



**HAL**  
open science

## Hydration properties of the lumbar intervertebral discs in AIS after surgical correction:five years follow-up and comparison with an age-matched control group

Kariman Abelin-Genevois, Eva Polirststok, Erik Estivalèzes, Jérôme Briot, Annick Sevely, Jérôme Sales de Gauzy, Pascal Swider

### ► To cite this version:

Kariman Abelin-Genevois, Eva Polirststok, Erik Estivalèzes, Jérôme Briot, Annick Sevely, et al.. Hydration properties of the lumbar intervertebral discs in AIS after surgical correction:five years follow-up and comparison with an age-matched control group. EPOS 34th Annual Meeting, Apr 2015, Marseille, France. pp.32-33, 10.1007/s11832-015-0637-0 . hal-03662160

**HAL Id: hal-03662160**

**<https://hal.science/hal-03662160>**

Submitted on 9 May 2022

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



## Open Archive TOULOUSE Archive Ouverte (OATAO)

OATAO is an open access repository that collects the work of Toulouse researchers and makes it freely available over the web where possible.

This is an author-deposited version published in : <http://oatao.univ-toulouse.fr/>  
Eprints ID : 15778

**To link to this article :**

URL: <http://link.springer.com/article/10.1007/s11832-015-0637-0>

**To cite this version** : Abelin-Genevois, Kariman and Polirstok, Eva and Estivalèzes, Erik and Briot, Jérôme and Sevely, Annick and Sales de Gauzy, Jérôme and Swider, Pascal *Hydration properties of the lumbar intervertebral discs in AIS after surgical correction:five years follow-up and comparison with an age-matched control group.* (2015) In: EPOS 34th Annual Meeting, 15 April 2015 - 18 April 2015 (Marseille, France).

Any correspondence concerning this service should be sent to the repository administrator: [staff-oatao@listes-diff.inp-toulouse.fr](mailto:staff-oatao@listes-diff.inp-toulouse.fr)

# Hydration properties of the lumbar intervertebral discs in AIS after surgical correction: five years follow-up and comparison with an age-matched control group

Kariman ABELIN-GENEVOIS<sup>1</sup>, Eva Polirsztok<sup>2</sup>, Erik Estivalezes<sup>3</sup>, Jerome BRIOT<sup>3</sup>, Annick Sevely<sup>4</sup>, Jérôme Sales de gauzy<sup>5</sup>, Pascal SWIDER<sup>3</sup>

<sup>1</sup>Spine surgery, CMCR des MASSUES, <sup>2</sup>Pediatric Orthopaedic Surgery, CHU de Nancy (Hôpital de Brabois),

<sup>3</sup>Laboratory of Biomechanics, University of Toulouse (UPS), <sup>4</sup>Neuroradiology, University Hospital of Toulouse,

<sup>5</sup>Hopital des Enfants

## Summary

We compared disc hydration properties of adolescent idiopathic scoliosis before and 5 years after spinal fusion with an age-matched control group. We conducted a prospective MRI follow-up of 23 patients. Disc and nucleus volumes were reconstructed on T2 weighted sequence. In the scoliotic group, vd and vn were lower than control group, hydration ratio (Vn/Vd) was lower. After surgery, subjacent discs rehydrated. AIS induces a loss of IVD hydration. Surgical correction can reverse homeostasis disturbances related to spinal deformity.

## Hypothesis

Scoliosis may alter intervertebral disc hydration and induce early degenerative changes.

## Design

to compare the disc hydration properties of adolescent idiopathic scoliosis (AIS) before and 5 years after spinal fusion with an age matched control group.

## Introduction

Intervertebral discs (IVD) assume the mechanical support and flexibility of the spine. The supportive function is under the influence of disc hydration. Scoliosis induces a chronic asymmetric loading of the IVD that may alter the disc nutrition and may induce early degenerative changes.

## Methods

We conducted a prospective MRI follow up of 23 AIS patients (average follow up period 5,5 years). Patients underwent pre and post-operative T2 weighted MRI sequence. Specific software was developed with Matlab® to reconstruct disc and nucleus volumes (vd, vn). Hydration content was determined by the ratio vn/vd expressed in percentage. A comparative control group of 20 patients was matched by age. Controls were selected in the PACS database and medical charts were reviewed to exclude any deformity or disease affecting the spine. Disc hydration content was measured using the same protocol.

## Results

In the control group, volumetric parameters increased during growth spurt and were correlated to age (vd:  $R^2=0.49$ ,  $p<0.001$ ) ; vn:  $R^2=0.33$ ,  $p=0.02$ ). Disc hydration content remained constant (mean 28%). In the scoliotic group before surgery, vd and vn were lower than normal values, hydration ratio was lower (mean 24%). At latest follow-up, Vd remained constant while vn increased significantly. Disc hydration content was boosted at a mean value of 32% ( $p=0;001$ , Mann Whitney Wilcoxon test).

## Conclusion

AIS induces a loss of IVD hydration. The correction-fusion induces expansion of the nucleus, but at constant disc volume. Our results suggest that scoliosis surgery performed at the end of growth can reverse the discs constraints related to spinal deformity. However subjacent discs become "hyper hydrated" after surgery. This may be a consequence of homeostasis restoration but also excessive stress induced by spinal fusion on the lumbar spine.