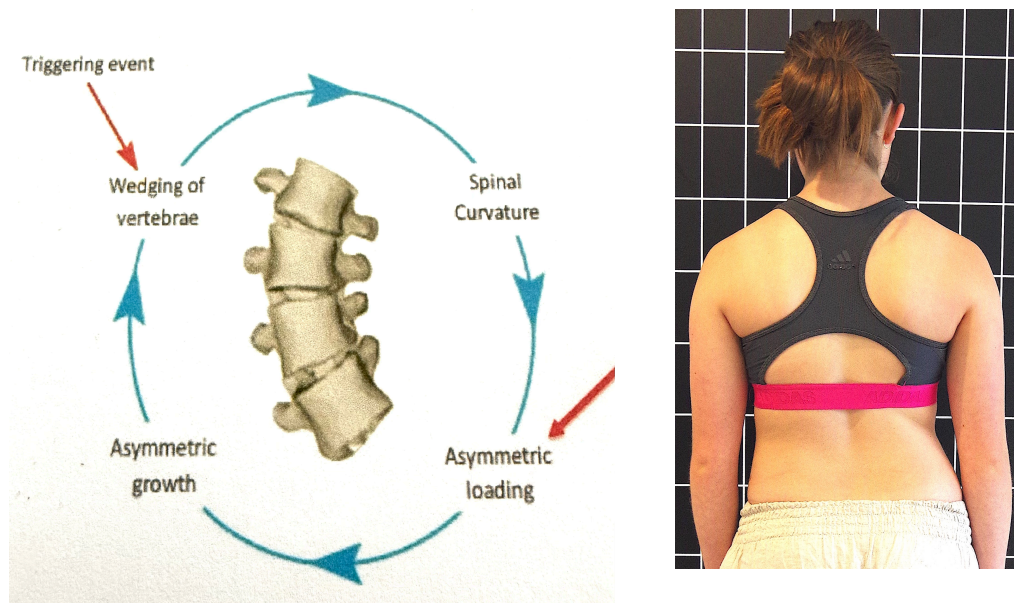


Vicious Cycle



The "vicious cycle" in scoliosis is a bio-mechanical feedback loop where a curved spine leads to uneven pressure on the vertebrae. This asymmetry causes bones to grow unevenly and wedge-shaped, which further deepens the spinal curve. Once this cycle is underway, gravity drives continued progression, especially during adolescent growth spurts.

The cycle is typically described in four continuously reinforcing stages:

1. **Lateral Curvature & Gravity:** Even a minor curvature throws the spine off its vertical axis. Gravity pulls downward, creating uneven weight distribution.
2. **Asymmetrical Loading:** The inside (concave) of the curve experiences abnormally high, constant compression, while the outside (convex) experiences less pressure.
3. **Asymmetrical Growth ([Hueter-Volkman Principle](#)):** According to this biological principle, bone growth is stunted by excess mechanical compression and accelerated by reduced pressure. As a result, the vertebrae grow wedged, becoming shorter on the concave side.
4. **Increased Curvature:** The wedge-shaped vertebrae cause the spine to bend even further, which restarts the loop and makes the curve stiffer and more structural.

Why the Cycle Accelerates

- **Muscle Imbalance:** The muscles on the lengthened (convex) side stretch and weaken, while the muscles on the compressed (concave) side tighten, actively pulling the spine further out of alignment.
- **The Adolescent Growth Spurt:** Mechanical forces dominate during periods of rapid skeletal maturation. If the central nervous system fails to control these asymmetries, the progression can accelerate rapidly.

Breaking the Cycle

Mainstream treatments for adolescent idiopathic scoliosis, such as [Schroth Method](#) exercises and 3-Dimensional Bracing, aim to interrupt this cycle. They apply symmetrical mechanical forces and rotational correction to offload the compressed side of the spine, allowing for normalised, symmetrical growth.