



# Healthy sitting

at 24/7- and other  
computer workstations

# Back pain

## Common illness No. 1

Did you know that we spend most of our time sitting down? In fact, there is an acute lack of physical movement in all areas of our day-to-day lives. In the morning, we travel to work by car, train or bus. Most of us then spend the day sitting at a desk – moving only to click the button on the mouse. When we leave work, we don't usually feel like doing anything sporty or active, so we curl up on the sofa to relax, exhausted from the working day.

The consequences of these long periods of sitting on the health of our backs can be alarming: A third of the population in industrialized countries aged between 35 and 50 suffer from chronic back pain. Muscular

pain, circulation problems, headaches and heart complaints affect our health and our performance.


The risk is particularly high at 24/7 VDU workstations owing to the long periods of sitting and the special mental and physical stresses involved.


There are a number of factors that may be at the root of back pain, and often it is impossible to determine the exact cause.

But there is one thing we know for certain: Active sitting on a comfortable, ergonomic chair goes easy on your back and your body. In this brochure, we share tips that will help you not only enhance your well-being but also boost your performance at the workplace.

**20%**   
of all retirement requests are made due to back complaints.

**80.000 HOURS**   
The average office worker will spend 80,000 hours seated over their lifetime.

**30%**   
of all sickness-related absences from work are caused by muscular and skeletal complaints.

**1/3**   
of people aged between 35 and 50 suffer from chronic back pain.

Awkward working postures reduce our personal performance by up to **40%**

**9 out of 10**   
office chairs are not set up correctly, causing back pain and complaints with the neck and shoulders.



Did you know?

# The spine

## and its effects on the rest of the Body

The spine is the central supporting element in the human body. The intervertebral discs act as buffers between the 24 vertebrae. These discs allow the spine to rotate, bend, tilt and absorb impacts. The intervertebral discs are avascular, so they obtain nutrients through a process of osmosis triggered by the extension and release of the discs.

If you do not move around enough, the discs suffer premature wear – which can often result in slipped discs or arthrosis in the vertebrae.

Nerve cords protrude from between the vertebrae all along the vertebral canal, which houses the spinal cord. These nerve cords conduct nervous impulses to the rest of the body. Conditions affecting vertebral function can therefore have an impact on the entire body.



Irritation in the nerves around the cervical spine often causes:

- Headaches
- Dizziness
- High blood pressure
- Earache

Irritation in the nerves around the cervical spine often causes:

- Heart complaints
- Exacerbation of asthma and bronchitis symptoms
- Stomach complaints

Irritation in the nerves around the lumbar spine often causes:

- Constipation
- Impotence
- Prostate complaints



# The spine Facts & figures

95% of all living things do not have one – a spine. Fortunately we humans are among the remaining 5% which do have one. That means we can walk upright, do sports and many other things we couldn't do without one. And when we are sitting doing our work the spine gives us great support – but uneven or incorrect loads very often result in back pain and other physical complaints.

When we sit, our muscles – including the 300+ muscles around our spine – go to sleep and we only burn around 1 calorie per minute. Unlike the 3 calories per minute we burn when walking.

To illustrate the spine's huge importance for our health and its amazing efficiency we have compiled some interesting facts and figures about one of the most important human body parts.

**1 kcal**  
per Min



**3 kcal**  
per Min

Incidentally, chewing gum increases consumption by about 0.1 calories.



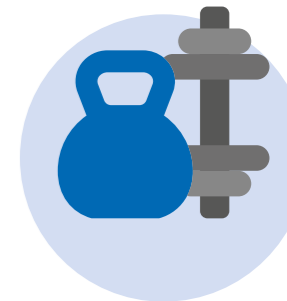
**80%**

of back pain is caused by tension in the muscles. Spinal discs are to blame in only 3 out of 100 cases.



**800kg**

A young person's spine can withstand 800 kg of pressure. This decreases significantly with age, but it can still support 450 kg.

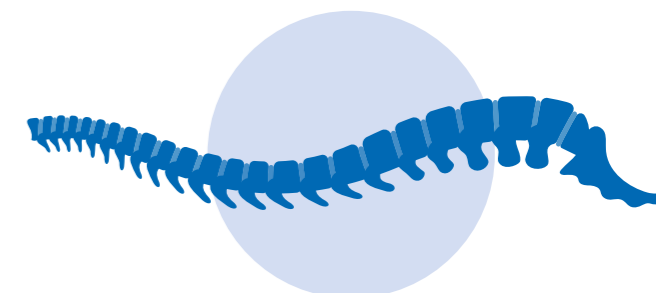


**20kg**



A human head weighs about 6 kilos. When we look down at our mobile phone the load on our spine

increases by 20 kilos. That's equivalent to balancing a crate of bottles of water on our head. And a lot of mobile phone users look at their phone for more than 4 hours a day.



**33 - 7 = 26**

We are born with 33 vertebrae, but as adults we only have 26. How come? Some vertebrae grow together to stabilise the pelvis and coccyx.

**1/4**

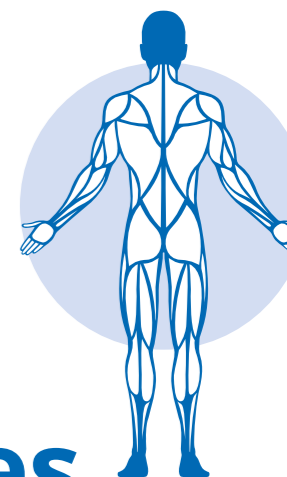
of the spine consists of cartilage tissue. During the day this tissue is compressed by the force of gravity, so we are shorter in the evening than when we get up in the morning. Astronauts on the other hand are taller when they return to earth than at the start of their journey because of the lack of gravity.



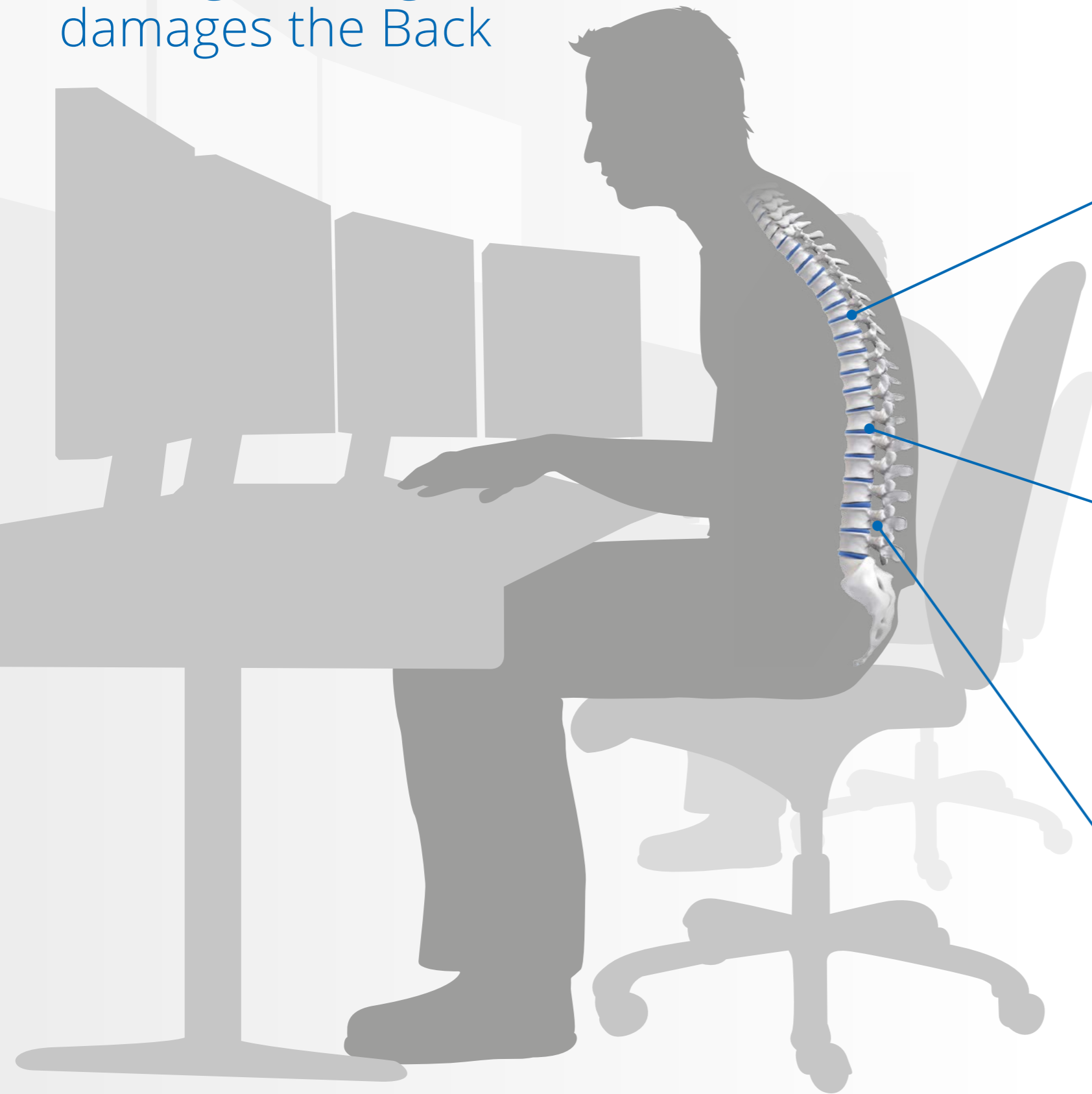
Our spine is surrounded by more than

**300  
Muscles**

and it is only with their help that we can walk upright and with the head up.



# Sitting in a rigid, fixed Position damages the Back



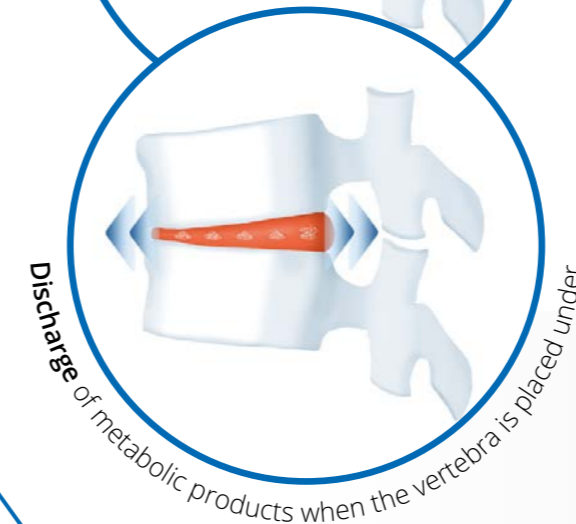
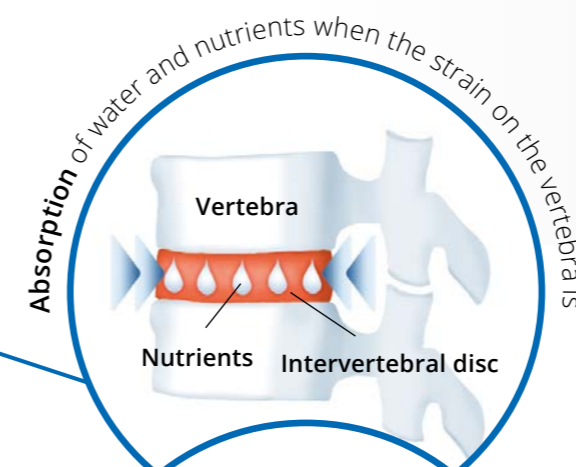
When seated, our pelvis tilts backwards and the spinal column moves out of its healthy S-shape into a rounded position. We experience this posture as comfortable, as it relieves strain on our back and stomach muscles. But we fail to notice that we're forcing our

intervertebral discs into a pronounced wedged shape. The short-term consequences of this passive and static seated posture include tension, blood stasis, a lack of concentration and headaches. The long-term effects can be serious.



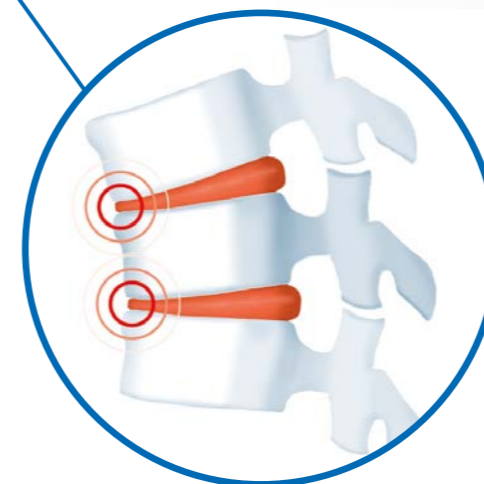
## Muscular problems

Our muscles can only be supplied with the blood and nutrients they need when they are in constant use, switching between stretching and relaxed positions. When we sit in a rigid, fixed position, we only put our muscles under static, one-sided stress, resulting in tension, premature fatigue and problems with posture.



## Intervertebral discs are starved of nutrients

The intervertebral discs are avascular, and obtain their nutrients through osmosis – a process which requires movement in order to function. A rigid sitting position inhibits this nutrient supply – the discs become brittle, torn or deformed (slipped disc or bulging disc).

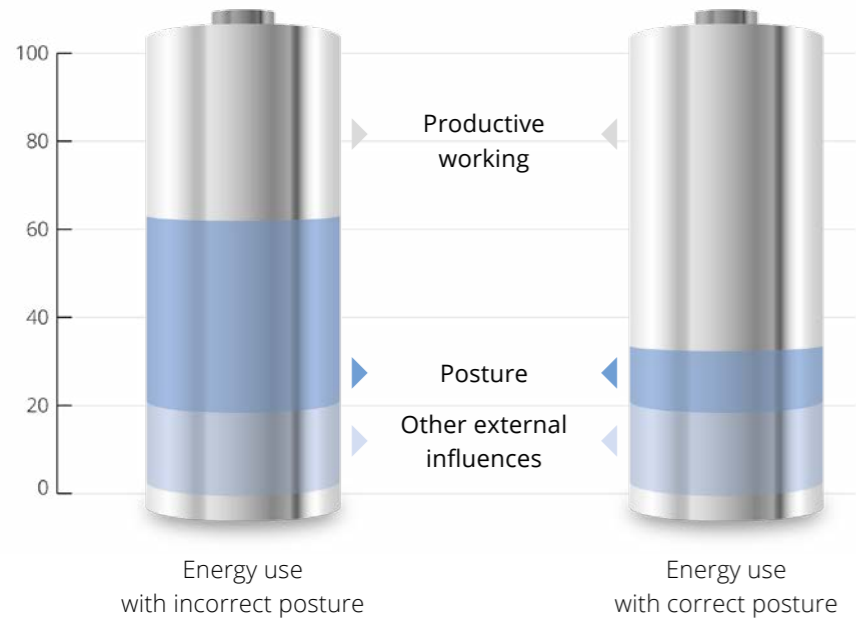


## Intervertebral discs are overstrained

We tend to round our backs when sitting. This posture places one-sided, static stress on the intervertebral discs. The discs become deformed, resulting in irritation to the nerves.

# Sitting ergonomically keeps you fit and healthy

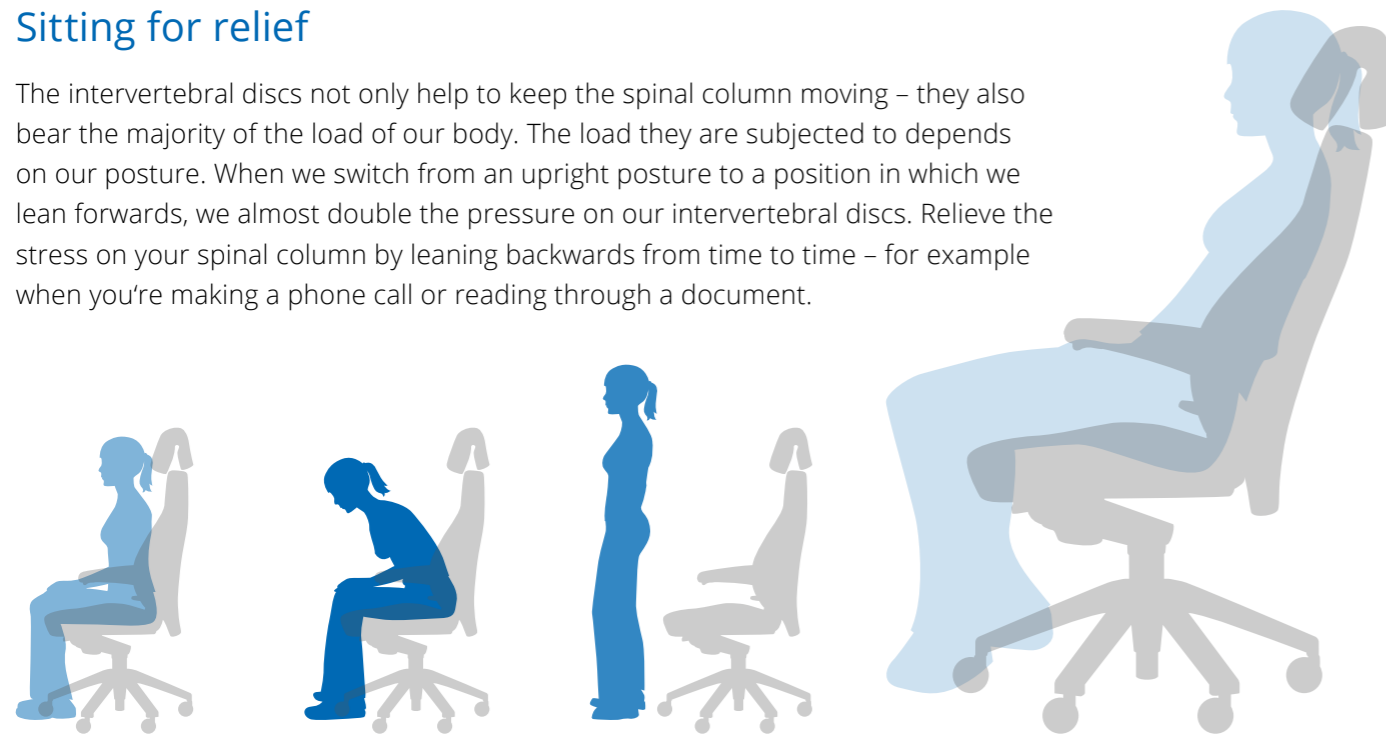
Performance in %



According to the latest studies in the field of ergonomics, deficiencies in the working environment and the resulting poor posture reduce performance by 40%. In control centres in particular, staff are required to maintain exceptional focus and concentration. A high-quality control centre swivel chair helps to prevent the avoidable symptoms of physical and mental fatigue. The user can focus fully on the task at hand, reducing the risk of errors.

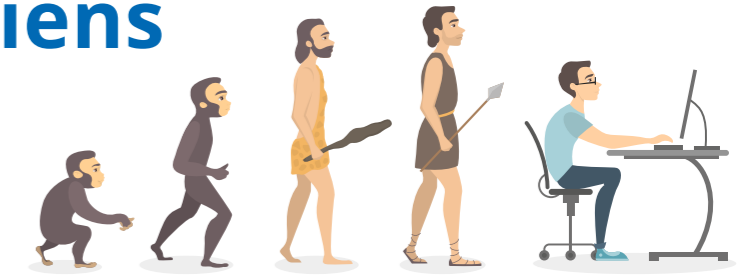
## Sitting for relief

The intervertebral discs not only help to keep the spinal column moving – they also bear the majority of the load of our body. The load they are subjected to depends on our posture. When we switch from an upright posture to a position in which we lean forwards, we almost double the pressure on our intervertebral discs. Relieve the stress on your spinal column by leaning backwards from time to time – for example when you're making a phone call or reading through a document.



Load on the intervertebral discs

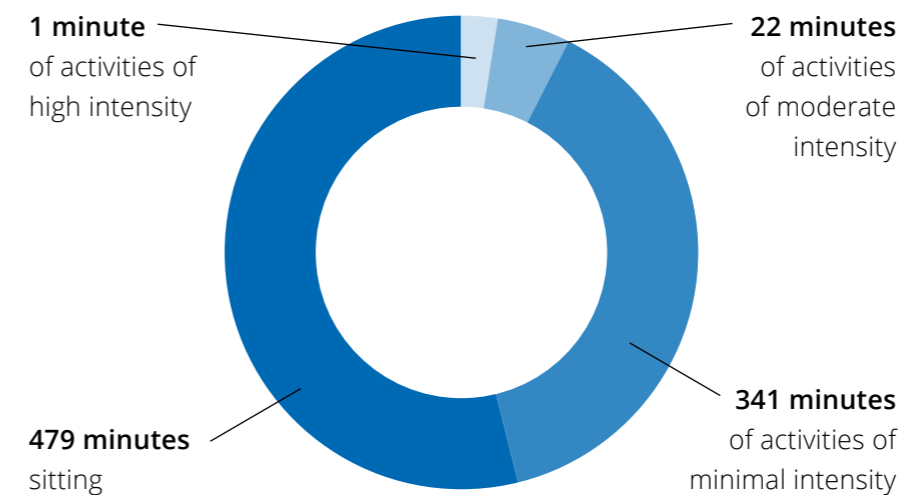
# From Homo sapiens to Homo sedens



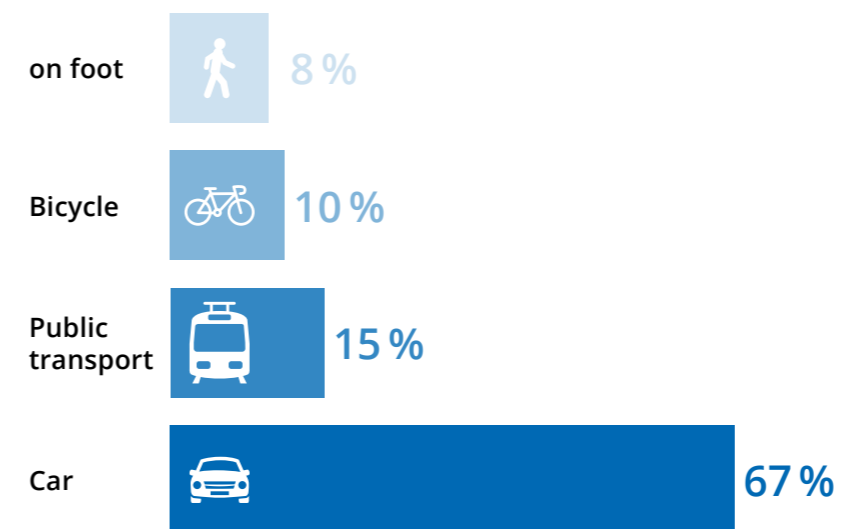
Most of us spend long periods of time sitting, periods that are getting ever longer. Sitting has become a defining feature of our lives – the Sitting Man, or Homo sedens. Sitting for between 3.5 and 7.5 hours in the office, plus in the car, eating meals, then on the couch in the evening. Sitting for up to 14 hours a day is not uncommon.

These days we spend an average of 80,000 hours sitting during our working lives, something that affects more than just our muscles and back. It is currently assumed that as well as causing obesity, a minimal amount of physical activity significantly increases the risk of diabetes, heart attack and stroke.

## We sit for the most part of the day



## Nearly everyone sits on their way to work



## Only 20 minutes a day

Only 50% of Europeans manage the minimum of 150 minutes of moderate movement per week as recommended by the WHO.

## Not everything used to be better, but it was more active

Jobs with medium to high physical activity



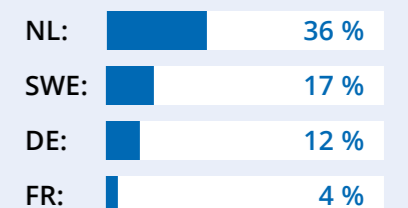
## Our lifestyle carries weigh

An obese global



## The Dutch are showing us

how Share of the population for which the bicycle is the most common mode of transport (2014)



# Healthy sitting made easy

More and more people are suffering from painful discomfort in their muscles and spine. In most cases however these complaints can be avoided by adjusting the office chair or control centre chair correctly. Read about what you should basically focus on when adjusting your chair.

Start at the bottom with the basic settings, then work your way upwards step by step.

# 1

## Seat height

The seat height is correctly adjusted when your thigh forms a line sloping down to the knee. The angle between your back and thigh should be 110-120°.

**Frequent errors:** Seat height too high - you lose contact with the floor and your muscles tense up.

# 2

## Seat depth

With your pelvis back up against the backrest, you should be able to fit at least three fingers between the hollow of your knee and the front edge of the seat. The lumbar support should be level with your waistline.

**Frequent errors:** Too much seat depth - you automatically slide forward and lose contact with the backrest. Not enough seat depth - insufficient support area, leading to muscle tension in the legs.



# 3

## Armrests

The next step is to adjust the height of the armrests. Your shoulders should be more or less horizontal while your forearms lie on the armrests. Like this you will avoid cramp due to incorrect posture.

### Frequent errors:

Armrests too high - you cramp up and your muscles can become shorter over time.

Armrests too low - your arms pull your torso down, resulting in a hunched back and a stretched cervical spine.

# 4

## Adjusting the mechanism

In an upright sitting position, when you lean back you must neither tip backwards nor have to push too much, the backrest must provide pleasant support with a gentle counter pressure.



# Healthy sitting with the Svenstol®-formula

The Svenstol®-formula for healthy sitting in control centre environments:

improved comfort = less stress = better performance

Our concept is based on two pillars: the chair's comfort padding (this combines comfort know-how from motor vehicle development with the ergonomic requirements of a VDU workstation) and the active-

Plus kinematics which promotes your blood flow and protects your back. When adjusted and used correctly, a StolComfort swivel chair has a lasting impact on your well-being.



## An upright sitting position

our sitting position is active and upright. The lumbar support and slightly tilted seat angle help to ensure that your pelvis remains straight, and that your spinal column retains its natural S-shape. The comfort headrest also relieves strain on your neck muscles.

**Effect:** Poor posture with a rounded back is prevented; the intervertebral discs and muscles are relieved of strain.

## Comfort cushioning

The cushions – made from elastic polyurethane foam – adjust to the contours of your body, holding you in place comfortably without restricting movement. Your body weight is optimally distributed to prevent pressure points, particularly during long periods of sitting.

**Effect:** Increased sense of well-being, reduced risk of poor posture; discs, sit bones, muscles and nerves are protected.



## Relaxed sitting

Give your intervertebral discs a chance to really relax. Lean back to relieve all pressure on your spinal column and back and stomach muscles. Your feet remain firmly on the ground.

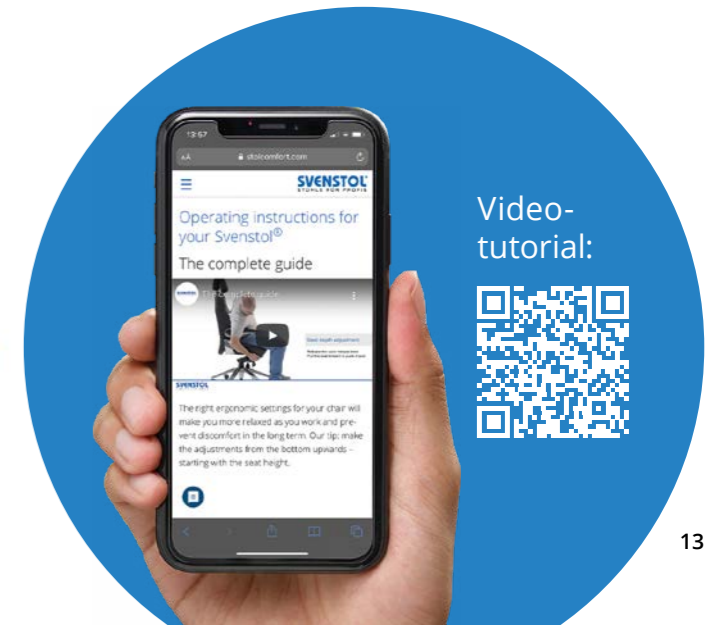
**Effect:** Relief for intervertebral discs; support and posture musculature can relax.



## Active sitting

An upright position is the foundation of ergonomic sitting. However, in order to prevent health problems, we must move away from our established habit of sitting in a rigid, fixed position. Our tilt mechanism was designed to enable the user to move around intuitively to find balance and identify the best position for their needs. Static sitting becomes dynamic sitting – without taking the user's focus off their work.

**Effect:** Better circulation, no muscular strain or tension, more efficient supply of nutrients to the intervertebral discs, less fatigue.



Video-tutorial:



# The most important thing: ... always keep moving!



# (Disruptive) factors affecting our performance capability

Emails, phone calls, work colleagues, meetings – each day we battle with different ‘disruptive factors’ which disturb our concentration on our actual work. To these we can add ‘home-made’ problems such as a lack of sleep, a lack of movement, a workplace that is not ergonomically arranged, not to mention our natural tendency to postpone unpleasant or difficult things:

“My flat was never cleaner than when I was studying for my final or exam.” – an experience which probably most of us share. But once we have identified the problem of being unable to concentrate, we can do something relatively simple to deal with it.

## Chair

It should be comfortable and encourage active sitting. If your back or neck is bothering you then you can't focus on your work.



## Screen

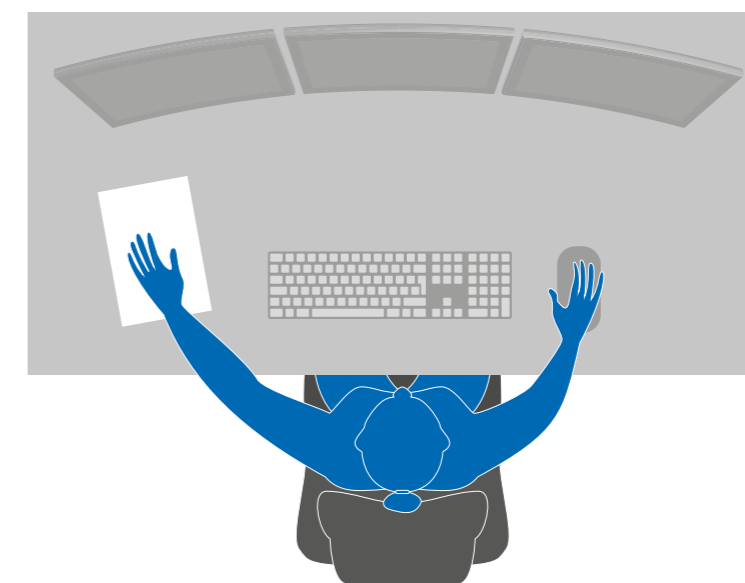
Screens are often set too low, inevitably resulting in tense muscles. Your sight should be directed straight ahead at the upper third of the monitor.

## Keyboard

This should be relatively near to the body to prevent a bent-forward posture. A wrist rest is recommended for prolific typists. Flat keyboards are quiet.

## Desk

An ergonomic desk is 80 cm deep and 160 cm wide, with a low-reflection surface; ideally the desk should be height adjustable so you can also work while standing.



## Mouse

Those who work a lot with the mouse should use an ergonomic mouse to prevent problems due to long-term poor hand positioning. Guide the mouse as close to the keyboard as possible.



# (Disruptive) Factors affecting our performance capability



Chair, table and monitor are correctly adjusted, you've slept well and colleagues know to only disturb you as a last resort. Now, if the lighting, acoustics and room environment are also right, the report or the new app will practically write themselves.

- 1 The ideal room environment:** Temperature is 20-22°C, humidity 40 – 60%.
- 2 Sufficient daylight** is both stimulating and motivating. Ensure there is sun protection to avoid glare on your screen and high temperatures.
- 3 Optimal lighting** is a combination of indirect overhead lighting and a desk lamp positioned to the side.
- 4 White walls** have a stimulating effect. For other colours, it's best to check first what kind of impact they can have on mood.
- 5 Sound-absorbing elements** or pictures on the wall help to reduce background noise.
- 6 Regular impact ventilation** supplies oxygen and prevents the air from becoming too dry – especially in winter.
- 7 Green plants** are a great way to increase humidity in the office.
- 8 Keep your desk organised:** make sure it's tidy and if possible limit it to only the absolute essentials.
- 9 Eating:** fresh fruit, vegetables or nuts boost concentration. Conversely, a rich midday meal is fatal for concentration.
- 10 Drinking:** water is the best way to quench your thirst. It is best to keep a bottle of water with a glass on the table. Coffee increases short-term concentration, but more than two cups of caffeine a day can lead to health problems.
- 11 Movement:** chewing gum or a short walk boosts concentration.

**Eat the Frog:** Don't put off difficult tasks that require a relatively high level of concentration. Once you've taken care of the frog you will find it much easier to work..

**Printers** should be kept in an adjoining room so that you aren't distracted by the noise.

# 24/7 instead of 8-to-5

Hopefully no one has to work in a control centre or similar environment for 24 hours. Even so, working in a control centre differs from working in an office in a number of important ways. Even if the different activities in control rooms, operating centres and similar settings require a differentiated perspective, there are some typical features that entail specific ergonomic reagents.

**Total concentration**  
required constantly

**Added stress**  
due to shift work

**A high stress level**

Mistakes can have direct and serious consequences.

**Changing users**

at the workplaces



A good 24h chair meets the resulting requirements. It offers permanent sitting comfort and supports both active and relaxed sitting postures in rapid succession so as to prevent muscle tightness and premature fatigue. It can also be adjusted to suit different users and can cope with the heavy strains of continuous usage.

# The ergonomic Chair The Foundation of healthy sitting

Based on the physical structure and foundation of the spinal column, combined with the guidelines for health sitting, we can derive a clear set of requirements for ergonomic chairs: The chair must be adjustable to suit user, support an upright seated position and promote frequent changes of posture through mechanism designed for movement.

## In balance

Your work requires your full concentration, so it's not always possible to make conscious choices to maintain a healthy posture. However, with a sufficiently high and wide backrest, lumbar support ① and an adjustable seat tilt angle ②, the chair can do this on your behalf. The pelvis straightens up, the spinal column extends – and your seating position is balanced.

## Active sitting

To encourage us to change our seated posture regularly, a high-quality office chair should ideally be equipped with mechanisms designed to promote movement ③. Increased movement improves the efficiency of the nutrient supply to the discs and stimulates the circulation.

## Suitable for S to XXL

Whether you're tall, short, stocky or slim, a high-quality chair provides healthy and comfortable seating for almost all body shapes and sizes. Good seat padding ④ helps the user to stay relaxed and focused during long periods of sitting, preventing pressure point loads on our 'sitting bones' among other things. The seat height ⑤, armrests ⑥ and seat depth ⑦ must be adjustable to increase comfort and avoid poor posture.

## Stability

24h chairs in particular must also be very load-resistant and hard wearing to withstand continuous use. The chair should therefore be proven to meet at least BS 5459 and the requirements of the 'Tested Safety' (GS) mark, including for loads up to 200 kg.

# Unique solutions for stresses and strains

The equation looks simple enough on paper: A control room chair is used five times as much as the average office chair. If an office chair lasts for ten years, then the same chair will last for two years in a control room. However, this doesn't work out in practice: Often, office swivel chairs very quickly become faulty or get damaged in a control room and can no longer be used. The equation fails to take some important aspects into account: the chair is used by different people and is therefore adjusted frequently; a significantly larger proportion of time is actually spent sitting; when working, sitting positions are often adopted which place significant stress on the chair, because the users are predominately men and the average weight is higher. Our Ergonomic Stability Package (ESP) ensures that the Svenstol® S5 will cope with these stresses and strains for many years to come.

## 1 Steel frame construction

Unlike traditional office chairs, the frame of the Svenstol® is constructed entirely from steel and designed to even survive a crash test. Once a frame is damaged, it must either undergo extensive repair or the chair can no longer be used.

## 2 Stable, low-maintenance mechanism

The principle behind our mechanism: A high level of comfort combined with maximum stability and a design which is as simple as possible. And if a fault should occur then the complete mechanism can be removed with no great effort.

## 3 6-legged base

Unlike other office chair bases, our 24h chair provides an additional sixth supporting leg and ensures greater stability even in more extreme seating positions. The specific strain on the base and castors is simultaneously reduced by 20 percent.



## 4 Hard-wearing cover materials

There are two crucial factors in sitting comfort: The chair must make working easier and remain comfortable over a sustained period of time. For covers, we therefore rely on material with particular characteristics. The leather is both breathable and robust, and the fabric is approx. 20 times more wear-resistant than office chair cover fabric. There are special covers for weapons carriers..

## 5 Svenstol® Armrests

An armrest developed in-house that can be quickly adjusted for any sitting posture by simply pulling it up. The aluminium core and medium-hard polyurethane support pad make for a practical combination of comfort and a long service life.

## 6 Replaceable padding made from permanently elastic foam

The padding foam was originally developed for use in vehicles, and has long-lasting elastic properties (just 15% loss of elasticity in 36 months). The padding is both comfortable and hard-wearing.

If despite our careful design, sitting should become less comfortable after many years of intensive use, the seat cushion can be easily replaced

## 7 Gas spring column for height adjustment

The gas spring is one of the most heavily stressed components of the chair. The seat load and bending moment are absorbed by a specially designed (self-supporting) pressure tube. The gas spring we fit in our chairs meets the highest standards of hardness.

# Sitting comfort

## Work better relaxed

Poor sitting comfort first makes itself felt at places where sitting pressure is too great – usually around our ‘sitting bones’ or thighs. And if you try to relieve the pressure on these points you will force your body off-balance. Some of your muscles will be overloaded and tense up. You will start to sit crookedly, leading to back pain, headaches, fatigue and a loss of concentration over time.

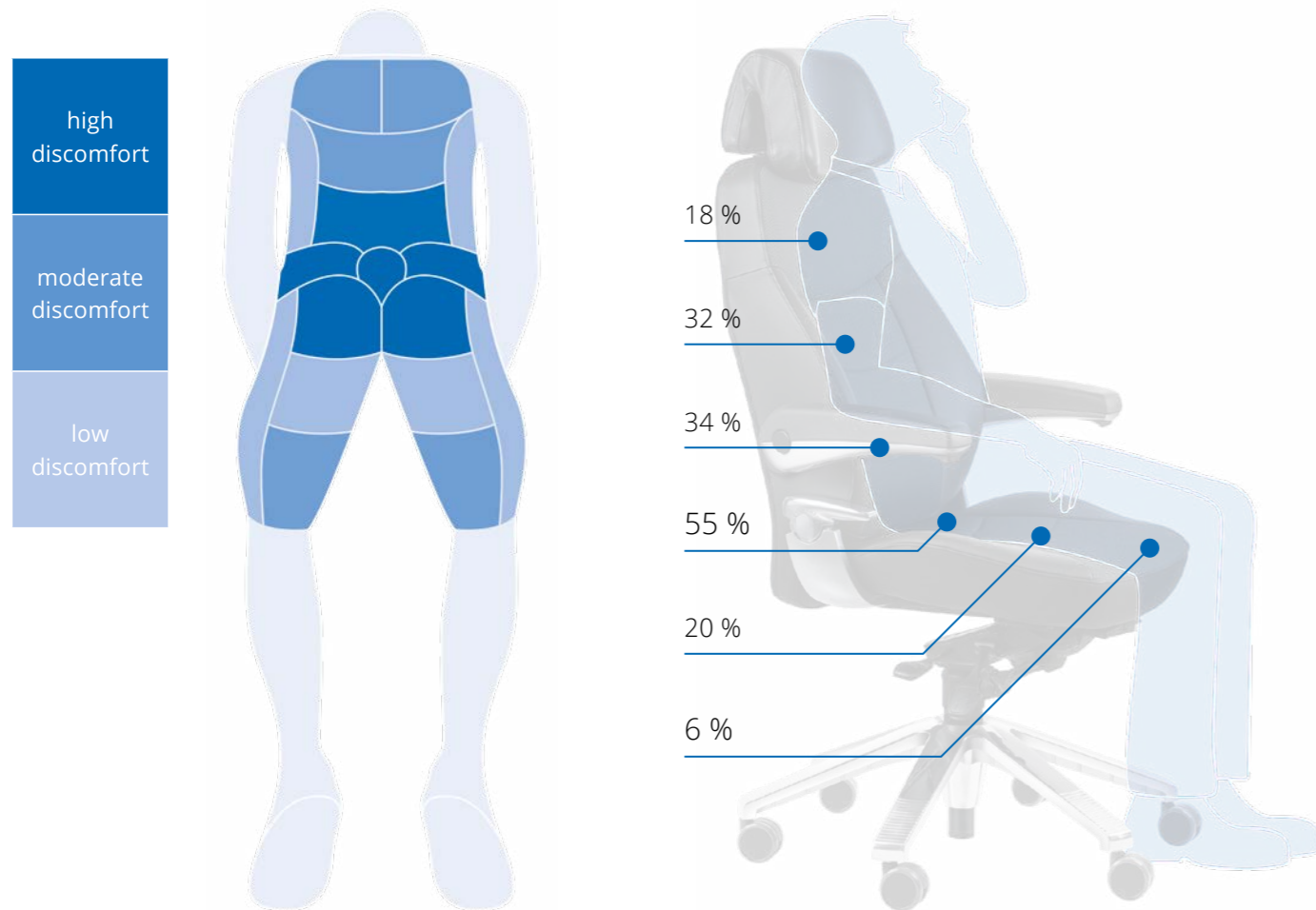
Good seat padding must try and prevent such pressure-point loads. The user must be able to adopt – and maintain – an active, upright sitting position. This will distribute the body's weight evenly, relieve pres-

sure on the muscles and improve circulation; reduced pressure on the diaphragm improves breathing and makes it easier for the body to supply the brain with oxygen.

The safety factor known as the ‘human being’ plays a central role, whether in emergency and rescue services, supply or communication networks or control centres. Serious mistakes are demonstrably avoided by a work environment that promotes relaxed and focused working. So a suitable chair offering a high level of comfort can contribute to greater safety and reliability.

### Optimum pressure distribution

based on pressure points while sitting as identified in tests



**Left side:**  
Empirical identification of pressure points while sitting

**Right side:**  
Optimum pressure distribution while sitting

# Costs & Benefits

## Investing is worth it

### Seven times more stress

Swivel chairs in control centres are on duty for 8760 hours a year, office chairs for only around 1800 hours.

If we include the added strain of alternating users and the more frequent task-related switches between active and relaxed posture, then control centre chairs are under seven times more stress than office chairs.

A chair that can satisfy the requirements of this demanding environment does, of course, come at a cost. However, when you consider the time users will spend sitting in the chair, the price tag actually represents excellent value for money.

	Control centre chair	Office chair
Average price	1650 €	570 €
Average effective use	7 years	2 years
Costs per year	235 €	285 €

\* based on a total service life of 10 years



### A profitable investment

Employees in control centres – who are required to focus on screens and spend long periods of time sitting down – are exposed to specific health risks.

A high-quality control centre chair is an investment in the health of your workforce. And it's not just another expense: The costs of the chair must be viewed in the context of the savings potential it brings. If the chair prevents just one of the four to five days of sick leave taken by the average employee each year, the chair will pay for itself within a year.

After seven years, the savings are colossal.

