SLEEP WITHOUT BACK PAIN

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Choose the right bed
and maximize your
comfort and sleep

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INTRODUCTION

Back pain: not a disease but a symptom

Back complaints and sleep disorders are evolving worldwide into one of the major social problems: 60 to 80 percent of the Western population will be faced, in the course of their life, with a moment of non-specific lower back pain, with a peak between the ages of 35 and 55. In 85 percent of the cases, no clear cause for the presence of the pain can be found. In America, the cost of treating patients with chronic back pain exceeds $90 billion a year!

Approximately 50 to 70 percent of patients with chronic lower back pain have sleep disorders. If you suffer from a sleep disorder but do not have back pain, it is even assumed that those sleeping problems may be a risk factor for the subsequent development of back pain. For the time being, it is still unclear to what extent sleep disorders are the cause of lower back pain or vice versa, or to what extent they are both the result of other causes.

But it cannot be denied that a problem exists. In the United Kingdom alone, 120 million working days are lost every year as a consequence of back pain. In Japan, back pain, shoulder aching and arthrosis are amongst the most frequently reported complaints among the population.

Meanwhile, the back is now our second most common location for pain. Back pain is not a disease but a symptom.

Based on my scientific background as a physical therapist, researcher and experienced expert in guiding thousands of patients in the quest to maximize their sleep comfort, I felt the need to convey my knowledge about the right bed for your back.

I want to explain to everyone why a good bed is so important for your back and for your night's sleep. It is disconcerting to see how little most people know about their sleep system – the combination of mattress, bed base and pillow – especially when you consider that we spend a third of our lives in our bed, and that it has such a big influence on our quality of life.

Therefore, in *Sleep without back pain*, I want to dispel the many misunderstandings and prejudices about beds. This is also in line with one of the main guidelines of the European working group on the prevention of back problems, COST Action B13, namely that back patients should be properly informed about fundamental care for the back, which we will call back hygiene.

Good back and sleep hygiene with adequate treatment of pain is one of the pillars for the treatment of back and neck patients. This implies that therapists must apply maximum effort to every kind of prevention. You cannot resolve poor sleep with medication (although medication may temporarily be part of the treatment). Discuss this with your general practitioner.

An important part of treating back patients with sleep disorders is related to education about sleep (what you need to know about sleep), sleep hygiene (what you should not do or conversely what you should do), back hygiene and relaxation-related therapies. The focus of the treatment must therefore simultaneously be on back pain as well as on sleep disorders.

Sleep without back pain aspires to be a guide that accompanies you in your quest for the best bed for your back. But even if you are not immediately planning to buy a new bed system, you can probably considerably increase your sleep comfort by means of the many tips that I give in this book.

After reading this book you will have a better understanding of the interplay between your body and your bed.

Happy reading and sleep well!

CHAPTER 1

How our back is put together

Chances are that at some time or another you have been troubled by back pain. Over 80 percent of all people will experience this at some point in their life. So you have only one chance in five that you will escape back pain.

Usually, it involves lower back complaints caused by incorrect positions and movements – in other words, by incorrect strain on the spinal column. Because those are mechanical factors, doctors often speak of mechanical lower back pain. This you may already experience at a young age, especially if your occupation involves a lot of sitting or standing.

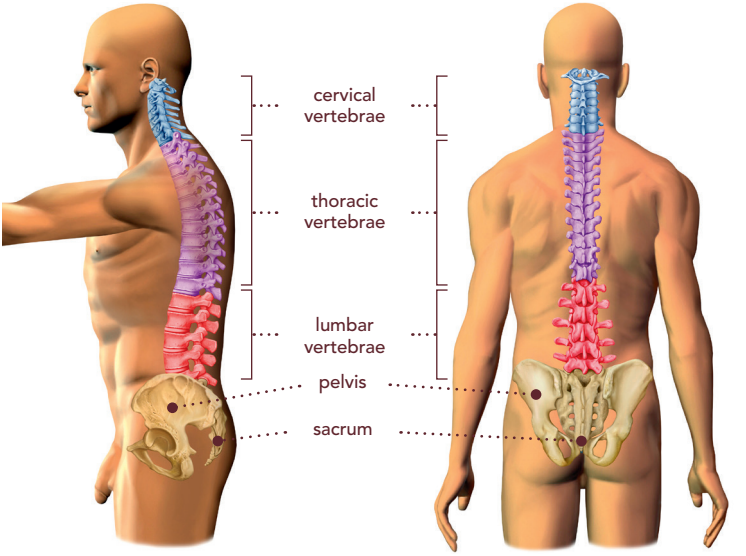
To gain an understanding of how lower back pain arises, we first need to take a closer look at the structure of the back and the spinal column.

THE SPINAL COLUMN

The spinal column is the central support axis of our skeleton. It supports the body and protects our organs.

Much is demanded of the spinal column: it needs to be sturdy, or we would not be able to stand upright without problems. At the same time, it must also remain flexible, otherwise we would not be able to

move our trunk. How the spinal column manages to meet those two opposing requirements will be revealed below.



Figures 1 and 2 The spinal column in lateral and posterior view.

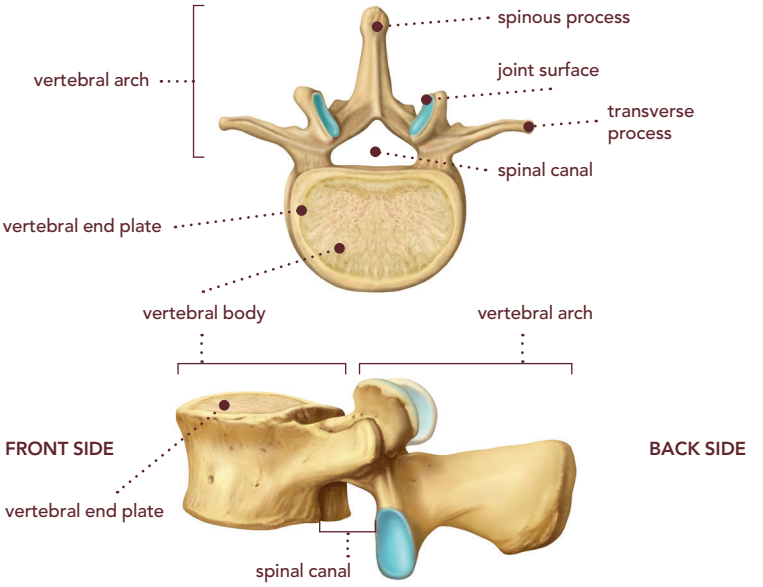
We have 24 distinct vertebrae, which are divided into three groups. The seven **cervical vertebrae** are relatively small. They support the head, which weighs about seven kilograms. Below are the twelve **thoracic vertebrae**, to which the twelve ribs are attached. The rib cage protects organs such as the heart, the lungs and the liver. Further down are the five **lumbar vertebrae**. They are large and sturdy because they must bear a substantial part of the body weight – 80 percent when we are standing upright. The lowest lumbar vertebra is connected to the sacrum. The sacrum consists of five fused vertebrae and, together with the hip bones, forms the pelvis. The pelvis is the base of the spinal column and the upper body. It also connects the spinal column to the legs, and protects the abdominal organs, the bladder and the sexual organs.

From side view, the spinal column has a natural S-shape. This enables the spine to carry the weight of the upper body and helps to absorb shocks. A normal spinal column has four curves (Figure 1): the cervical curve forwards at the neck, the thoracic curve backwards at chest level, the lumbar curve forwards at the lower back and the sacral curve backwards.

THE VERTEBRAE

Now that we know the structure of the spinal column, we can elaborate on the elements of which it is composed: the vertebrae.

In Figures 3 and 4, you can see that a vertebra consists of three parts: on the front side is the vertebral body located, in the middle, the spinal canal and on the back side, the vertebral arch, which is equipped with joints and protrusions.



Figures 3 and 4 Structure of a vertebra.

The **vertebral body** is the largest bony part of the vertebra. It has the shape of a disc and is somewhat flattened at the rear. At the top and bottom, it is covered with a thin layer of cartilage – we call those layers the vertebral end plates.

Seen from above, each vertebra has an opening between the vertebral body and the vertebral arch. All together, these openings form the **spinal canal**: a tunnel through which the spinal cord passes.

On the rear side of the **vertebral arch**, we notice several protrusions. Some of those, together with the corresponding protrusions of the adjacent vertebra, form the four facet joints. They are held together by a joint capsule and ligaments, and make bending and stretching of the vertebrae possible. Bending, we have a convex back, stretching, a concave one. The facet joints direct these movements as well. Rotating movements are possible within limitations. The facet joints carry 15 to 20 percent of the weight that is supported by the spinal column.

You feel the large protrusions on the back of the vertebrae as bumps on your back. We call those the spinous process. To the left and to the right are the transverse processes located. Spinous and transverse processes are the levers with which the vertebrae are moved: they constitute anchor points for ligaments and muscles.

THE INTER-VERTEBRAL DISC

Between two vertebral bodies there is a flat disc that serves as a shock absorber and as a stabiliser. This disc absorbs the majority of the forces loading our backs as we walk, run, jump or perform other everyday activities. The inter-vertebral disc is composed of cartilage, connective tissue and for 80 to 85 percent of water. It does not lie loose between the vertebrae, but is firmly attached.

The inter-vertebral disc has two components: the annulus, the outer peel, and a nucleus.

The **annulus** is made up of ten to twelve concentric rings of tough connective fiber, which are firmly attached to the vertebral bodies and the ligament structures. The function of those rings of connective tissue is mainly to absorb tensile forces. They are also capable of processing the twisting forces as we turn our trunk and they dispense 25 percent of the compressive load on the inter-vertebral discs.

The jelly **core** (Figure 5) of the inter-vertebral disc absorbs the remaining 75 percent of the compressive load. At birth, the core consists of 85 to 90 percent of water. Later on, this amount decreases to about 70 percent. Thanks to this flexible core, the inter-vertebral disc can change shape and perfectly follow the movements of the vertebrae.

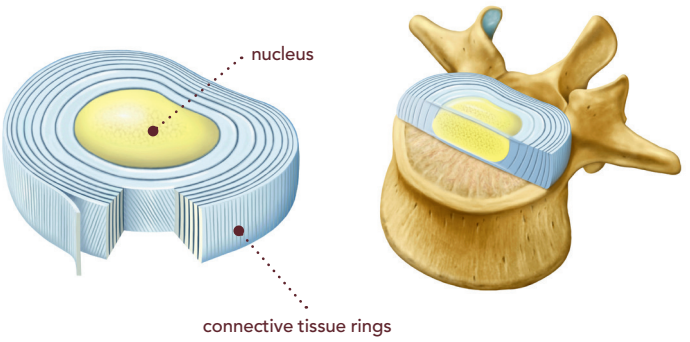


Figure 5 Detailed cross-section of an inter-vertebral disc.

Every minute of our lives, our inter-vertebral discs are under strain. The Swedish back researcher Alf Nachemson measured the pressure on the third lumbar inter-vertebral disc in various standing and lying positions. The results are shown in Figure 6.

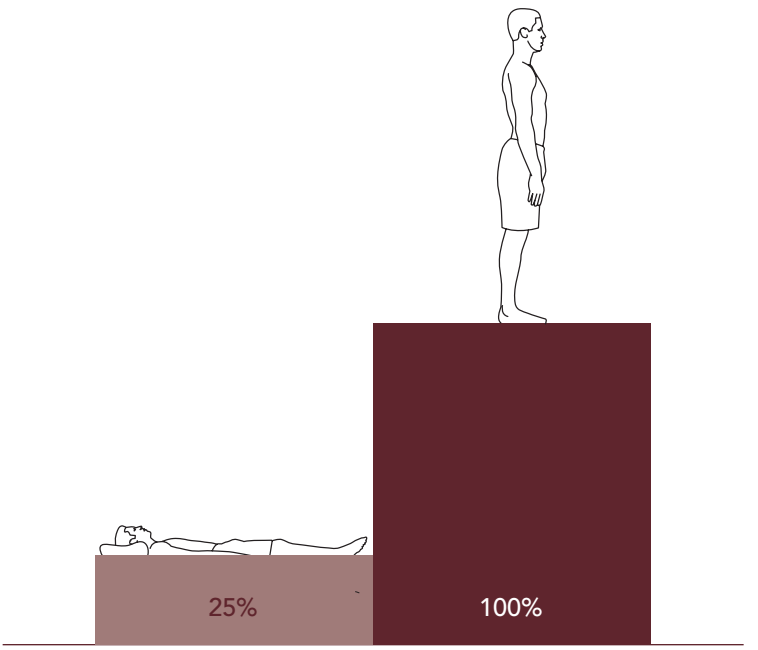


Figure 6 Relative decrease in the pressure on the inter-vertebral disc in a supine position compared to the pressure when standing upright. The pressure is expressed in percentages of the body weight (100 percent = body weight).

When we are standing upright, the pressure on the inter-vertebral disc is found to be approximately equal to the body weight. Let's just call it 100 percent. As soon as we lie down, the pressure does drop, but it never goes away completely – in the supine position, we will still find it to be 25 percent.

At the level of the lumbar vertebrae, the spinal column is curved forwards. The pressure is therefore partially directed forwards onto the connective tissue rings that are located on the anterior side. The nucleus, which is shifted somewhat forward, and the rear connective tissue rings are less heavily loaded. In order to compensate for the uneven distribution of pressure, the inter-vertebral disc is thicker at the front side and significantly thinner on the back side (see Figure 7).

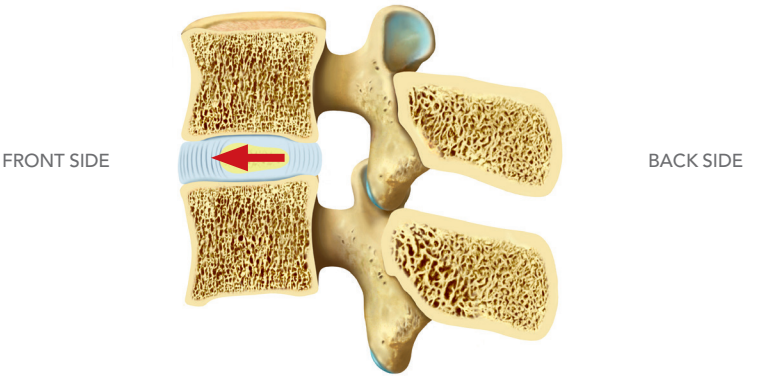


Figure 7 The inter-vertebral disc is significantly thicker on the front side.

The inter-vertebral disc consists mainly of cartilage and connective tissue, and has no blood supply. Having no blood supply has the advantage that it can absorb forces without bleeding, but it makes the supply of nutrients slow, because those now have to seep in from the surrounding ligaments. This takes place primarily by diffusion through the end plates of the adjacent vertebrae. That is also why inter-vertebral discs heal slowly. Moving a lot at daytime and adopting various positions will keep your inter-vertebral discs in good condition and will improve the supply of important nutrients.

THE LIGAMENTS

The facet joints in our spinal column are supported by tough, rigid fibrous bands: the ligaments (see Figure 8). These ligaments keep the joints firmly together and limit great movements. In addition, very strong ligaments also pass over the entire length of the spinal column, on both the front and back sides. Their main function is to stabilise the spinal column and protect it against harmful extreme movements.

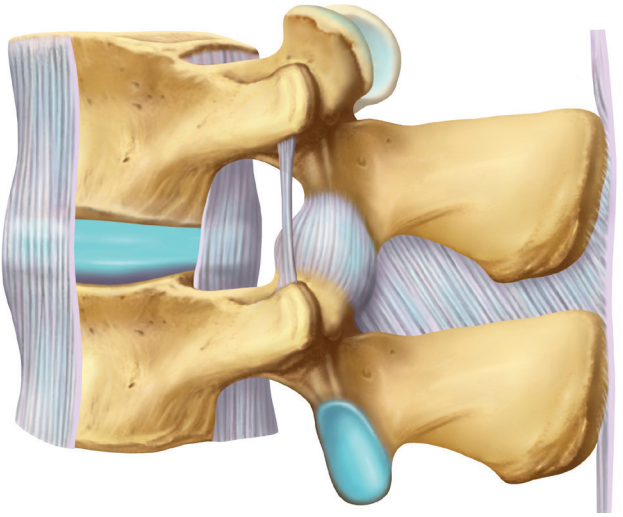


Figure 8 Ligaments of the spinal column.

Ligaments heal more difficult if they become damaged: substances which are needed to heal must be supplied via the blood, and ligaments have only a limited blood supply. What's more, the healed ligament will never again function as well as before the damage: the fibers cling together and form scar tissue, which gives rise to reduced elasticity.

THE MUSCLES

All vertebrae together form a flexible column – which is so flexible that it cannot keep itself upright: therefore it needs help from the muscles. One can compare it somewhat to the tall mast of a sailing ship: it can only remain upright with the help of cables that exert forces in different directions (Figure 9).

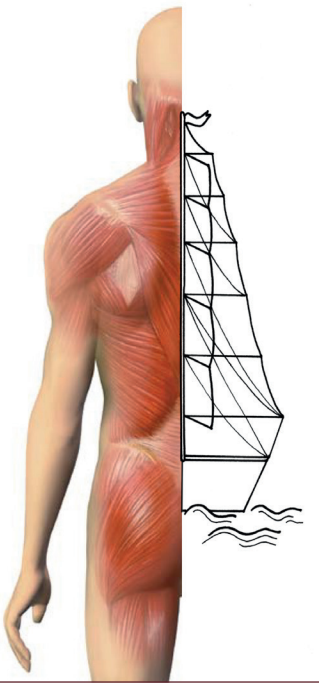


Figure 9 Muscles function like the cables of a sailing ship, where we can compare the mast to the spinal column.

To begin with, we have **short back muscles**, which run from one vertebra to another. On the one hand, they make very subtle movements possible, and on the other hand, they also limit movements. They serve mainly to maintain **positions**. On top of those little muscles run **long back muscles**, which span a large part of the spinal column. In thin people those are clearly visible. They serve mainly for the **movements** of the trunk. Together with the abdominal muscles, the back muscles form a sort of natural corset. The better the muscles control and coordinate movements, the stronger and more capable of bearing loads our back becomes. Buttock and leg muscles are also important for the back and must be in good condition. They play an important supporting role in all sorts of postural and movement patterns.

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Design: Keppie & Keppie
Binnenwerk: Wim De Dobbeleer
Cover photo: © Image Source/Corbis
Illustrations inside: © Frank Geisler, Marc Jacops
Translation: Madeline Cohen

D/2016/45/529 – NUR 860
ISBN 978 94 014 3937 4