SPONDYLOS
LASER SPINE LAB

Is the Surface Topography a helpful tool for the management of scoliosis?

Dimitris G. Papadopoulos, MD, CPO

Orthopaedic Surgeon

SPONDYLOS
LASER SPINE LAB

The aim was to reveal the importance
of surface topography
in complement to the x-rays

SPONDYLOS
LASER SPINE LAB

MATERIALS AND METHODS

SPONDYLOS
LASER SPINE LAB

616 Patients

432 females ♀

184 males ♂

SPONDYLOS
LASER SPINE LAB

Age

5 y - 21 y (average **14,7** y)

SPONDYLOS
LASER SPINE LAB

Measurements

We have used the Formetric 4D Dicom II system, which is supplied as well with Cobb angle measurement.

Measurements

The patients have been visited clinically by:

- *Inspection*
- *Adams forward bending test*
- *Bunnell scoliometer*
- *SpineScan scoliometer*

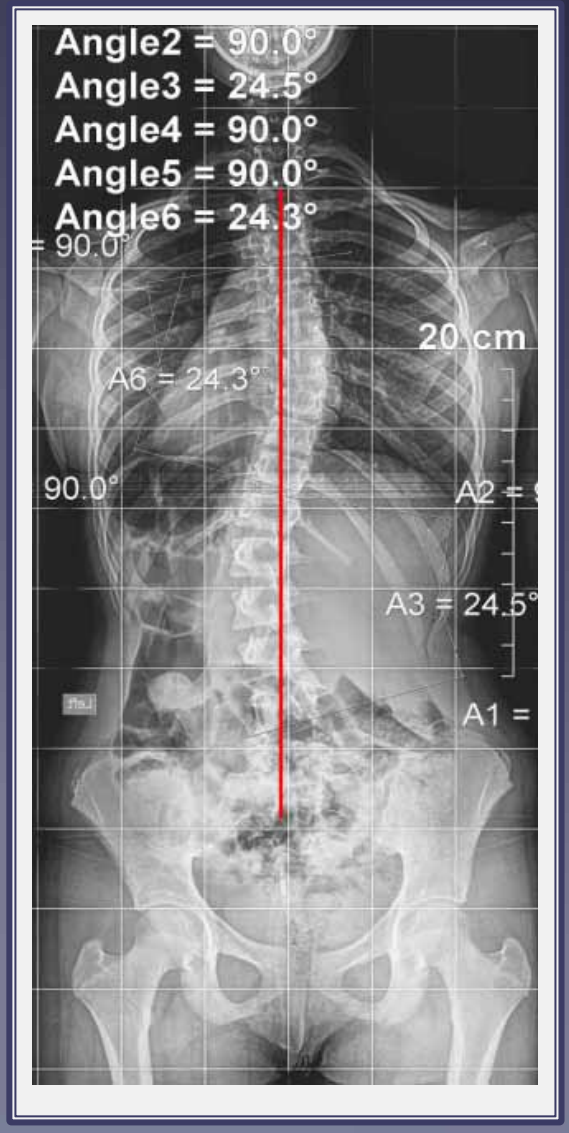
Bunnell scoliometer

SpineScan scoliometer

SPONDYLOS
LASER SPINE LAB

Measurements

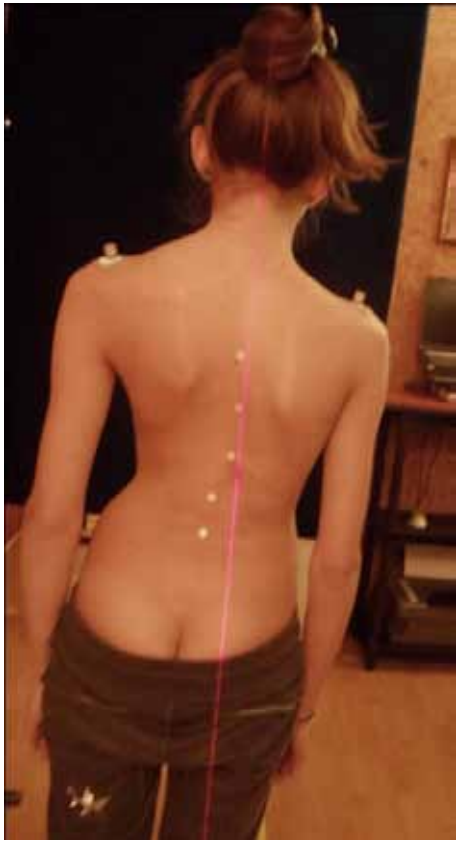
For the Cobb angle we have used Digital X-rays in which we have measured the Cobb angle with absolute accuracy



SPONDYLOS
LASER SPINE LAB

Measurements

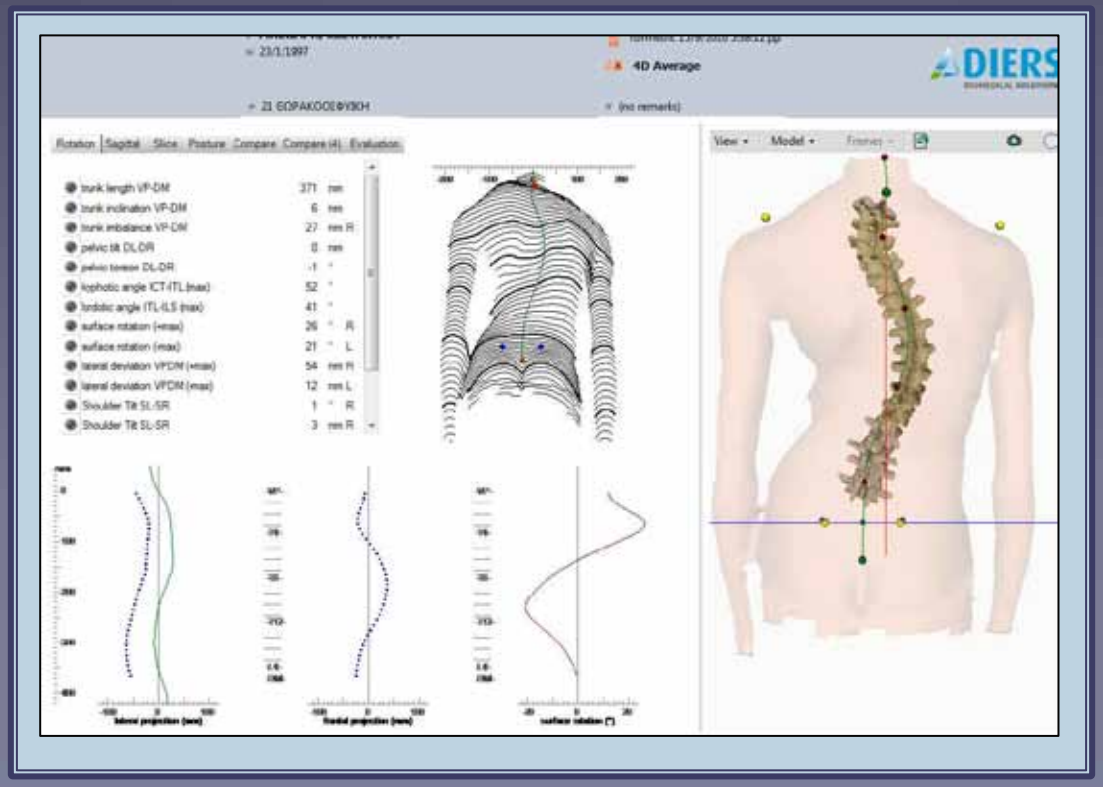
We have fit to every patient, 4-8 markers from the apex of T1 through L4 spinal process and 2 shoulder reflectors, to get the possibility for lateral Cobb angle measurement with the Formetric 4D.



SPONDYLOS
LASER SPINE LAB

Measurements

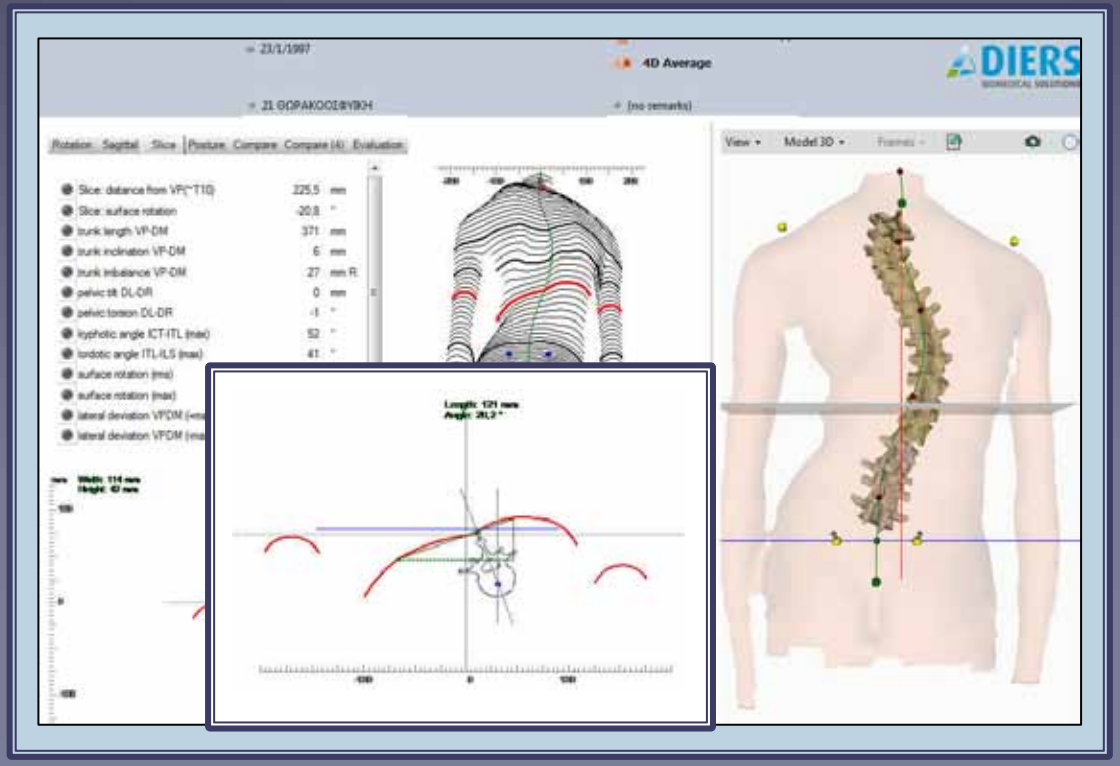
We have had various data through surface topography



SPONDYLOS
LASER SPINE LAB

Measurements

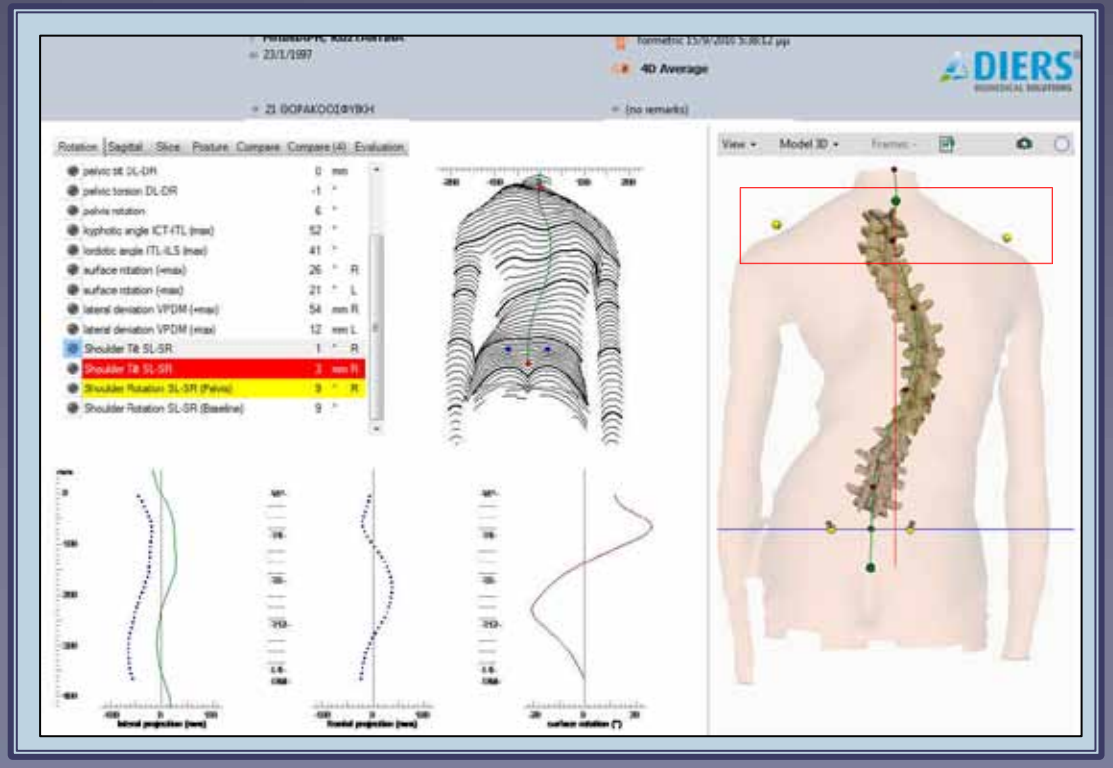
Surface rotation



SPONDYLOS
LASER SPINE LAB

Measurements

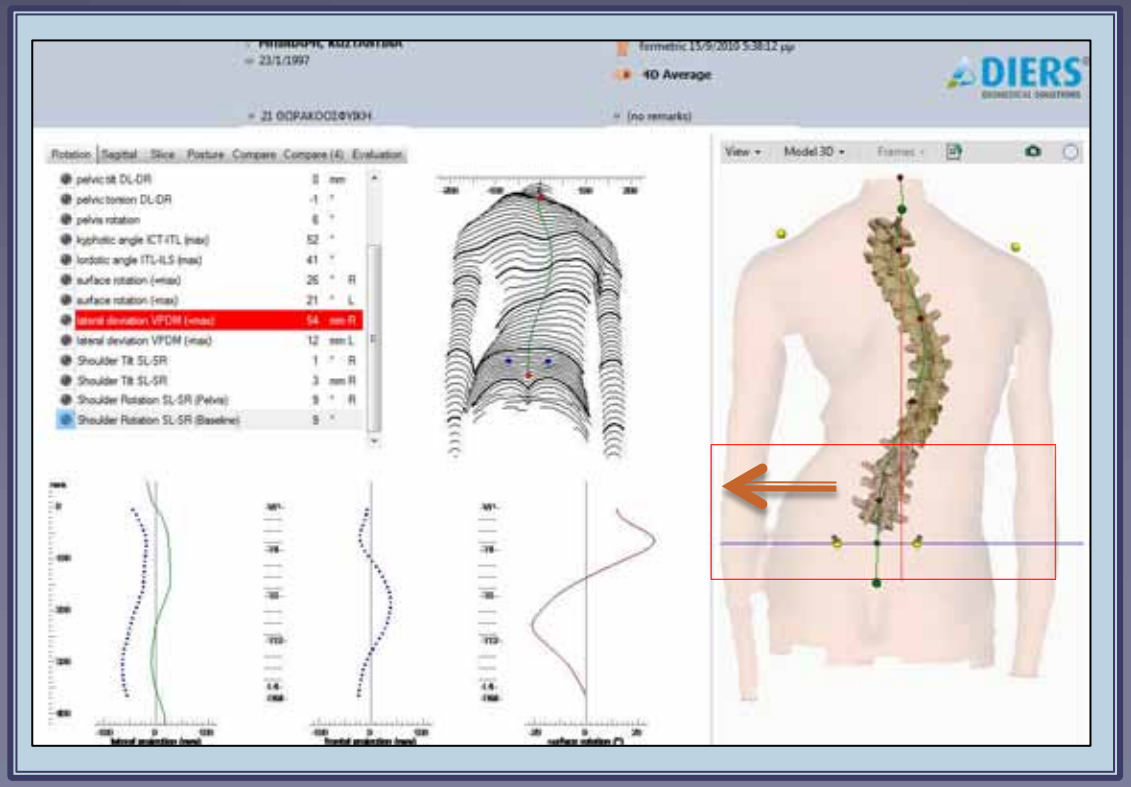
Shoulder Tilt and Rotation



SPONDYLOS
LASER SPINE LAB

Measurements

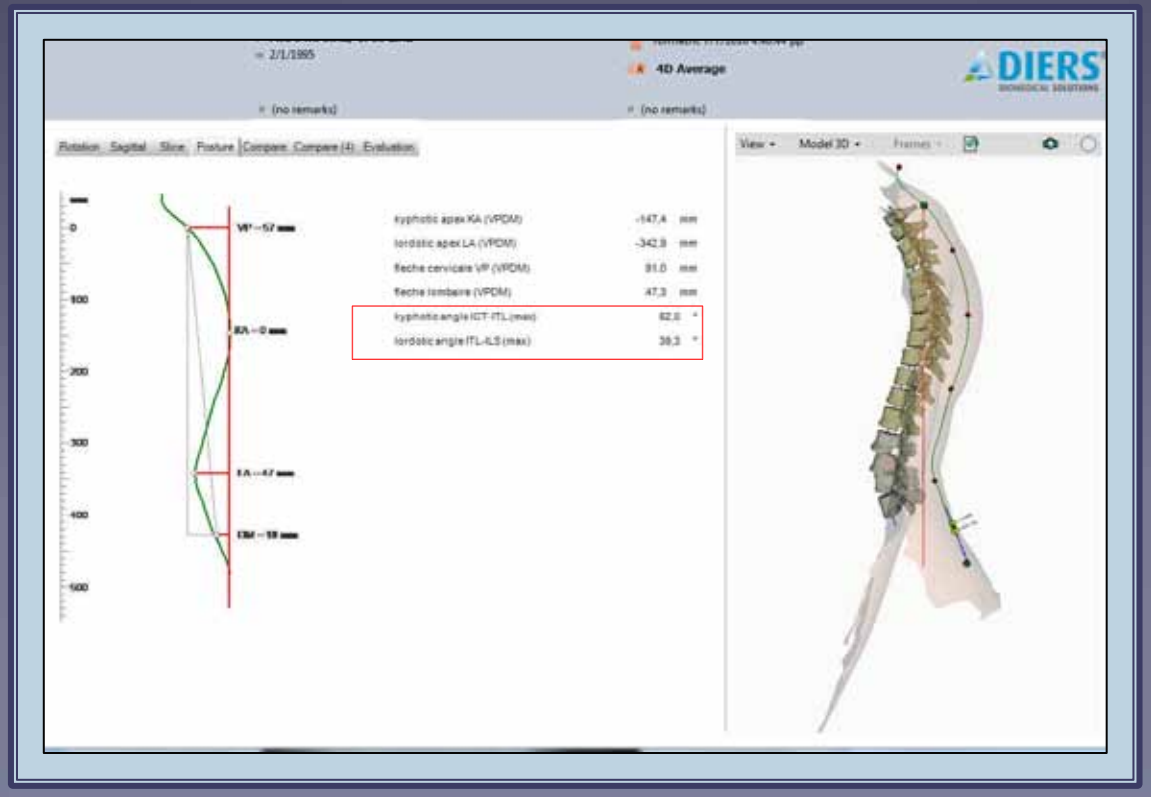
Pelvis rotation and lateral deviation



SPONDYLOS
LASER SPINE LAB

Measurements

Kyphotic and Lordotic angle



SPONDYLOS
LASER SPINE LAB

RESULTS

SPONDYLOS
LASER SPINE LAB

We have divided the Results in:

1- Scoliosis Cobb angle between 23° -45°

2- Scoliosis Cobb angle ⩾ 45°

3- Scoliosis Cobb angle ⩽ 23°

SPONDYLOS
LASER SPINE LAB

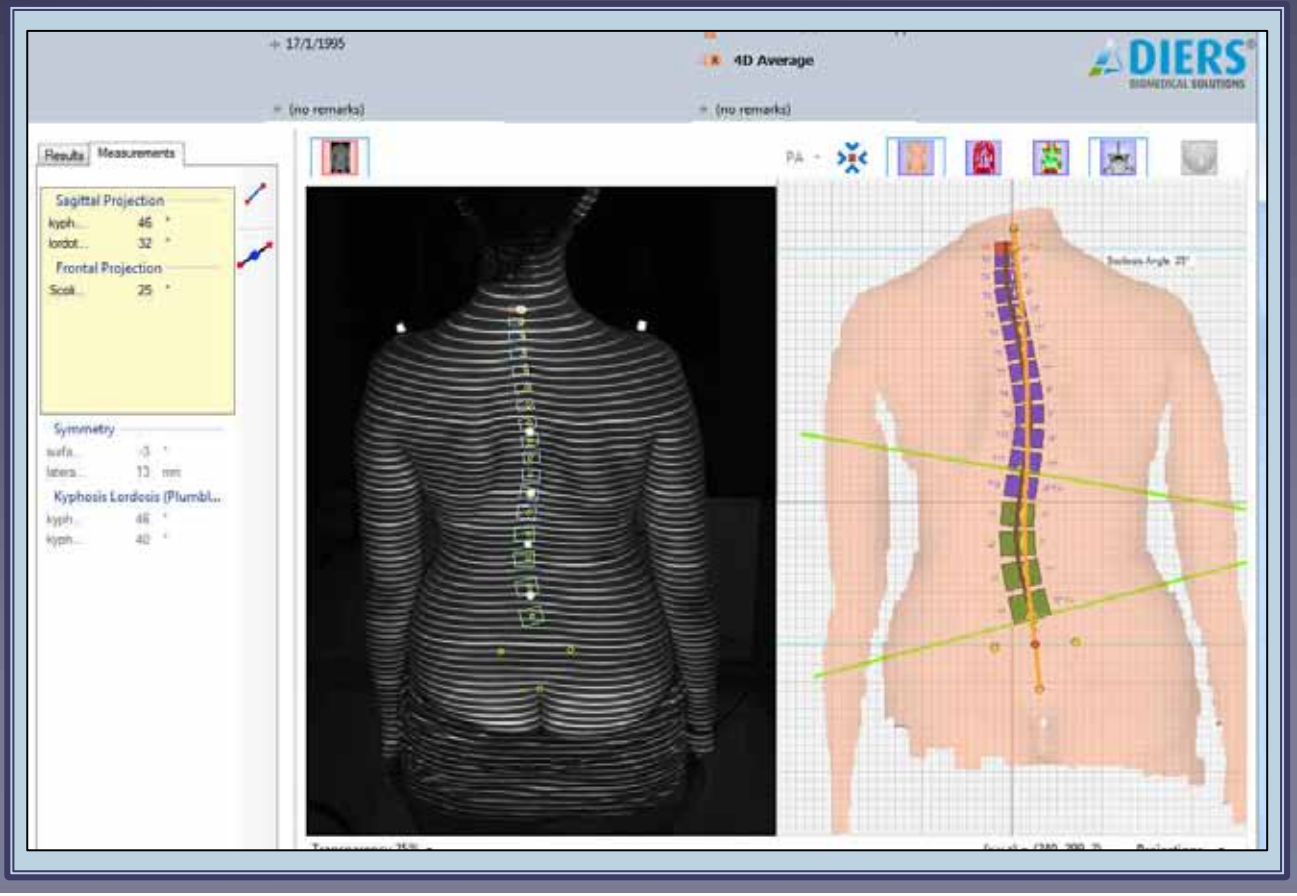
Scoliosis Cobb angle: 23 ° - 45 °

We had a > 95% accuracy in Scoliosis between 23° and 45° Cobb angle.

SPONDYLOS
LASER SPINE LAB

23° - 45° Cobb angle

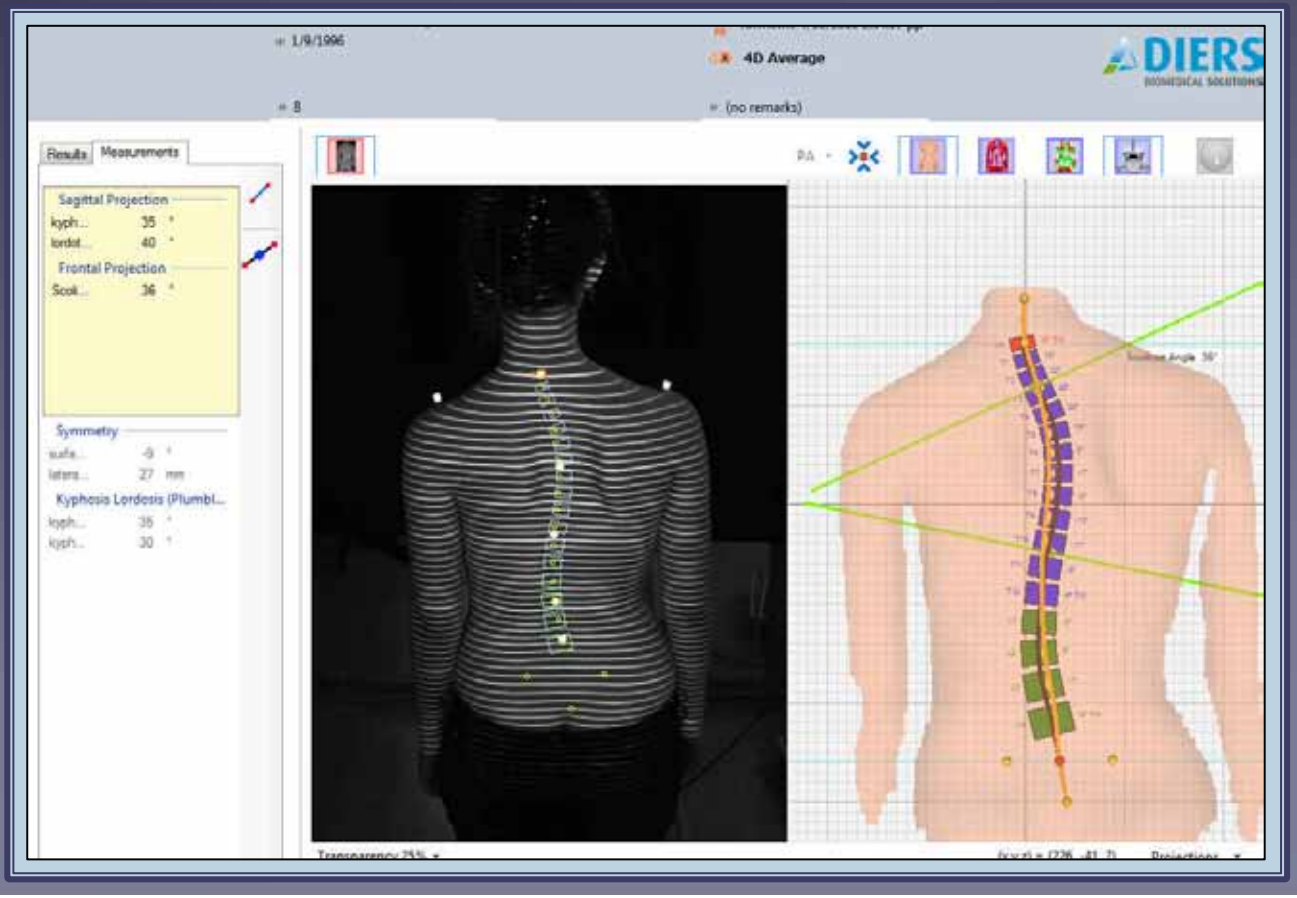
72 %



SPONDYLOS
LASER SPINE LAB

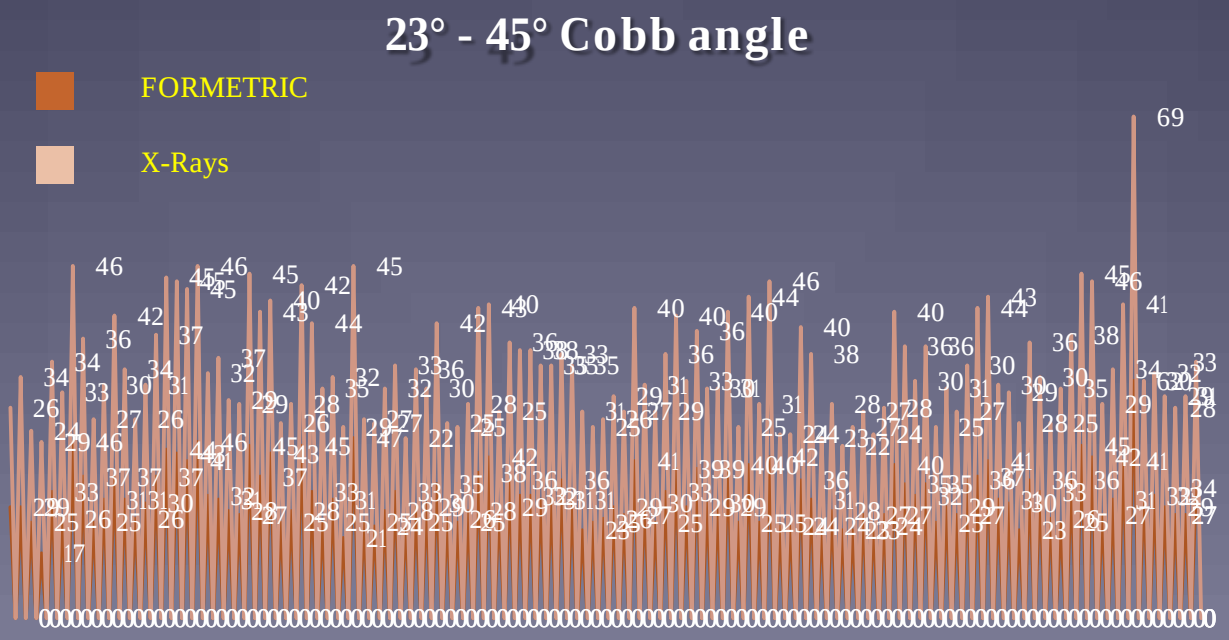
23° - 45° Cobb angle

100 %



SPONDYLOS
LASER SPINE LAB

23° - 45° Cobb angle



Average: 92 %

SPONDYLOS
LASER SPINE LAB

Scoliosis Cobb angle > 45 °

The accuracy was lower,

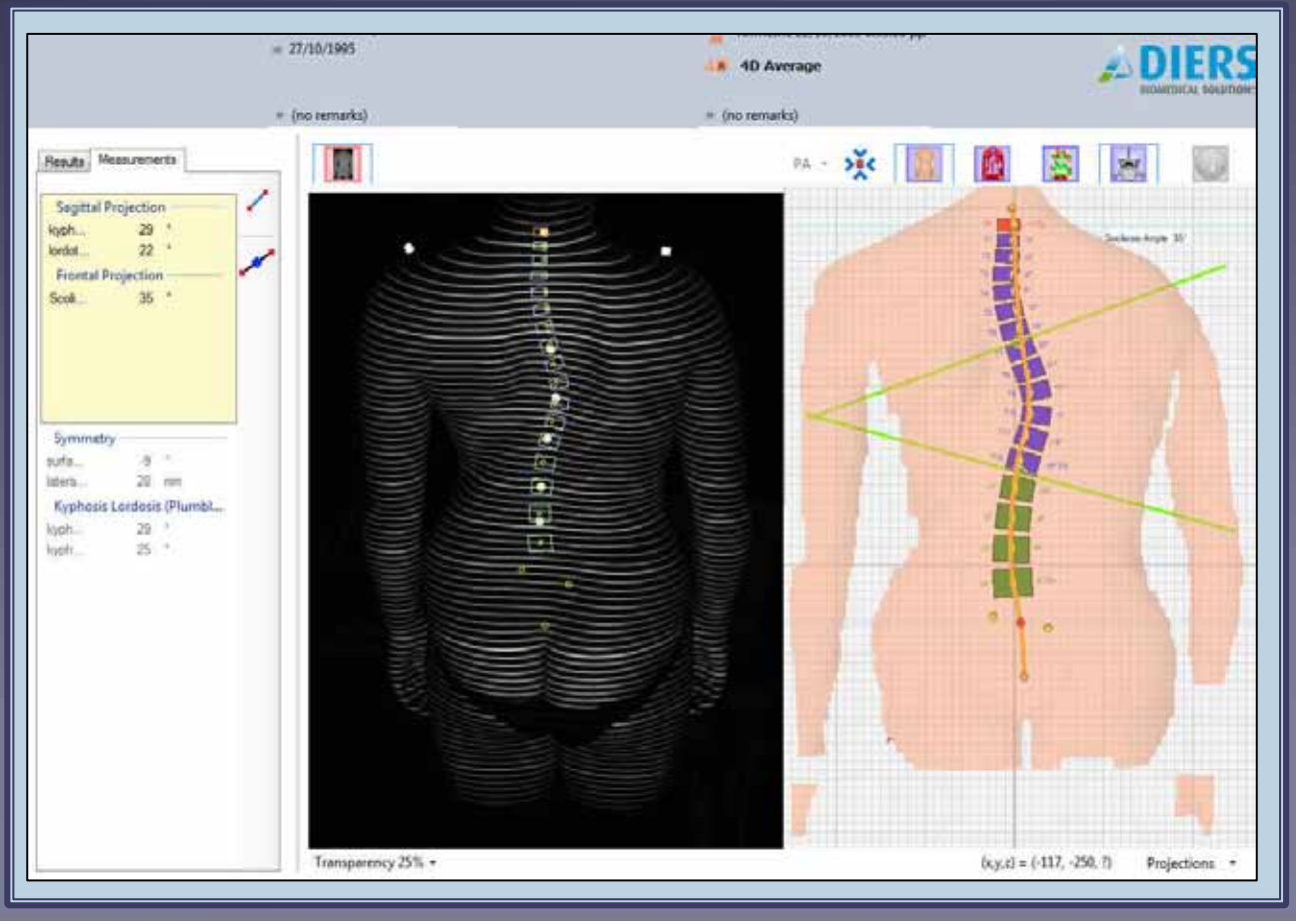
between 61% - 100%,

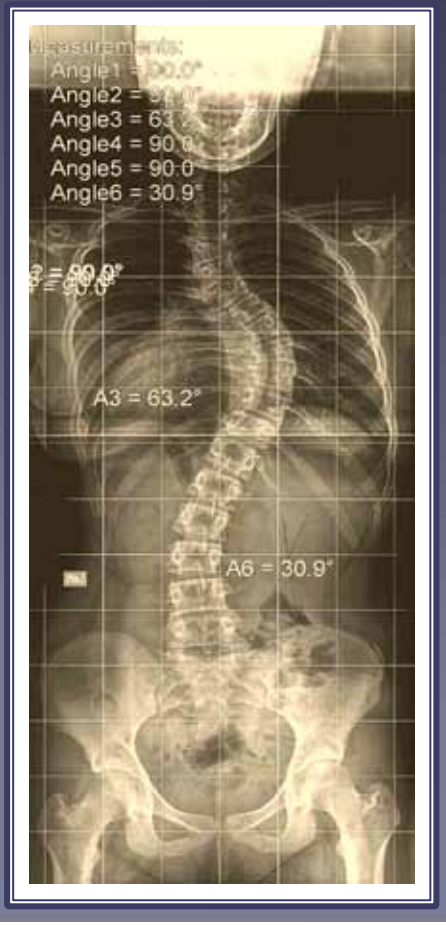
if the measured angle was > 45°

SPONDYLOS
LASER SPINE LAB

> 45° Cobb angle

61%

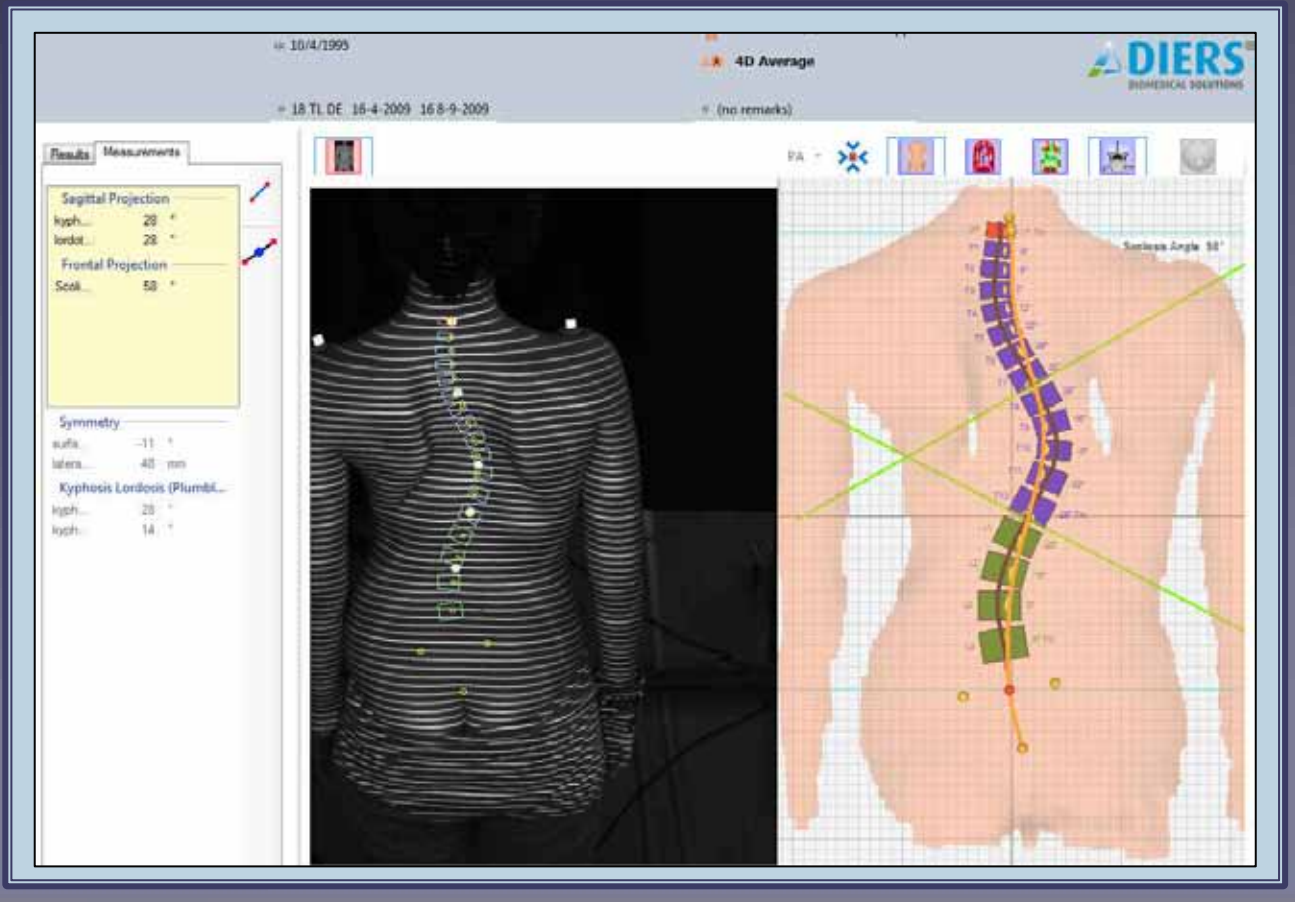




SPONDYLOS
LASER SPINE LAB

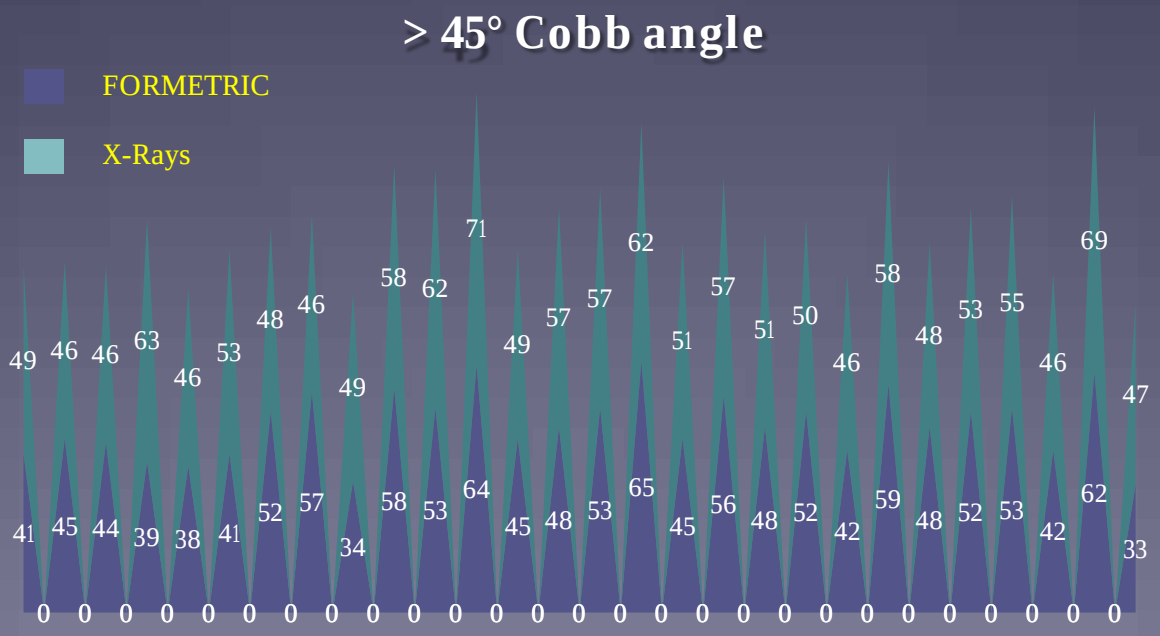
> 45° Cobb angle

100 %



SPONDYLOS
LASER SPINE LAB

> 45° Cobb angle



Average: 89 %

SPONDYLOS
LASER SPINE LAB

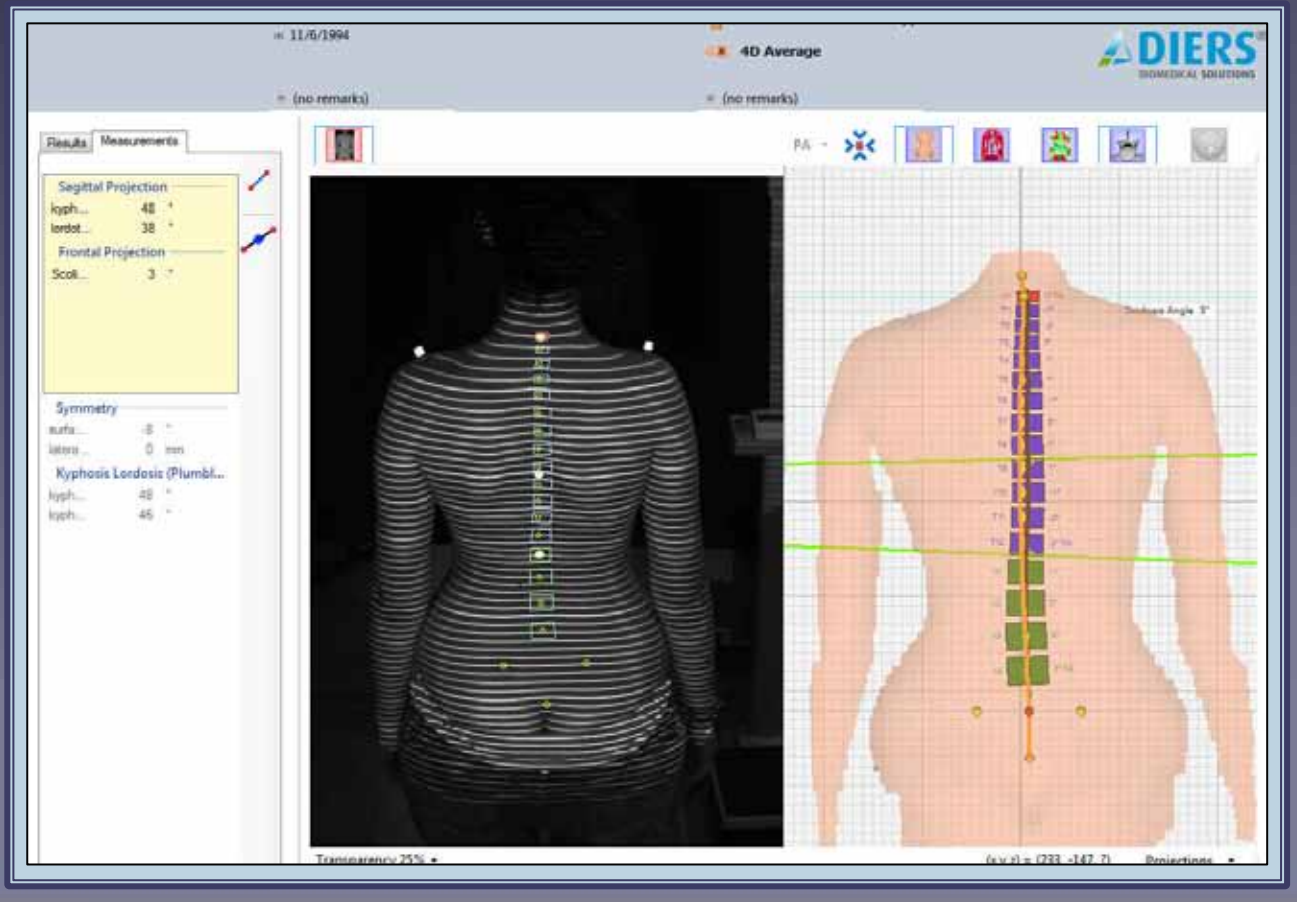
Scoliosis Cobb angle < 23°

The accuracy was even less in some cases, when the measured angle was < 23

SPONDYLOS
LASER SPINE LAB

< 23° Cobb angle

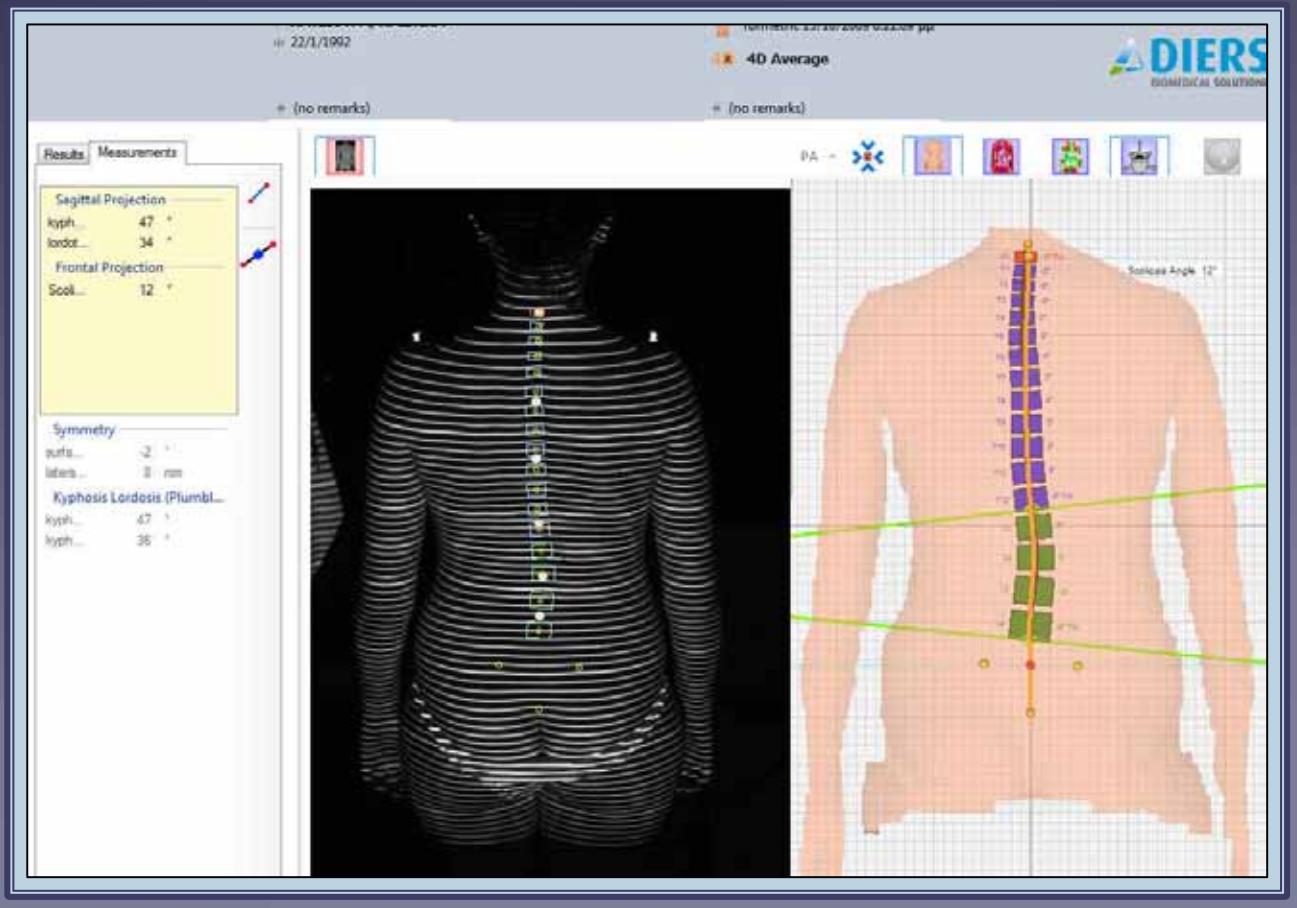
25 %

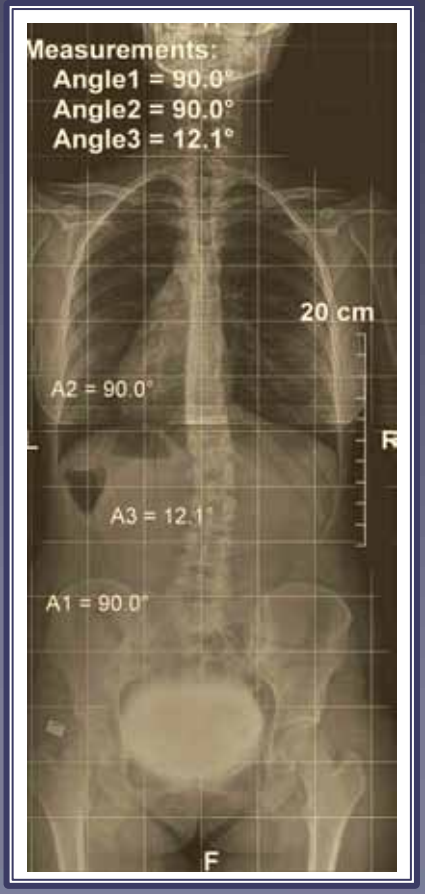


SPONDYLOS
LASER SPINE LAB

< 23° Cobb angle

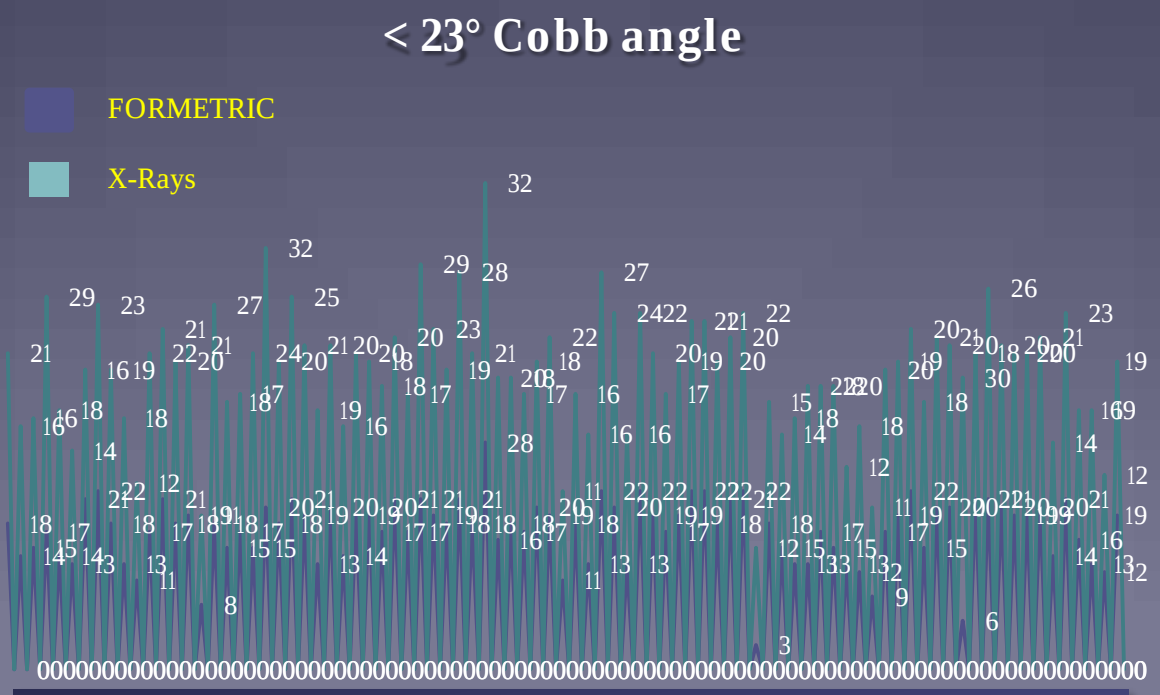
100 %





SPONDYLOS
LASER SPINE LAB

< 23° Cobb angle



Average: 86 %

SPONDYLOS
LASER SPINE LAB

Kyphosis Cobb angle

As it concerns the Kyphosis,

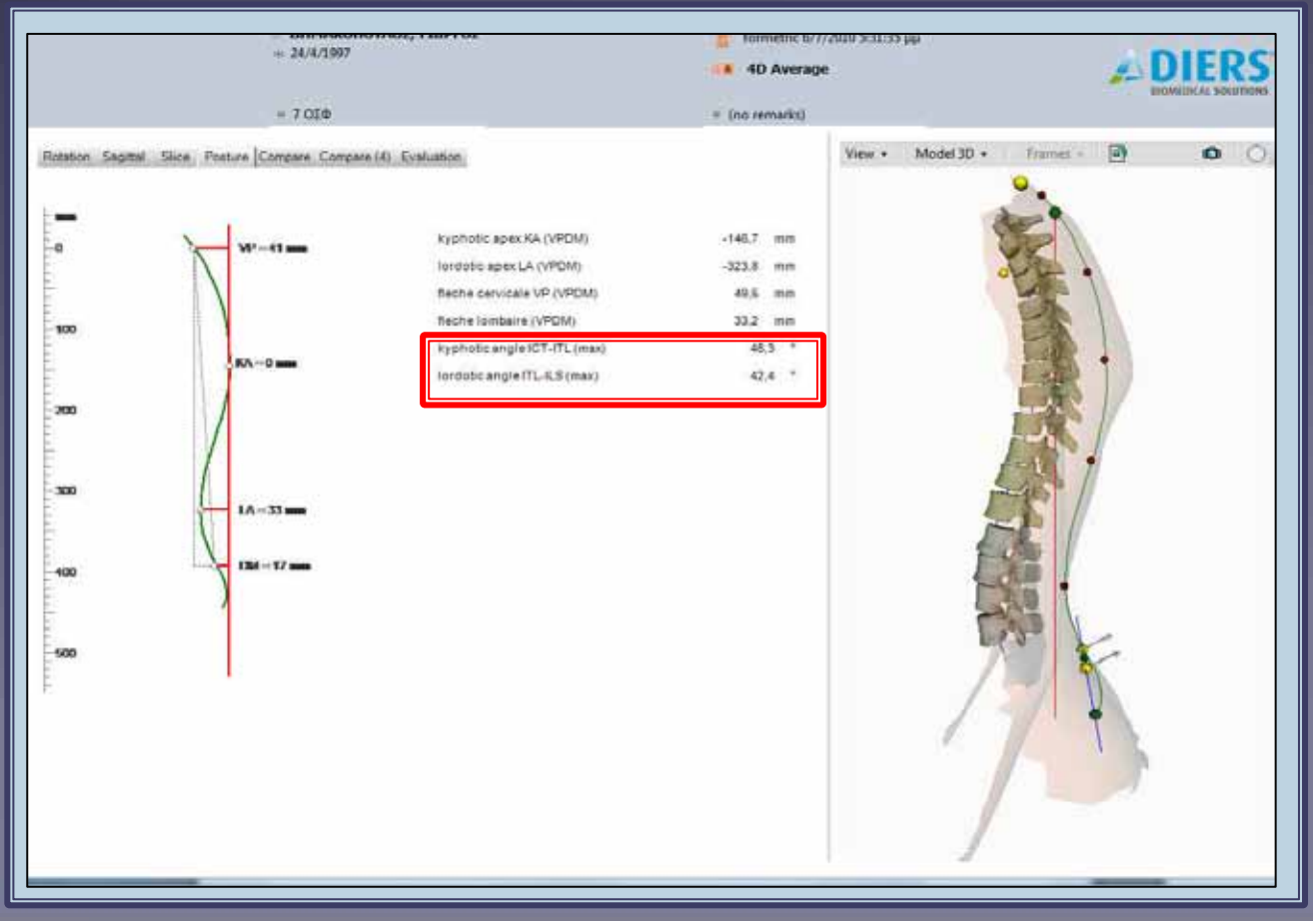
the cob angle was very accurate

as it was exceeded 90%

SPONDYLOS
LASER SPINE LAB

Kyphosis

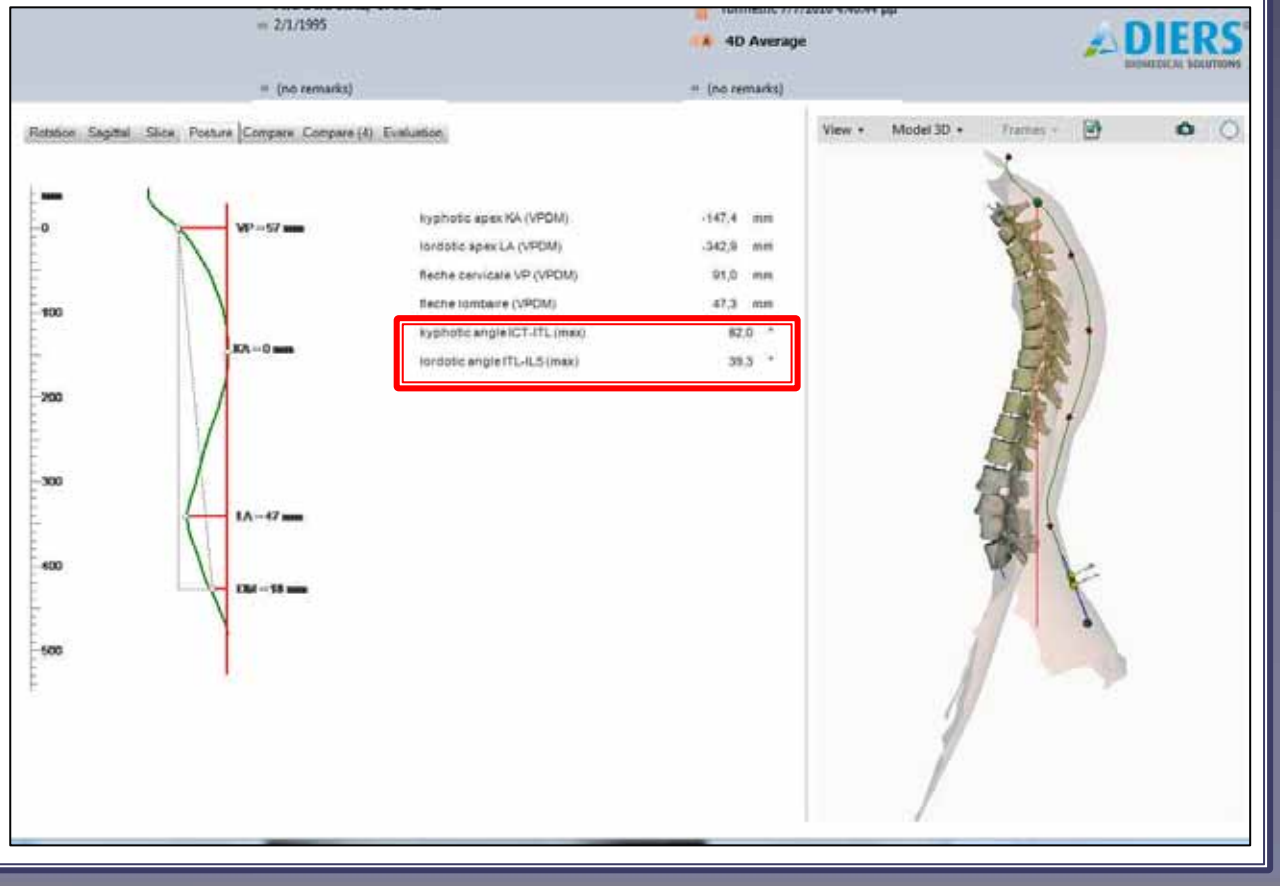
65 %



SPONDYLOS
LASER SPINE LAB

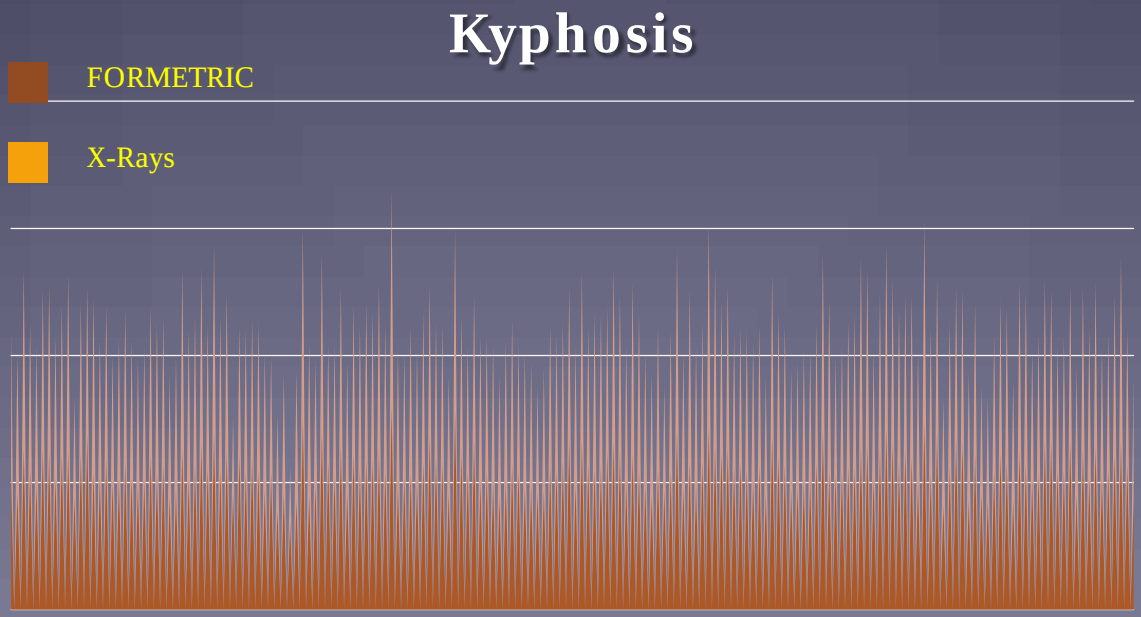
Kyphosis

100 %



SPONDYLOS
LASER SPINE LAB

Kyphosis



Average: 93 %

SPONDYLOS
LASER SPINE LAB

DISCUSSION

SPONDYLOS
LASER SPINE LAB

There was significant difference, between Formetric and X-rays in Scoliosis, when the patient was obese and was very difficult to find the spinous apophyssis for landmarks.

In Kyphosis the difficulty was when the patient could not relaxed enough and was straitening his back at the moment of the examination

We have got several data like rotation, shoulder tilt pelvic tilt and deviation etc, which are most important in the management of Scoliosis as a 3D deformity and especially when we are using the compare program for different visits.

SPONDYLOS
LASER SPINE LAB

It is very important
the experience of the examiner
as the position of the markers is crucial for the accurate Cobb angle measurement

SPONDYLOS
LASER SPINE LAB

CONCLUSION

SPONDYLOS
LASER SPINE LAB

We believe that the surface topography

is a precious tool for the diagnosis and follow up

of a complex three dimensional skeletal deformity,

such as Scoliosis.

SPONDYLOS
LASER SPINE LAB

The accuracy of the Cobb angle measurement

of Formetric surface topography

is excellent and

we believe that we must move to the next step,

which is the 3D dimension management

SPONDYLOS
LASER SPINE LAB

Thank you