



Cervical spine surgery: posterior approach

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You are set to undergo cervical spine surgery in the near future. This brochure provides further information on the nature of the disorder for which this surgery is carried out and about the operation itself. It also includes an overview of the admission procedure and areas requiring specific attention once you are discharged from hospital. Finally, it includes a number of useful contact data you can refer to after you have been discharged from hospital.

An operation on the cervical spine is executed via the front (anterior approach) or rear (posterior approach) of the neck. This is decided on the basis of the nature of the disorder, the site of the anatomical abnormality vis-à-vis the spinal cord and/or nerve structures and, where applicable, the need to fix one or more vertebrae.

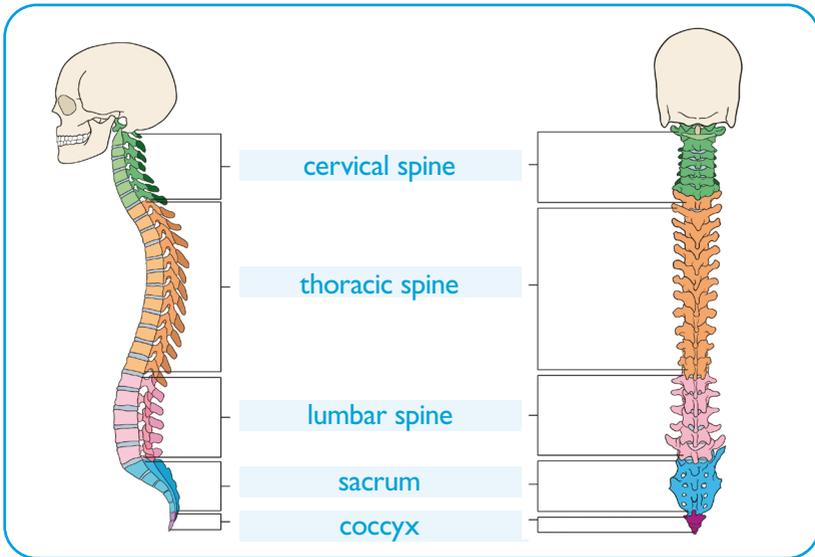
Your surgeon has opted, in consultation with you, for surgery with a [posterior approach](#). This brochure focuses specifically on this type of surgery.

Should you have any questions after reading this brochure, please do not hesitate to contact a doctor or nurse. Being well informed will make you feel more comfortable and less anxious, which will contribute to a smoother recovery process.

CERVICAL SPINE ANATOMY

The spine is made up of individual vertebrae. Going from top to bottom there are seven cervical or neck vertebrae, twelve thoracic or chest vertebrae, and five lumbar vertebrae. The sacrum is located below the lumbar vertebrae and below that the coccyx (see illustration below). The cervical vertebrae support the neck and are directly connected to the back of the skull.

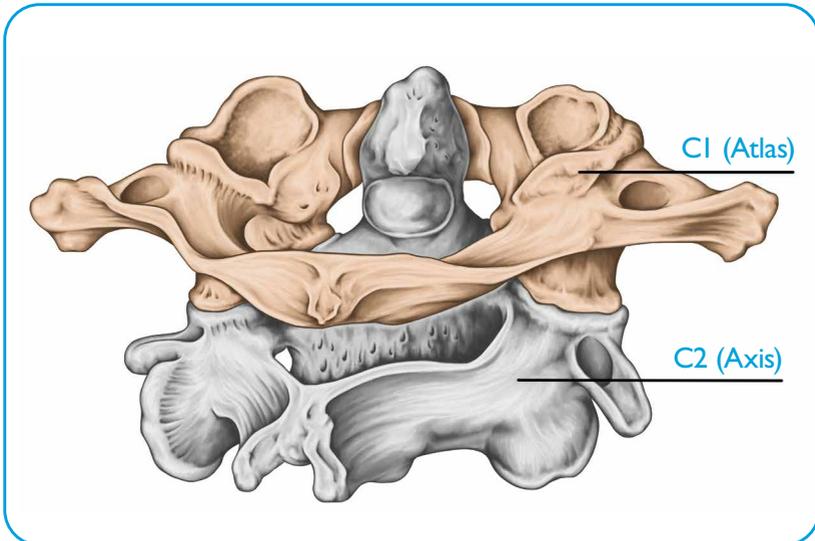
Cervical vertebrae are identified anatomically with the letter C together with the number of the vertebra. There are seven cervical vertebrae in total, numbered from top to bottom with C1 to C7.



Side and rear view of the spine

The **first cervical vertebra, C1**, is also referred to as 'atlas', after Atlas the mythological figure who carried the firmament on his shoulders. C1 connects the spine to the head, and supports the head. Contrary to other cervical vertebrae, C1 has a ring shaped rather than a body shaped structure. It is a fairly small vertebra.

The **second cervical vertebra, C2**, is also referred to as the 'axis' vertebra. It is a large cervical vertebra, with an upward protrusion that looks a bit like a tooth (dens axis). The dens forms a joint with the C1 vertebra and facilitates most of the neck motions to the left and right. Breakage of the dens axis is quite common and often a reason for surgery.



C1 (atlas) and C2 (axis), with rear view of the joint between the dens axis and C1 ring that facilitates most of the neck motions/rotation

The **third to seventh cervical vertebrae, C3 to C7**, have a more consistent structure. Similar to the vertebrae lower down the spine, they consist of a vertebral body and a vertebral arch.

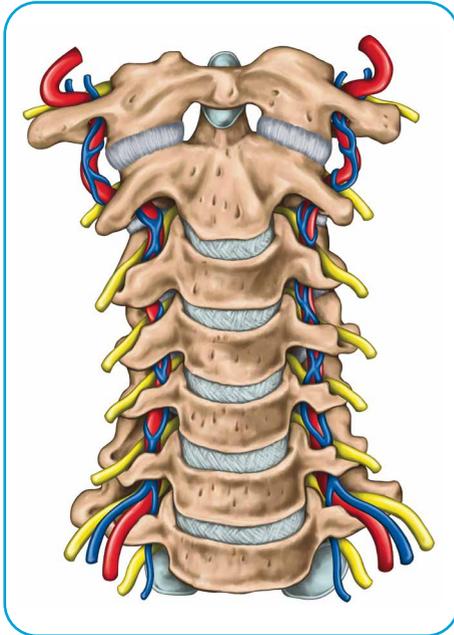
The vertebral arch consists of:

- X two transverse processes
- X four joint surfaces that make contact with the adjacent vertebrae
- X the lamina which protects the rear of the spinal canal
- X a spinous process that protrudes toward the skin and can be felt at the back

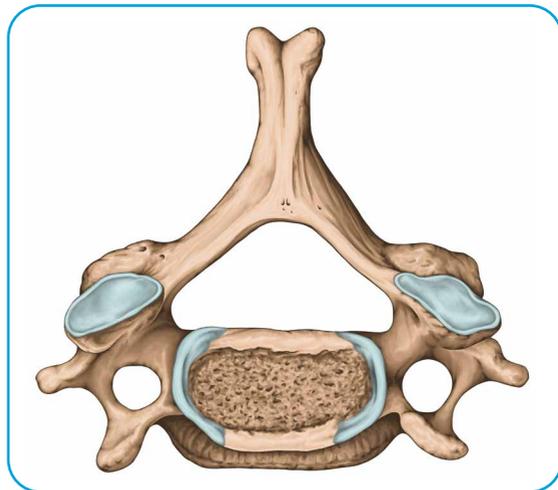
Contrary to the vertebrae lower down the spine, the transverse processes of vertebrae C1-C6 have an opening either side accommodating the arteries (arteria vertebralis) that supply blood to the brain stem and cerebellum.

Together the vertebral body and vertebral arch enclose a circle shaped opening. Stacked together the vertebrae thus create a channel: the spinal canal. The spinal cord runs through this channel in the cervical and thoracic spine.

The spinal cord is a direct continuation of the brain stem and contains all the nerve structures needed for the control and sensory impulses of the torso and limbs. Below the vertebral arch on each vertebra a nerve root protrudes on both sides. These nerve roots originate in the spinal cord. Intervertebral discs between adjacent vertebrae act as a shock absorber and joint. These intervertebral discs consist of a strong outer ring and a soft, gel like, core.



Frontal view of the entire cervical spine, including vertebrae C1 to C7. An artery runs to the brain stem and cerebellum on both sides of the cervical spine (coloured in red). The nerves leaving the cervical spine at each level are shown in yellow.



Top view of one of the cervical vertebrae in series C3 to C7 with the different anatomical elements

WHAT ARE THE REASONS FOR SPINAL SURGERY?

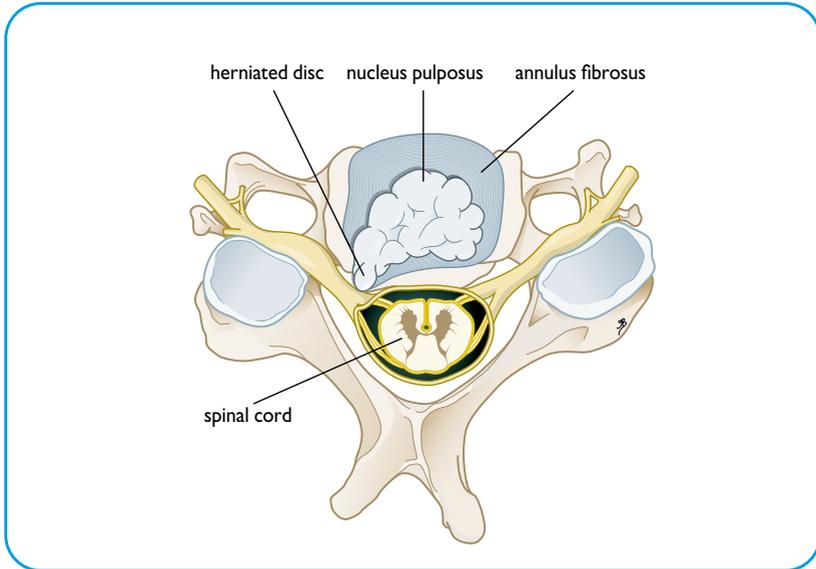
Most surgical interventions on the cervical spine are related to disorders that put pressure on the nerve root or spinal cord. They are usually caused by a herniated disc or bone growth and thickening of the ligaments as a result of wear and tear (degenerative disorders).

Other than that, operations are frequently related to accidents involving broken bones, tumours, inflammatory disease or congenital defects of the cervical spine. These interventions are less standardised and are consequently not covered in this brochure. Obviously surgeons will be happy to provide further information on these kinds of operations.

HERNIATED DISC

Similar to the vertebrae in the lower back, cervical vertebrae are connected by intervertebral discs. They not only act as shock absorbers, but also facilitate the spine's flexibility. An intervertebral disc consists of a soft inner core (nucleus pulposus) surrounded by a tough exterior (annulus fibrosus).

Because the intervertebral discs facilitate the spine's flexibility they are under pressure and subject to wear and tear. This can cause a tear in the tough exterior (annulus fibrosus), resulting in the soft core (nucleus pulposus) protruding from the spinal canal. This is referred to as a [herniated disc](#).



Herniated discs in the neck usually occur at levels C5-C6 or C6-C7, although they can also occur at other levels. Because of the closeness between the soft nerve structures and the rigid spinal canal, a herniated disc can often put pressure on one of the protruding nerve roots or the spinal cord.

Pressure on a protruding nerve root usually results in pain radiating into area that receives sensory impulses from the corresponding nerve. It is referred to as **radicular pain**, which often radiates from the neck down into the hand. It may also cause loss of feeling, numbness or tingling in the area covered by the nerve. Severe nerve root compression may lead to loss of strength in the muscle groups that are controlled by the corresponding nerve.

A herniated disc in the neck can also put pressure on the spinal cord, particularly if it is extensive or midline. This is often more serious than nerve root compression and can lead to dysfunction of the spinal cord. Such cases are referred to as [myelopathy](#). These symptoms often manifest themselves in the arms and legs, resulting in problems walking, instability, sensory complaints or a reduction in fine motor skills. Severe cases can even lead to problems when urinating or passing stools.

A herniated disc can repair itself spontaneously after a few weeks or months. In many instances it is initially a case of wait and see and the problem will resolve itself spontaneously. Loss of strength or signs of myelopathy, however, are usually reasons for surgical intervention in the short term. If there is no cause for alarm, but the pain is persistent, it may be decided after the initial waiting period to resort to surgery after all to treat the herniated disc. Examples of a conservative approach include (temporary) adjustment of day to day activities, painkillers or physiotherapy. If the pain is too severe it may be decided to resort to an epidural infiltration procedure, during which an anaesthetic and cortisone are injected into the site of the nerve root.

DEGENERATIVE DISORDERS

As we get older degenerative disorders gradually start to occur in many parts of the body. These abnormalities are a form of wear and tear and will consequently get worse as we age. They tend to occur in areas subject to a lot of movement and pressure such as the knees, hips, shoulders, etc.

In the spine these degenerative disorders mainly manifest themselves in the lower back and lower cervical vertebrae (C5 to C7). In anatomical terms degenerative disorders of the spine usually affect the intervertebral discs, the joints between vertebrae and the ligaments that interconnect the vertebrae. Wear and tear causes extra bone growth, thickening of the ligaments and swelling of the joint structures. This leads to narrowing of the spinal canal or the site where the nerve root protrudes. The results are similar to those associated with a herniated disc, i.e. compression of the nerve roots or spinal cord.

Contrary to a herniated disc, degenerative disorders will not spontaneously improve in structural or radiological terms. Complaints caused by nerve root compression can in some cases improve spontaneously. There is no definitive explanation for this. It is probably due to inflammation of the nerve root during an acute phase, which then gradually settles down. This means that the pain can be alleviated even though there are still signs of compression on the scans.

Signs of myelopathy or loss of strength in the arms or hands with degenerative disorders of the neck will also lead to surgical intervention sooner rather than later.

PLANNING OF ADMISSION TO HOSPITAL

If a decision is made to proceed with a posterior cervical operation, you will be referred to the anaesthesia unit for a **preoperative examination**.

You will have to complete a questionnaire in preparation for this consultation, which relates to potential allergies and other disorders, your lifestyle and previous operations you may have had. It would be useful to take a summary of any medication you are taking and results of recent blood, heart or lung examinations to the consultation so that the anaesthetist can check them. If you have a blood group card, you should also take that with you. It is important that you visit the anaesthesia unit before your admission to ensure that this process runs as smoothly as possible.

During the consultation someone will run through the questionnaire with you. Your general health will be checked, the type of anaesthesia and pain management, and any potential risks will be discussed with you. You will also be advised which medication you can or cannot take prior to the operation.

If necessary additional examinations may be carried out. If these examinations cannot be done immediately, you will be given an appointment for them.

Once the anaesthetist gives their approval your admission date will be confirmed, usually in writing.

YOUR ADMISSION TO THE WARD

Usually you will be admitted to the ward in the afternoon on the day before, or on the morning of the operation.

We would ask that you only bring essential items to the hospital because storage space is at a premium on the ward. Valuable items should be left at home.

It is advisable to bring the following:

- ✓ Any medication you are currently taking in its original packaging, which the nursing staff will look after on your behalf.
- ✓ Comfortable clothing allowing free movement during exercises on the ward and to go home in
- ✓ Nightwear, dressing gown
- ✓ Sturdy, enclosed slippers or sports shoes
- ✓ Toiletries, towels and face cloths
- ✓ Razor
- ✓ Books and/or magazines
- ✓ Loose change, for example, to buy magazines
- ✓ Charger for your mobile phone
- ✓ Insurance certificate

Preparation for the operation:

- ★ Shower before the operation, using ordinary soap.
The nursing staff will be able to assist you.
- ★ The following drinks are ok up to two hours before the operation:
 - Water
 - Smooth fruit juice
 - Carbohydrate drinks
 - Carbonated drinks
 - Tea or black coffee
- ★ Six hours before the operation you must stop taking in any solid foods or drinks other than those mentioned above. Ask the nurse or ward doctor when the operation should normally start in order to avoid it having to be postponed.

Just before the operation:

- ★ You will be given a hospital gown.
- ★ Remove jewellery, glasses, contact lenses, make-up, dentures, hearing aids, piercings and, where applicable, a wig, place them in the cabinet in your room and give the key to the nurse.
- ★ The nurse will check that you have an identification tag around your wrist.
- ★ The nurse will tell you which medication you can still take before the operation (with a sip of water).
- ★ You will then be taken to the operating theatre.

CERVICAL SPINE SURGERY PROCEDURE WITH POSTERIOR APPROACH

All cervical spine operations are carried out under general anaesthetic. Once the anaesthetist has put you under anaesthetic, the surgeon will move your head and neck into the correct position to operate on. With a posterior access operation you will be turned onto your stomach once you are under anaesthetic. If necessary the hair in your neck will be shaved, because your skin has to be as smooth as possible to ensure that it is properly disinfected before the operation. Your head will be stabilised during the operation using a cushion or clamp. If a clamp is used you will have three small wounds on your head after the operation.

You will always be given antibiotics as a preventive measure with a neck operation. If implants are used, they are often administered for 24 hours.

The incision for the operation is usually made on the midline. The operating site is marked using radiographic images before the start of the operation. Upon completion of the disinfection process and implementation of a sterile field the operation will start. The surgeon will make an incision and gain access to the rear of the spine through the subcutaneous tissues and neck muscles. Muscles attached to the spine will be detached at one or more levels. The actual treatment of the spine will then start, involving different surgical techniques depending on the nature of the problem.

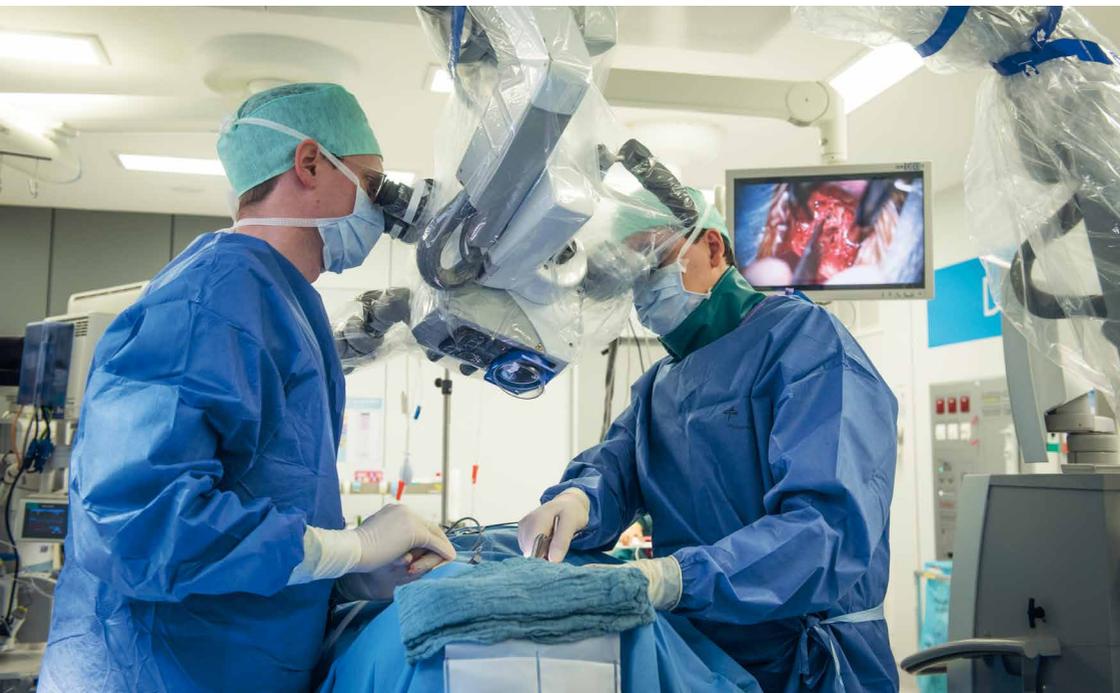
The most frequently used surgical techniques are:

- ★ **Laminectomy:** removal of the back of the vertebral arch to relieve pressure on the spinal cord
- ★ **Laminectomy and fusion:** removal of the back of the vertebral arch and fusion of two or more vertebrae using tiny screws inserted into the vertebrae
- ★ **Laminoplasty:** opening up of the back of the vertebral arch and widening of the spinal canal using tiny plates
- ★ **Laminoforaminotomy:** microscopic decompression of one or more nerve roots using microsurgery to open up the nerve canal through which the nerve root exits the spinal canal. In certain cases this technique can also be used to remove a herniated disc

Once the treatment on the spine itself is finished the different layers in the wound will be re-attached .

A wound drain (Redon), a tube to discharge blood and wound secretions, may be left in place. The anaesthetist will then wake you up and you will be taken to the recovery room.

In some cases a neck brace may be fitted after the operation. Your surgeon will discuss this with you.



AFTER THE OPERATION

After the operation you will be kept in the recovery room (PAZA or post-anaesthesia care unit) for a few hours for observation and subsequently taken back to the ward.

We would ask that during your admission you tell us if you are in pain or suffering persistent pain despite having been given painkillers. Pain management is very important for your recovery. It reduces the risk of complications and ensures a smoother recovery process.

In most cases you will be able to sit up again immediately after the operation and be allowed to move around on the day of the operation.

This is usually under the supervision of a physiotherapist, who will also tell you how to treat your neck correctly during the first few weeks following the operation.

Radiographic images are usually taken one or two days after the operation. The wound drain will generally be removed one or two days after the operation upon advice from the surgeon.

If there were no complications with the operation you will normally be able to leave the hospital quite quickly. Obviously the exact timing of your discharge may vary depending upon the complexity of the operation and the subsequent recovery process.

When you are discharged from hospital the doctor will provide you with the following:

- ★ A letter for your GP containing a brief, preliminary report of the operation and your stay in hospital.
- ★ A letter addressed to you detailing any medication you may have to take (e.g. painkillers). If you also have to take other medication we will provide you with a small amount of this medication so you don't have to go to the pharmacy on the day you are discharged.
- ★ A prescription for the pharmacy (if necessary).
- ★ A letter detailing your check-up appointment with the surgeon who treated you. Where necessary, this may be preceded by a medical imaging appointment in order to check your recovery process. This usually happens about six weeks after your discharge from hospital.

POTENTIAL COMPLICATIONS AND AREAS OF SPECIFIC ATTENTION FOLLOWING YOUR DISCHARGE FROM HOSPITAL

Posterior interventions on the spine are quite common and in most cases without complications. The following is a summary of the main areas of discomfort and complications following this type of operation. A full summary of any possible (rare) complications is not included in this brochure.

Because the operation is carried out near the spinal cord and protruding nerve roots, the most serious risk is associated with damage of the nerve structures resulting in neurological complications. In the most severe cases this could lead to paralysis, but this is extremely rare. With extensive decompression there is a 3 to 5% risk of loss of strength in the shoulder or upper arm. The reason for this is not entirely clear and this usually repairs itself spontaneously after a few weeks.

There is a small risk (less than 5%) that the membranes around the spinal cord or the nerve roots are accidentally breached without damaging the nerve tissue. This is usually identified and repaired during the actual operation. If this happens your surgeon may ask you to remain recumbent for up to two days after the operation. In rare cases another operation may be required to close up the defect in the spinal cord membranes.

With a posterior approach operation the neck muscles have to be detached in order to operate on the spine. These muscles will be re-attached at the end of the operation.

This means that during the first few days after the operation you may suffer from severe neck pain, stiffness and impaired movement, but this usually improves from the third day after the operation.

An operation, particularly one involving implants, is always associated with a risk of infection. The risk is low with operations without implants, but with extensive operations involving the use of several screws the risk may rise to approximately 5%.

There is also a very small risk of subsequent haemorrhaging at the site of the operation. This often requires another operation.

In the long term there is a risk of fixed implants not growing in and the bone not healing correctly. This may lead to permanent neck problems and in certain cases may require another operation.

WHEN SHOULD YOU MAKE CONTACT?

As mentioned earlier in this brochure, serious complications are very rare.

However, you should contact our department in the following instances:

- ✓ New or worsening signs of neurological complications:
 - loss of strength in the arms or legs
 - loss of feeling or abnormal sensations in the arms or legs
 - problems walking, feeling of instability
 - problems urinating or passing stools
- ✓ Worsening pain in the neck, arms or legs
- ✓ Wound problems (e.g. secretions, blood loss, swelling, redness, opening of wound edges)
- ✓ Fever during the first 3 weeks after the operation

Obviously you can always contact us should you be worried for any other reason.

The hospital has a 24/7 emergency service for spinal problems, which is manned even at night and at weekends. Or, in the event of acute problems, you can go directly to our A&E department.

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Design and Production

This text was composed by the neurosurgery and orthopaedics departments in conjunction with the Communications Department.

This brochure is also available at www.uzleuven.be/en/brochure/701144.

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