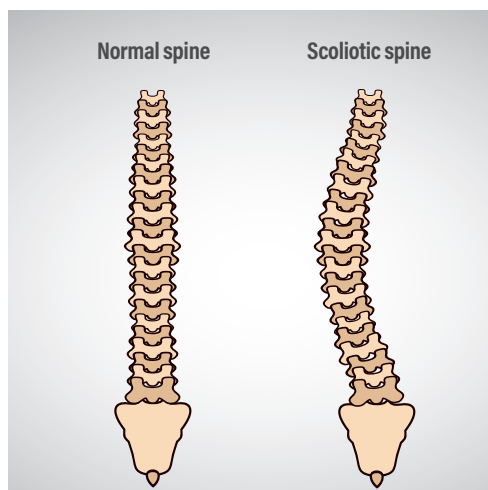


Did You Know? Scoliosis

Take-home message

- The risk of developing scoliosis is greater in women than in men.
- Idiopathic scoliosis affects 2.5% of the population.
- The evolutionary risk of scoliosis persists as long as pubertal growth is not complete.
- Scoliosis may be the result of a congenital malformation, or a consequence of a neuromuscular or bone disease.



▪ **Scoliosis is a three-dimensional abnormality** that occurs when the spine becomes rotated and curved sideways. The condition is characterized by a **local (vertebrae) and global (spine) deformity pattern**, simultaneously altering the vertebral shape and the spine balance and posture.

Scoliosis types:

- Congenital scoliosis.
- Idiopathic or secondary scoliosis in children or adolescents.
- Adult scoliosis that can continue to develop after bone maturity. In adults, scoliosis can be idiopathic, traumatic or degenerative (De Novo).

Idiopathic scoliosis is one of the **most severe types**, occurring predominantly in young girls (98% of cases). The incidence of idiopathic scoliosis in children is about 3%, and the incidence of idiopathic and degenerative scoliosis in adults is estimated to be between 30% and 60%.

Idiopathic scoliosis may have an unknown cause, however **there are several studies showing the genetic origin of this disease**. For example, the Riken Center study showed a **new gene** associated with adolescent idiopathic scoliosis. It is located on Chromosome 6 (GPR126). This gene delays the growth and formation of bone tissue.

MRI has no place in the systematic scoliosis screening but it allows to measure the quality and the morphology of the growth cartilages of the vertebral endplates.

Also, **MRI is of value prior to surgery**, for surgical planning purposes.



Complications

- Back or lumbar pain.
- Chest deformity which may lead to respiratory failure and cardiovascular complications.
- Aesthetic burden.

Possible treatment

- Drug and hormonal therapies must ensure the best bone strength.
- Rehabilitation to maintain the best flexibility.
- Conservative orthopedics including lombostats and braces in order to block the evolution of scoliosis.
- Surgery of scoliosis (the surgery is prescribed only in severe cases because it is cumbersome and very difficult).

In Olea Sphere®?

In **Olea Vision** the CPR (**curvilinear reconstruction**) functionality allows to reconstruct a new plane following a path defined by the technician. In the case of scoliosis, this will allow better analysis in a corrected image. Indeed, the exaggeration of the curvature can sometimes interfere with the classical interpretation of images because of the anatomical deformities caused by scoliosis, as well as by the lack of classical anatomical reference.

A 3DT2 acquisition is necessary to ensure a high-quality curvilinear reconstruction.

This reconstructed image is systematically compared with the native images in order to avoid the interpretation of artifacts related to the image reconstruction.



Cobb measurement with MRI : with total spine MR imaging the lordotic aspect of the thoracic deformation in scoliosis can be reliably measured.

Because of the absent radiation exposure the sagittal MR reconstructions could be used as an additional imaging in monitoring scoliosis

(ref1)

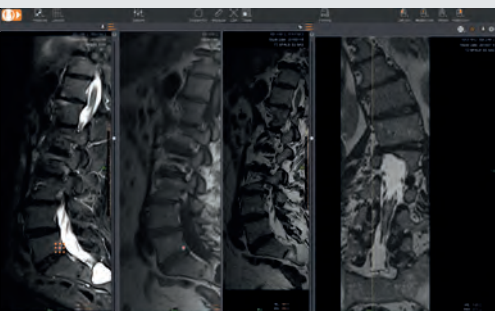


Figure 1: native images of 3DT2 acquisition. The spine cannot be seen in the entire sagittal plane due to the severe deformity in this patient.



Figure 2: curvilinear reconstruction showing the spine in the sagittal plane, showing on the same plane all the structures of the thoraco-lumbar spine (curvature "corrected" by the reconstruction).



Figure 3: visibility of the curvature in a «corrected» coronal plane thanks to a curvilinear reconstruction following the spine in the sagittal plane.

Sources: ref 1 [1] Sagittal Cobb-angle measurements in scoliosis with MRI whole spine imaging [Article in German] Schmitz AI, Jaeger U, Koenig R, Kandyba J, Gieske J, Schmitt O. http://www.allodocteurs.fr/maladies/os-et-articulations/scoliose/maladies-os-et-articulations-scoliose-scoliose-quand-la-colonne-s-affole_160.html#paragraphe1 https://www.researchgate.net/publication/270934153_Scoliose_idiopathique_de_l'enfant_et_de_l'adolescent <http://www.demauroynet/scoliose.htm> https://www.has-sante.fr/portail/jcms/c_1122240/fr/scoliose-evolutive <http://www.eurospine.org/scoliose-idiopathique.html#31001574> http://www.wicv-bordeaux.fr/pathologies/Deformations/adulte/scoliose_idio.pdf http://www.wicv-bordeaux.fr/pathologies/Deformations/adulte/scoliose_idio.pdf