



Healthy Sitting

**girsberger**



# **Healthy Sitting**

This brochure provides you with up-to-date information on sitting and tells you about Girsberger chairs' contributions towards healthy sitting.

Health and a seated position are not inconsistent with each other. Although the aim of this brochure is to help you improve your comfort and to show you the correct way of using your office chair, we also hope to awaken your enthusiasm for sitting.

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## Publisher's note

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## 1 | The problem facing frequent sitters

### Does sitting damage the body?

You may already have experienced neck pain, back tension, lack of concentration and fatigue; these are complaints that can often occur during a working day.

The modern world of work has brought about the change from *Homo erectus* to the so-called *Homo sedens*. We sit to work, we sit to drive, and we sit during our free time – on the sofa watching TV, at the movies, at the theatre. We have become a society of sitters, without enough exercise. At the same time, backache now counts as one of health care's greatest problems. Approximately 80 percent of the population suffer from backache at some time during their lives. Currently, over a third of the adult population is affected.

The fourth European survey of working conditions shows that approximately 30 percent of all European working people consider their health endangered by their work. The most frequently mentioned complaints are stress, backache, and pains in shoulders and neck.

It is therefore reasonable to assume that sitting has something to do with backache. However, a 2004 analysis of the factors that actually cause backache produced a remarkable result: It is impossible to prove scientifically that factors such as strain on the muscles of the torso or a seated position at work can result in backache. This means that sitting does not necessarily cause illness or damage to the spine. It is far more likely that today's way of life, lack of exercise, and psychosocial factors are the cause of back complaints.

### The sedentary society

At the beginning of the last century, industrialization served to reduce arduous (in other words bodily active) work and to continuously increase the amount of intellectual work done while sitting. A hundred years ago, our ancestors used about 80 percent of their muscular strength to earn their daily bread. On the contrary, we do not need more than 10 percent. For thousands of years, nature with its fields and forests served as a workplace for humankind. Today, a standard "field" measures 160 x 80 cm and is called a desk. This is where the *Homo sedens* sows and reaps, this is where he finds success. The computer not only holds his attention, it also puts a hold on his mobility. This is where he moves worlds with the click of a mouse – but neglects to move himself!

### Where the problem of frequent sitting lies

Basically, deskwork generates a very low level of physical stress. Our pulse does not quicken inordinately, we do not perspire, and seldom do we leave the office with aching muscles – just to mention a few of the symptoms that would normally suggest physical stress. When we take a closer look at today's office world, however, we discover two aspects that can provide an explanation for physical problems: a static sitting position (sitting largely motionless) and an unsuitable sitting posture. These are the two factors which can put undue strain on a seated person's back – the spinal column, the intervertebral discs and the muscles of the back (above all, those in the area of shoulders and neck).

Sitting statically means long, motionless sitting – the result of which is metabolic stagnation in muscles and intervertebral discs. In addition, a bad posture, such as a hunched back, will cause irregular pressure on the discs.

## **Life is movement**

The human being was created for movement. Movement boosts the metabolism, which in its turn nourishes the intervertebral discs and encourages the supply of blood (perfusion) to the muscular tissues. Lack of exercise causes deterioration in various parts of the body (bones, muscles, cartilage, nerve cells), whereas movement helps them to develop. The motto "Use it, or lose it" applies.

In the end, every static position – be it a standing, lying or sitting one – will lead to metabolic stagnation. Not only do desk workers suffer from loss of well-being and health through lack of exercise, employers and national economies lose a lot of money.

## 2 | Anatomy and function of the vertebral column

The vertebral column is one of the body's most stable structures. It is made up of hard bones – the vertebrae – and the intervertebral discs and joints give it both strength and flexibility. Additional stability is provided by firm tendons, taut ligaments and strong muscles.

The vertebral column performs three important functions for mankind:

**Posture:** In its capacity as central axis of the body, the vertebral column and corresponding muscles of the back stabilize a human's upright posture.

**Movement:** a fascinating construction allows the human being to move with dynamism and diversity. He is able to turn, bend, stretch and move in many other ways.

**Protection:** The osseous canal of the vertebral column protects the spinal cord and important nerve cells.

The human vertebral column (fig. 1) consists of 24 vertebrae separated by 23 intervertebral discs as well as several conjoined vertebrae that form the coccyx and the sacrum at the base of the column.

The 24 vertebrae are divided into three different sections:

**The cervical vertebrae:** The 7 vertebrae which carry the weight of the head.

**The thoracic vertebrae:** The 12 vertebrae to which the ribs are attached by joints.

**The lumbar vertebrae:** 5 strong vertebrae which carry the weight of the torso.

Looked at from the side, the vertebral column has a typically double-S shaped outline. The resulting curvatures are called cervical lordosis, thoracic kyphosis and lumbar lordosis.

### **The intervertebral discs absorb shocks and permit movement**

The intervertebral discs, which consist of cartilage, separate the vertebrae. On one hand, they give the vertebral column stability. On the other, they permit a wide range of movement. Together with the S-shape of the vertebral column, they absorb shocks and evenly distribute pressure. They are made up of a relatively compact elastic outer fibrous ring and a soft gelatinous core (fig. 2).

Because the intervertebral discs have no blood vessels, they are not fed through blood circulation but solely by diffusion from surrounding tissue. In order for this to take place, pressure has to be regularly applied to and then removed from the discs. In the same way as a sponge, the intervertebral disc can soak up fluid when pressure is released (fig. 3) and yield it when pressure is applied (fig. 4). The intervertebral disc survives on movement! By frequently changing our sitting position – as in dynamic sitting – and regularly alternating between walking, standing, sitting and lying down,

we supply our intervertebral discs with a sufficient amount of nutrients. The discs then work better and are less susceptible to overtaxation.

Image-providing procedures such as x-ray or magnetic resonance show degenerative changes in the intervertebral discs of certain people. It makes sense that these changes are considered the cause of backache. Scientific studies, however, show that this wear is seldom the reason for back complaints. Intervertebral disc degeneration is, in fact, normal and can be considered as natural as hair changing to grey as a person grows older. Irrespective of their condition, intervertebral discs feel no discomfort when manifold and frequent movements are part of the sitting procedure. You will find information and tips on active sitting further on in this brochure.

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**The cervical vertebrae**

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**The thoracic vertebrae**

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**The lumbar vertebrae**

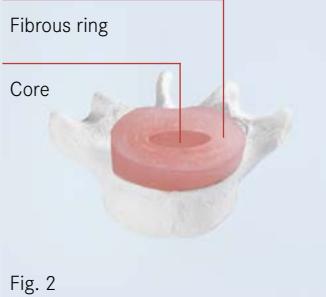


Fig. 2

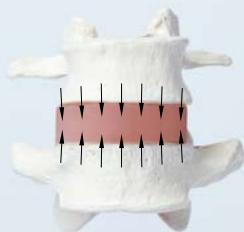


Fig. 3



Fig. 4



Fig. 1

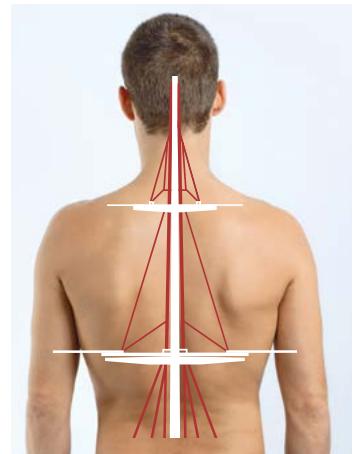


Fig. 5

## 2 | Muscles allow us to retain position and to move

Muscles are the active part of the musculo-skeletal system. An upright position and movements of the spine are made possible by the muscles of the back. In order to obtain a clearer picture of the complex interaction between vertebrae, ligaments, intervertebral discs, and muscles, one can compare the vertebral column to the mast of a ship, vertically secured by ropes (muscles) to the hull of the ship (pelvis) (fig. 5). If the system is well balanced, then the mast is perpendicular. The pelvis provides a base for the vertebral column and makes the connection between legs and torso. A balanced pelvis, receiving stabilizing support from the muscular system, is important for an upright and disc-friendly posture.

The muscles of the back give the vertebral column support and stability and are therefore of great importance to a healthy back. If they are well trained through regular use at work and during free hours, then they will successfully provide the required support and have a relieving effect on the intervertebral discs.

Body awareness, however, is also a decisive factor where posture is concerned. Thanks to body awareness, malpositions can be detected and corrected with the help of the back's muscles.

With regard to muscular function, we distinguish between static and dynamic muscle work:

In the case of **static muscle work**, constant and immobile tension reduces perfusion. Fatigue and hardening of the muscles as well as muscular pain can result. **Dynamic muscle work**, on the other hand, is characterized by a rhythmic alternation between tension and relaxation. The need for blood and perfusion are evenly matched, allowing dynamic muscle work to continue over a longer period of time.

### Conclusions in connection with

**healthy sitting:** In the case of almost motionless sitting, the stabilizing work done by the muscles of the back is predominantly static. The shoulders and neck are especially affected – even more so when keyboard and mouse are in use. It is therefore easy to see why the most frequent muscular complaints in connection with sitting are to be found here. When the sitter sits freely, without using the backrest, static muscle work is further increased. This intensifies the active work of the muscles. Changing sitting positions, on the other hand, induces dynamic muscle work (fig. 6 to 8). The synchronous function of the office chair (see the following paragraph) promotes a dynamic alternation between forward and backward sitting positions. Even the smallest alterations in a sitting position will result in different muscle fibres being used, thus preventing overtaxation.



Fig. 6



Fig. 7



Fig. 8

## Recommendations

Recommendations for healthy sitting are as follows:

During active sitting and position changing, the muscles are used dynamically. In addition, by continuously returning to an upright position in which the vertebral column regains its natural S-shape, the sitter distributes pressure evenly over the inter-vertebral discs.



## 3 | Ergonomics and sitting

### What are ergonomics?

The term 'ergonomics' is composed of the Greek words ergon (work) and nomos (law). Ergonomics are the scientific study of the legitimacy of human working conditions. One of this science's most important duties is to adapt machinery, operating controls, tools, and work environments so that they comply with human needs.

### Relation and behaviour

Because the adaptation of work and labor conditions to human needs is ergonomics' main goal, we are primarily concerned with **working conditions**. In the office sector, the motto "Fit work to man" is understood to mean the individual adaptation of workplace elements (e.g. office chair, desk, foot support) to the size of the user. However, the ergonomic design of the office chair alone does not guarantee that its user will profit from the ergonomic conveniences he is offered by using them to support his health.

### This brings us to behaviour at work.

An office chair designed in accordance with ergonomic factors can only provide health advantages if its user can make meaningful use of the individual functions. A health-promoting effect is only achieved when the user knows how to handle the ergonomically designed features correctly.

## 4 | Focus on the relation between ergonomics and the chair

The described structure and functions of the vertebral column, the intervertebral discs and the muscles of the back, make it possible for us to determine what the basic requirements are in connection with the ergonomic design of an office chair. From an ergonomic point of view, the fundamental design criteria are as follows:

**The geometric construction** of the chair, e.g. the measurements or the contours of the seat and backrest.

**The adjustment options**, e.g. the seat height and the respective adjustment span. Adjustments in accordance with the individual measurements of the user will promote an ideal sitting posture.

**The movement mechanism**, e.g. the synchronous function. In this case, seat and backrest move in a certain ratio to each other when the chair's user moves from a forward to a backward sitting position (fig. 6 to 8). When he leans back, the back end of the seat moves down, effectively stopping him from slipping forward. This encourages him to regularly change his position – dynamic sitting is the result.

## The level of ergonomic relation and relevant user behaviour

Healthy sitting can therefore develop when ideal ergonomic conditions are coupled with ideal use. To focus solely on the ergonomic conditions offered by the chair – a relation-linked aspect – is not enough. In order to be able to make the correct adjustments and use the chair in the best possible way, it is equally important that each of the chair's functions are correctly understood. This means that a comprehensive concept for health, efficiency, and comfort at the workplace must take both the extent of ergonomic relation and that of user behaviour into account.





Fig. 9

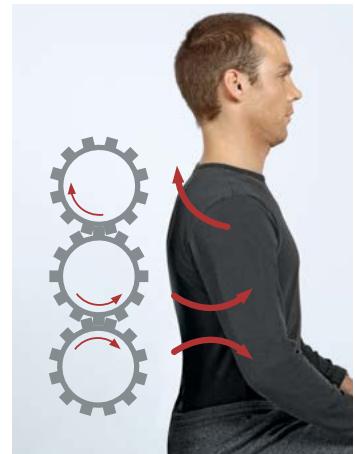


Fig. 10

## 5 | Healthy sitting – focus on user behaviour

An office chair designed in accordance with ergonomic principles does not guarantee that its user will not have trouble if he uses it frequently. The chair will only offer favourable conditions for healthy sitting in combination with a health-conscious attitude on the part of the user.

### On the impossibility of sitting “correctly”

The often-heard allegation that sitting in the “wrong” way will damage the vertebral column and subject the intervertebral disc to increased wear is probably incorrect. However, if there is no “wrong” way of sitting, there is also no “right” way of sitting in order to prevent damage to the inter-vertebral column. It is a fact that sitting for long periods can cause problems. Muscle cramp and pain can result when the user statically overtaxes his body by remaining in the same position all day. This does not mean that the muscle in question or some other part of the body will be permanently damaged. However, the pain is a signal that must be taken seriously.

Essentially, the human being was not made for sitting. Therefore, the sitting position is always a compromise. In spite of this, sitting is a usual and logical position in the working and office world and cannot be avoided. The ideal sitting position does not exist, much in the same way as there is no single ergonomically totally correct office chair. One can basically say: the best office chair is always the one that is not being used. And the best sitting position is always the next one. This again shows how important movement and position changing are. It is a fact: we feel better when we do not remain motionless at a desk for hours. He who rests, rusts: So keep moving, change your sitting position frequently and stand up from time to time.

### Healthy sitting must be learnt

If there is no “right” way of sitting, how should the frequent sitter sit, if he wants to do something for the health of his back? “Healthy” sitting seems to be the more appropriate goal. This is a physiological (natural) way of sitting which allows the vertebral column to assume its natural double-S shape (fig. 9) as far as possible. In order to adopt this position, a seated person must tilt his pelvis slightly forward. His chest straightens up and the neck sector of his vertebral column is stretched. His abdomen is freed of pressure, and this again helps both digestion and breathing. This way of sitting can be compared to the interaction of cogwheels: When the lowest cogwheel (the pelvis) moves forward, then the next one moves backward in the opposite direction (lifting the chest). This, in turn, moves the third wheel forward again (straightening the neck section of the spine and thus lifting the sitter's head and stretching his neck) (fig. 10).

Because of static muscular strain, however, it is not possible to sit in this way for a longer period of time without a backrest. As we know, desk work is mainly “brainwork” and not an alternative to fitness training. Therefore, anybody who wants to remain healthy and physiologically erect when sitting for a longer period must give his back the corresponding support in order to relieve the muscles of some of their static, stabilizing work. A special shape in the lumbar region of the backrest (lumbar support) holds the pelvis up and stops it from tilting backward.

Posture awareness comes from training. The reward: if you work on maintaining an upright position, you will acquire a new awareness of sitting.



## The following promotes healthy sitting

Correctly adjusted and attuned chair functions (backrest height, back support force, seat height, height of armrests etc.) and the other workplace elements (desk, height of monitor screen, keyboard etc.) are conducive to an ideal individual sitting position.

A well considered and healthy (beneficial to the spine) way of sitting (upright, supported, mobile) prevents detrimental pressure on the intervertebral discs and static overtaxation of the muscles.

Frequent changes in working position (e.g. dynamic sitting and standing) guard against constant overtaxation.



Fig. 11



Fig. 12

## 5.1 | The correct adjustment of the chair's functions

The following example featuring the REFLEX office chair shows you how to use Girsberger chairs for healthy sitting.

### An upright sitting position

In order to make the ideal adjustments to the chair, it is important to start by sitting down in the correct way. The upright position described above will receive the best support from the backrest if you sit as far back as possible. The backrest will provide support to the pelvic region and you will remain upright. REFLEX offers you the possibility of giving the seat angle a forward tilt of 4 degrees – this provides additional support to the lumbar region of the spine.

### The seat height

In the case of REFLEX, the lever on the front right side of the seat allows infinite adjustment of the seat height (fig. 11). The correct position also depends on whether you can also adjust the height of your desk.

- If the height of your desk cannot be adjusted (the usual height is 72 cm), then the height of your chair should be set so that – with your upper arms in vertical position – your elbows are at approximately the same height as the top of the desk. You will then be able to rest your forearms on the desk. This means that small people must choose a higher position and tall people a lower position. But it is also necessary that your thighs are horizontally positioned and your lower legs are vertically positioned. Smaller people will need to use a foot support.
- If you are able to adjust the height of your desk, then you will choose a seat height which lets your legs form a right angle at the knees and allows your feet to rest comfortably on the floor. In this case, small people will have a lower and tall people a higher position.

### The backrest

If the backrest of the chair is adjustable in height, the lumbar support must be positioned at the same height as the extreme part of the lumbar lordosis (the natural hollow of the back). REFLEX can be outfitted with an optional, adjustable lumbar support. The support can be moved up or down on the frame of the backrest (fig. 12), and a twist grip on the lumbar support itself allows you to adjust the supportive depth.



Fig. 13



Fig. 15



Fig. 14



Fig. 16

#### The seat depth

By adjusting the depth of your seat, you can provide your thighs with a seat surface that is both supportive and comfortable. But make sure that there is no pressure on the hollow of your knees. REFLEX has a button on the right side of the seat, which allows you to move the seat forward or backward (fig. 13).

#### The armrest

The armrests should be set at the height you need to lay each forearm along the whole length of the armrest when sitting upright. This will relieve the pressure on the shoulder and neck muscles. Armrests that are too low will lead you into assuming a hunchback position. In the case of REFLEX, a push button under the armrest cap lets you adjust the armrest height (fig. 14), and after turning a knob at the bottom of the armrests, you will be able to increase or decrease the space between them.

#### Synchronous movement

The synchronous function invites you to sit dynamically. The twist grip at the front left of REFLEX's seat (fig. 15) offers you a choice between synchronous movement and locking the backrest into any preferred position. Once the synchronous function has been activated, the backrest will follow your movements. But you may sometimes wish to work with a fixed backrest. No problem: Turn the grip backward and the backrest will be locked into the chosen position.

Adjusting the back support force (spring tension) of the synchronous mechanism to suit the user's weight further optimizes dynamic sitting. The regular position-changing the synchronous mechanism offers is generally only put to use if the sitter does not have to use too much force, yet still receives sufficient support. REFLEX allows you to adapt the back support force to your weight by means of a useful twist grip at the right side of the seat (fig. 16).

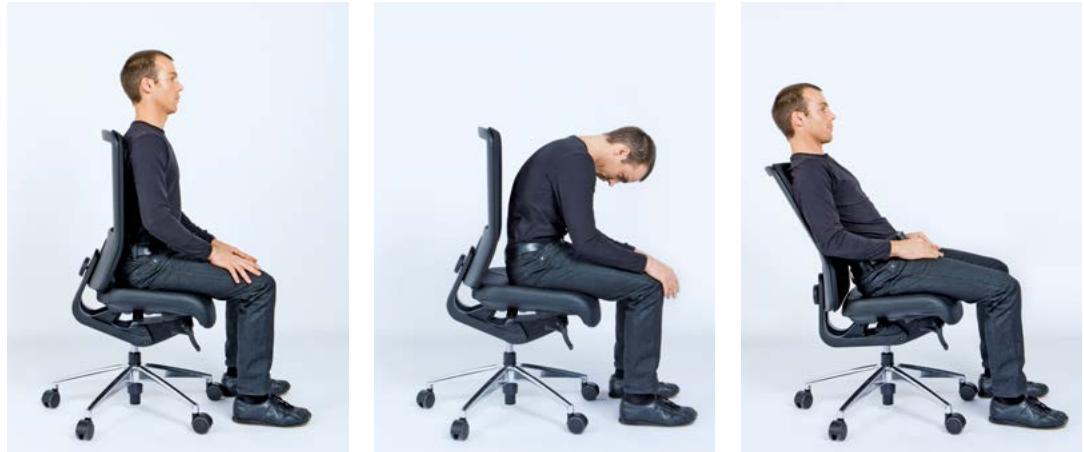
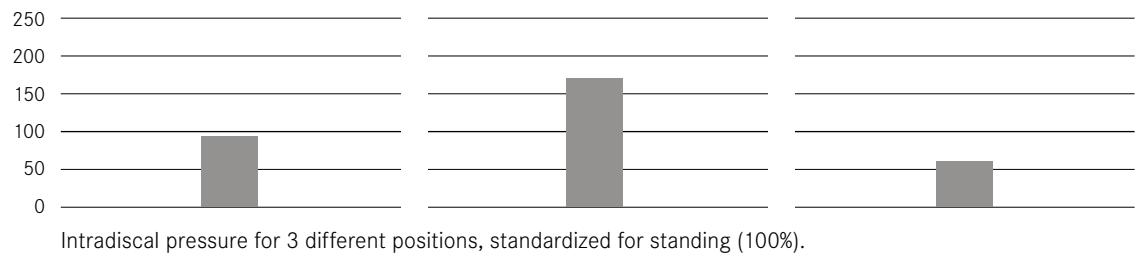


Fig. 17

## 5.2 | The healthy way to sit: upright – supported – mobile

### Upright

A seated position that is beneficial to the vertebral column – as described in the cogwheel model – must be deliberately assumed, appreciated and regularly practiced in order to achieve a lasting change of behaviour.

### Supported

The muscles of the back need not maintain this upright position at all times. You may lean back, that is what backrests are for! Entrust your back to the rest. But be careful: after a certain time and in spite of the lumbar support, there is danger that the pelvis will tilt backward and a humpback will sneak in. The frequent sitter should therefore check his sitting position from time to time and correct any sinking of posture. Such small corrections already belong to the little movements that activate metabolism in the structures of the back.

### Mobile

There are other, additional movements that serve this purpose. From a medical point of view, the negative image we have of a fidget should be positive! Be as creative as you wish – the main thing is that you are mobile while sitting and do not remain frozen into position on your chair. Here are some tips:

- Tilt your pelvis forward and backward.
- At times, rest your weight on your right buttock, at others on your left buttock.
- Stretch the upper part of your body sideways, or move your chest forward and backward.
- From time to time, stretch your neck by pushing up the back of your head.
- Assume a forward sitting position and lean on the desk.
- Lean on both armrests and take the weight off your buttocks.

### The advantages of reclining

Biomechanical tests have shown that a reclining position puts the least amount of pressure on the intervertebral discs (fig. 17). A complete contradiction of the “obsolete” recommendation to avoid such a position at all costs: reclined sitting is vindicated!

Leaning back reduces pressure on the intervertebral discs. (The twist grip on REFLEX allows the user to unlock the fixed position and choose synchronous movement.) This means that the intervertebral discs can also receive a supply of fluid and nutrients during the day. In order to profit from this positive effect on the metabolism, you must remain in position for several minutes. You will only be completely comfortable if you have a headrest. And shorter armrests that allow you to move nearer to the desk are more suitable for reclining. A backrest which provides sufficient support to the back is, however, still important.

Be careful: Leaning back to work can also cause you to bend your head too far down and forward. This is more likely to happen when you look at the keyboard rather than at the screen. It is therefore a good idea to keep your eyes on the screen when leaning back to relax, or to take this position when you are on the phone or thinking up new ideas. And why not cater to your need for recuperation and take a nap (a so-called “power nap”)? Give it a try, use this relaxed position for communication, thought and creative activity.

## 5.3 | Changing your working position: working dynamically

Standing up from time to time is a complement to dynamic sitting and has a positive effect on your health. Alternating between sitting at a normal desk and standing at a high desk or some other high surface (dynamic sitting and standing) adds valuable movement to your office day.

### Look for “reasons to move”

Our modern computer workplaces unfortunately allow us take care of many things by click of the mouse. Formerly we would have had to get up and go into another office. Now, walking around “unnecessarily” is not just a remedy against a frozen position. It also increases motivation, the willingness to perform, and social contact at work.

Deliberately organize your workplace in such a way that you are unable to reach everything from your chair. The printer need not be in the same room. A telephone placed out-of-reach can induce you to stand up, and many meetings would profit from being held while standing. Movement stimulates creativity. Maybe this is exactly why Goethe, Schiller, and Einstein preferred to work at a high desk.

As far as changing positions at work is concerned, the following breakdown can be recommended:

- approx. 50 % sitting
- approx. 25 % standing
- approx. 25 % moving

At the same time, it is important that these positions are not held for too long. The body's position should be changed regularly, i.e. 2 to 3 times an hour.



## **6 | Movement at the office: how to keep fit at work**

How can one prevent neck pain or back tension from occurring? Quite simply, through movement! Don't worry, you will not have to sacrifice your valuable lunch break for a visit to the fitness studio. Just a few simple exercises at the office will let you improve your feeling of well-being.

The attached leporello leaflet holds descriptions of several exercises that can be done at the office whenever you want and without any additional gear. But don't just stop at reading the information: Office gymnastics will only have an effect if they are done on a regular basis. Never mind being watched - find out which movements let you feel comfortable and have the courage to do the exercises that do you good!





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