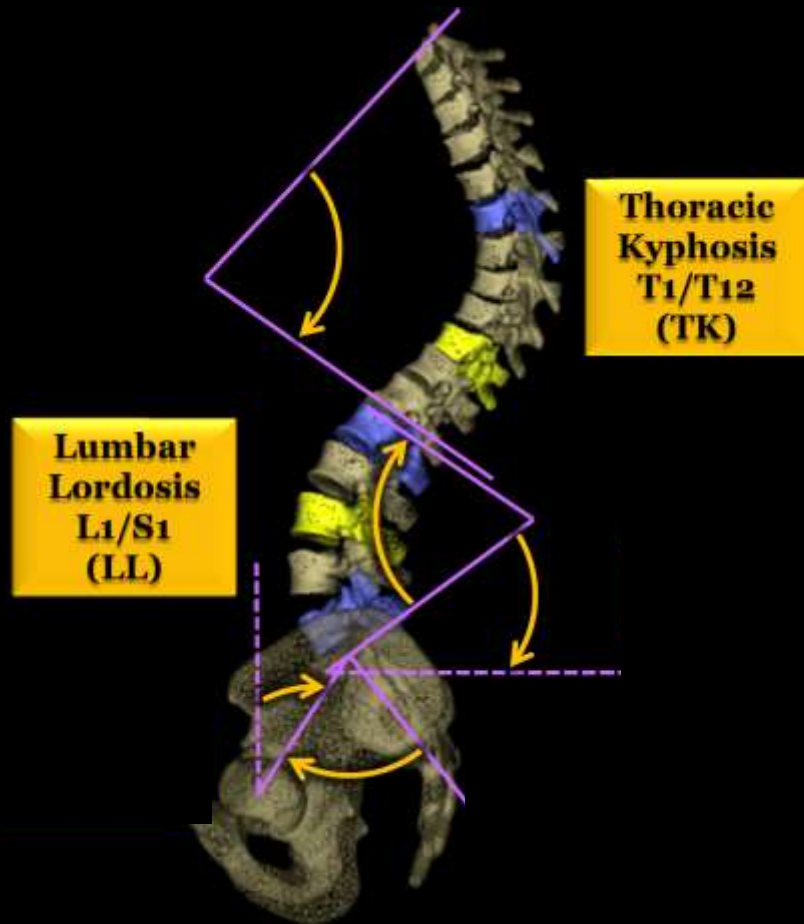
(G. Charpak,  
Nobel Prize 1992)

**Free standing  
position**

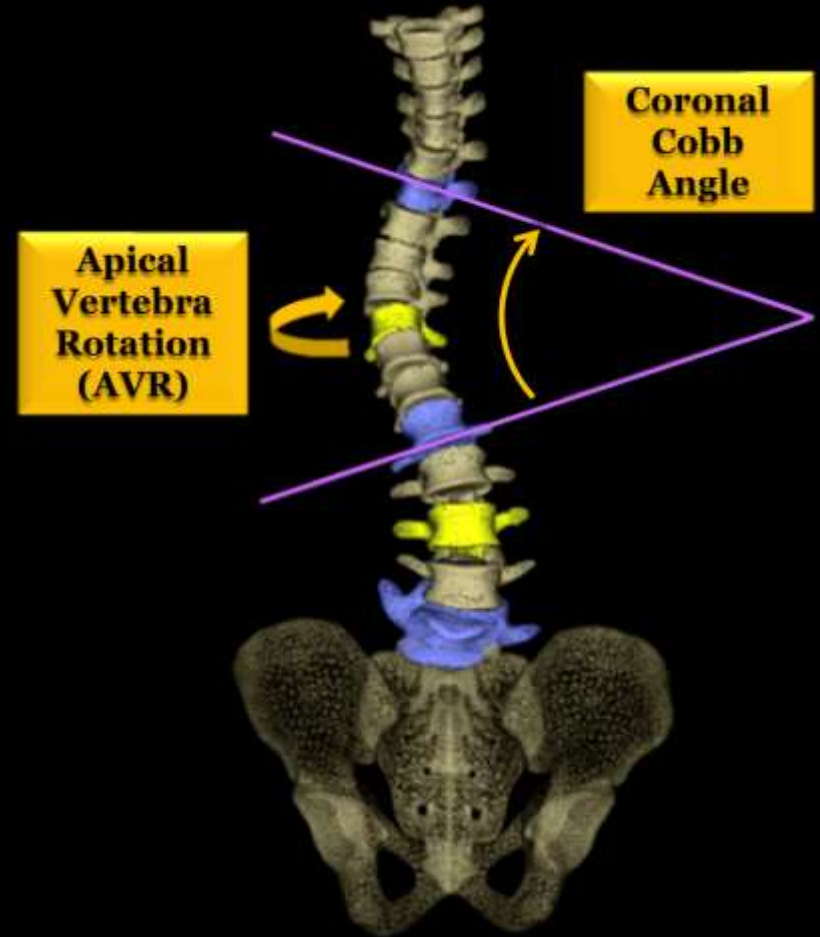
**3D  
reconstruction  
and parameters  
calculations**

# Spino-pelvic parameters

## Sagittal

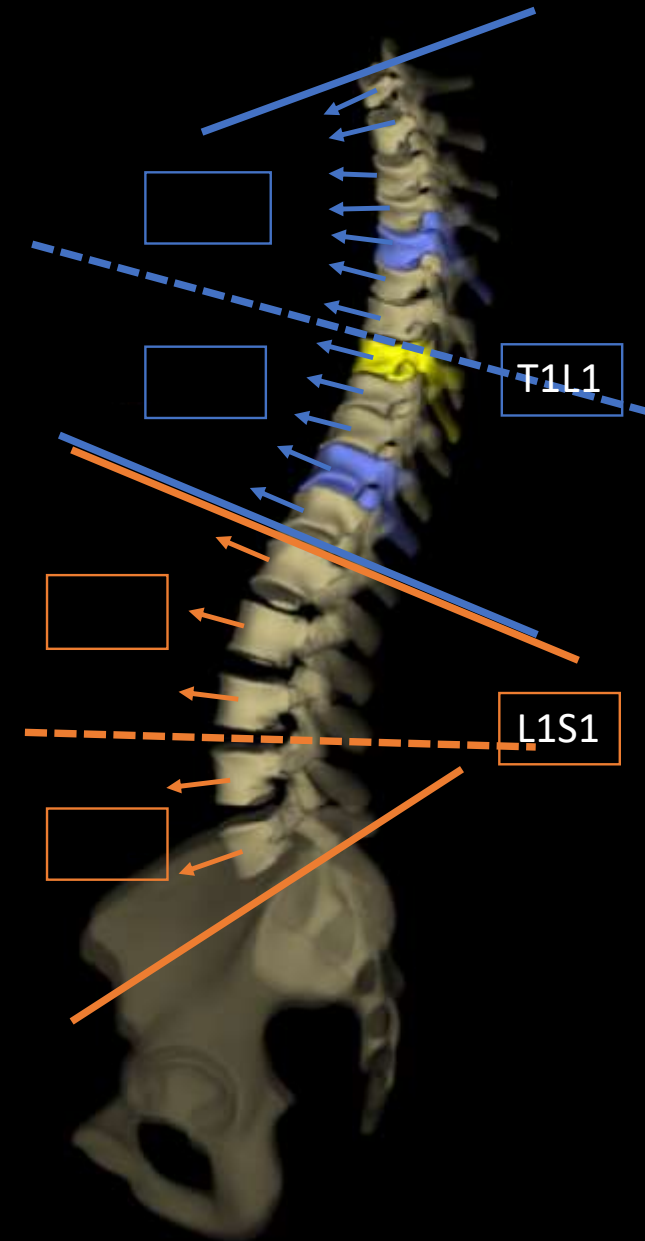


## Coronal + Axial



## Contribution of each vertebral level to regional sagittal curvatures assessed for :

- Thoracic Kyphosis (TK, T1L1)
- Lumbar Lordosis (LL, L1S1)
- Proximal and distal kyphosis (T1T7, T7L1)
- Proximal and distal lordosis (L1L4, L4S1)



# Statistics

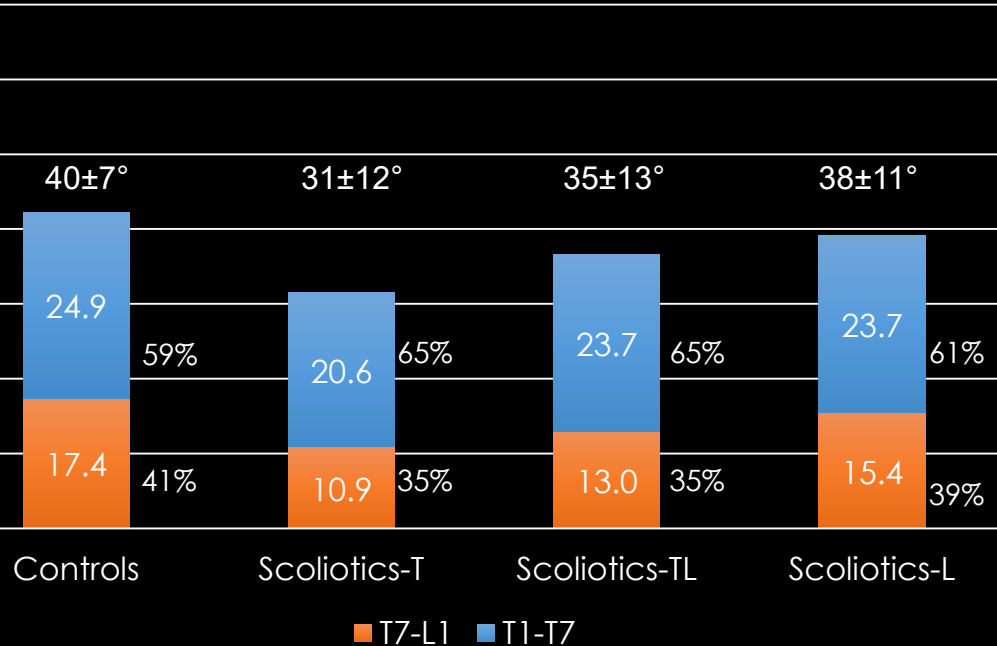
Scoliotic subjects were subdivided into 3 groups depending on the location of the apex

<u>Thoracic (T)</u>	<u>Thoraco-lumbar (TL)</u>	<u>Lumbar (L)</u>
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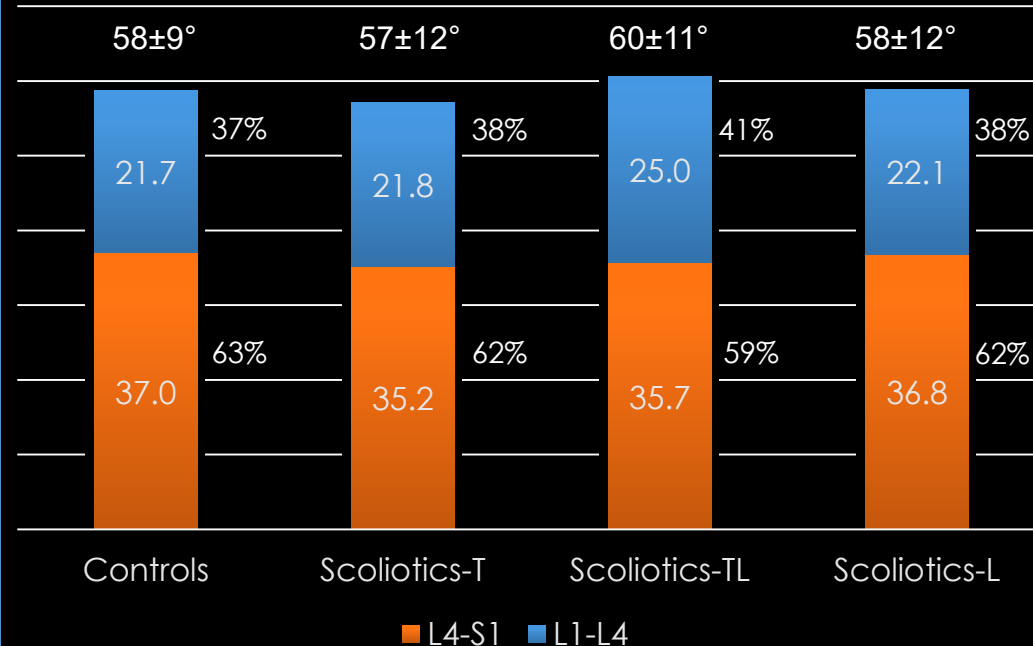
Contribution of the proximal and distal levels in thoracic kyphosis and lumbar lordosis were compared between subjects with AIS with different types of curvature and controls  
(Chi-squared test)

# Results & Discussion

**Segmental thoracic kyphosis (°)**  
p>0.05



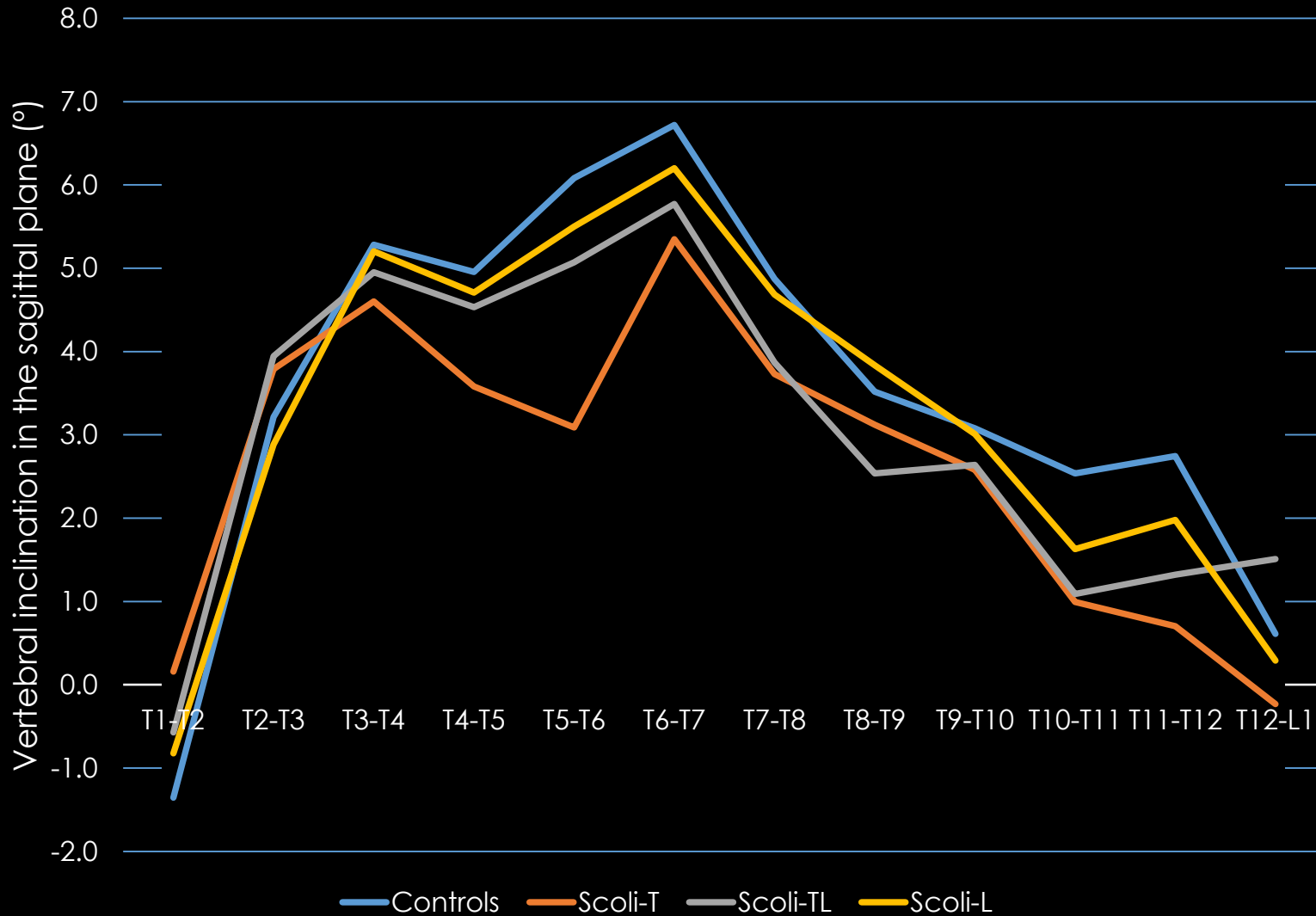
**Segmental lumbar lordosis (°)**  
p>0.05



- TK was significantly lower in the T group compared to the L and control groups
- LL was similar between groups
- Contributions of the proximal and distal thoracic portions to the overall TK was similar between controls and all AIS groups
- Contributions of the proximal and distal lumbar portions to the overall LL was similar between controls and all AIS groups



# Overall sagittal vertebral contribution



# Conclusion

- **First study** to evaluate thoracic kyphosis and lumbar lordosis in subjects with AIS with different types of curvatures
- Contributions of the proximal and distal segments of each sagittal curvature seem to be **homogeneous**.
- Sagittal deformity in AIS occurs **homogeneously** across curvatures
- Surgical correction should attempt to **correct sagittal malalignment uniformly**.



Conflict of interest: None



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