

Hanger Spine Rx[®] Suite

Nocturnal Bending Brace





NBB

BACKGROUND AND PRINCIPLES

Nocturnal Bending Brace (NBB)

- Benchmark for nighttime, scoliosis management for more 30+ years.
- Manufactured by Hanger Inc. for 30+ years
- 25+ research papers published on this design.



NBB Goals

1

Maintain the patient's scoliotic curvature at, or near, pre-brace values throughout the growth period and on to skeletal maturity.

2

Promote better brace wear compliance through the nocturnal wear.

3

Promote positive self-image & reduce burden of treatment

NBB Principles

•Growth Modulation (unbending)

- The rate of the epiphyseal growth plate is affected by pressure applied to its axes.
- An area of increased pressure inhibits growth and an area of decreased pressure accelerates growth.

•In Brace Correction (overcorrection)

- The amount of in brace correction is a predictor of long-term outcome of treatment.
- CCB principles overcorrect a spinal curve in accordance with the spine flexibility and
- Maintain the patient's scoliotic curvatures at, or near, pre-brace values throughout the growth period and on to skeletal maturity.

•Patient Compliance (comfort)

- Patient comfort and compliance is promoted through nocturnal wear.
- Compliance is measured by a compliance monitor embedded into the device.



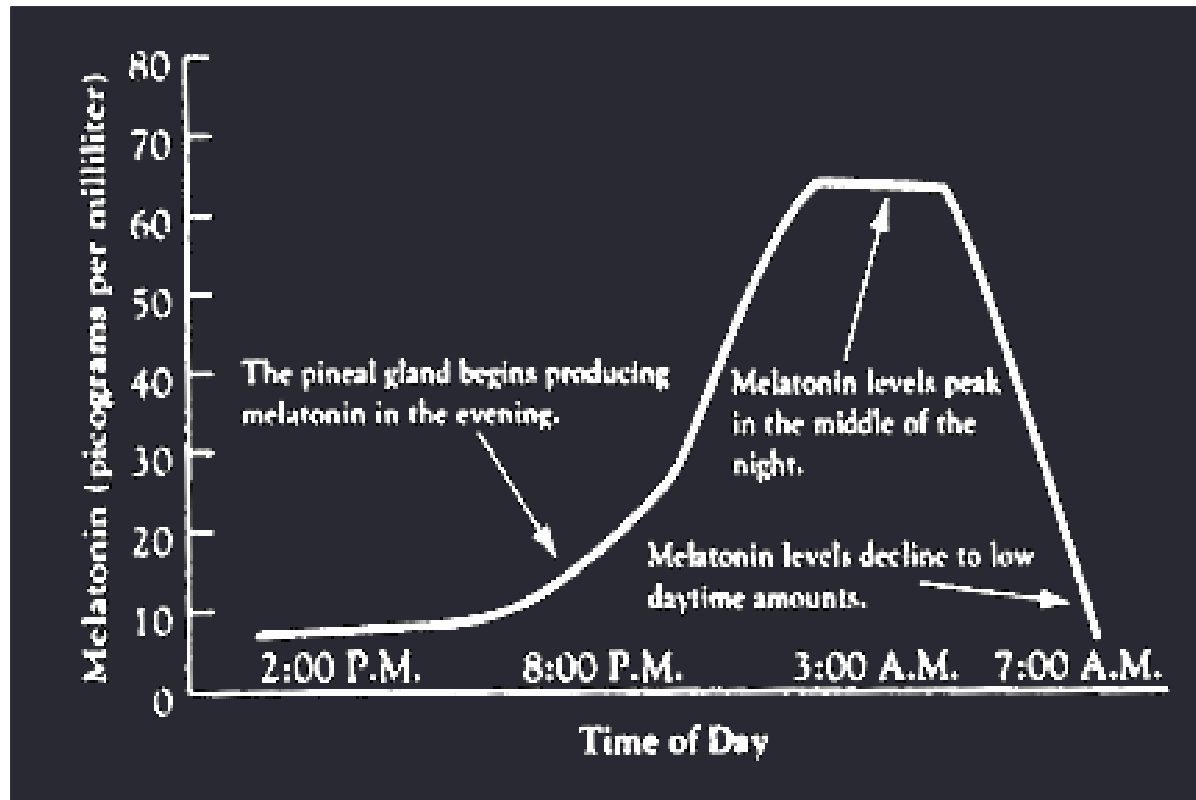
NBB

Theory: GROWTH MODULATION

Gravity vs. Growth

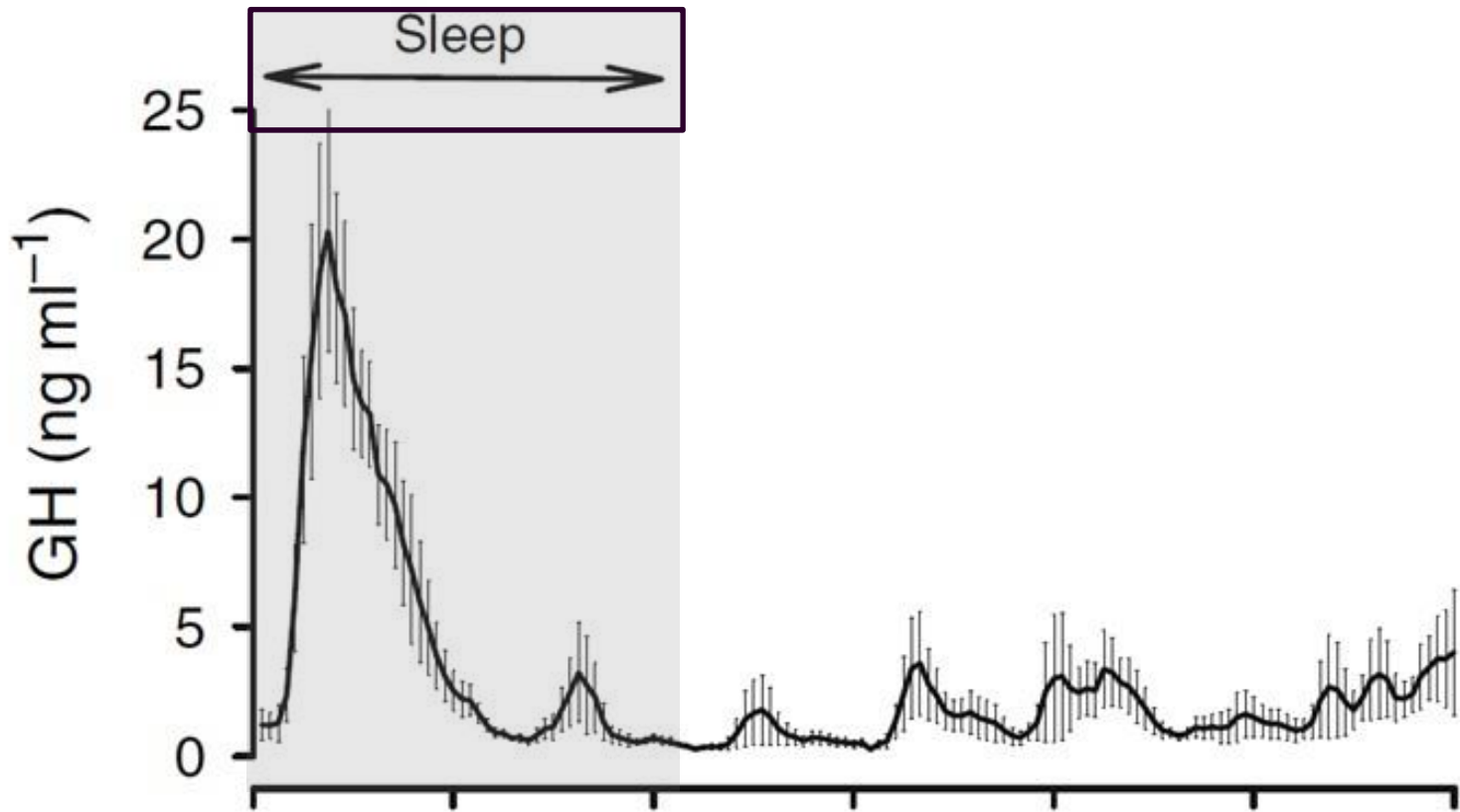
- **IF** scoliosis is a disorder of **GRAVITY** then **daytime** support is necessary.
- **IF** scoliosis is a disorder of **GROWTH** then **nighttime** bracing may be all that's required.

Melatonin



- Levels are high at **night** - minimal levels during the day
- Levels are low in patients with progressive AIS

Growth Hormone is only present and active at night



Brandenberger G, "The 24-h growth hormone rhythm", J Sleep Res. 2004 Sep;13(3):251-5.

Tibial growth in lambs

“...at least 90% of **bone elongation occurs during recumbency** and almost no growth occurs during standing or locomotion. The authors hypothesize that growth may also occur in children during rest or sleep.”

Noonan KJ, et al. JPO 2004; 24(6):726-31



EVIDENCE-Spinal growth modulation by compression

1. Villemure I. Aubin CE. Dansereau J. Labelle H. *European Spine Journal*. 13:83, 2004
2. Newton PO, et.al. *Spine*. 30:2608, 2005
3. Stokes IA, Aronsson DD, et.al. *Journal of Orthopaedic Research*. 24:1327, 2006

In Brace Correction Correlates to biomechanical effectiveness of Brace treatment in AIS

“In the framework of the **Hueter-Volkman principle**...in brace correction predicts long-term outcome of the treatment and provides insights in the understanding of brace biomechanics.”

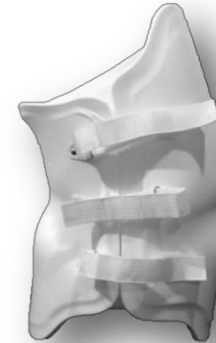
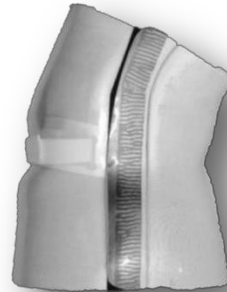
Clin J, Aubin CÉ, Sangole A, Labelle H, Parent S Spine 2010 ;35(18):1706-13.

Growth Modulation



- Bending increases pressure on convex vertebral growth centers to reduce growth
- Can be used for high thoracic curves
- Double curves are difficult to brace but can be treated by bending brace

NBB OPTIONS:



NBB-Standard

- Nighttime scoliosis management
- Benchmark for 35+ years
- Long single curves.

NBB-II

- Nighttime dynamic treatment for Thoracolumbar Type II curves
- Dynamic alignment strap

NBB-Lite

- Nighttime wear for early intervention
- Cobb angles > 25°
- Neuromuscular patients
- Weaning / transition
- Multi-durometer foam

Now available: Calculate wearing compliance % with iO™ Compliance Monitor.

Powered for Evidence.

Intelligent Orthotics  Intelligent Outcomes

A stylized graphic of a human spine, rendered in orange and red. The spine is composed of several rounded, stacked vertebrae. A large, curved brace is positioned around the spine, with its ends pointing towards the top and bottom. The brace is also rendered in orange and red, matching the spine. The entire graphic is centered on the page.

NBB

Nocturnal BENDING BRACE

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