

# CHAPTER ONE:

# THE BASICS

## A. ANATOMY of the VERTEBRAL COLUMN AND SPINAL CORD

### • The Bony Vertebral Column (Spinal Column)

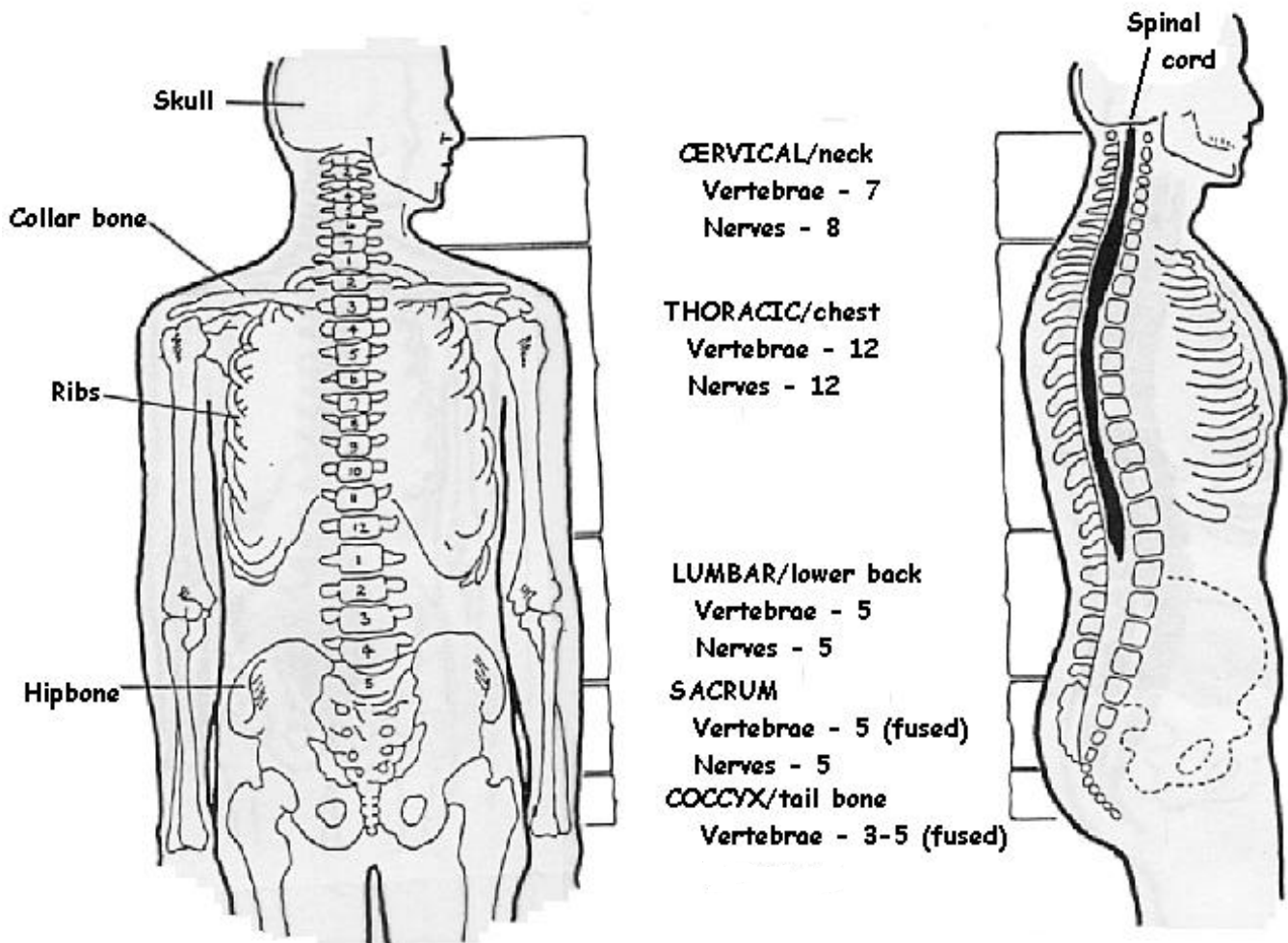
- Supports the head and encloses the spinal cord.
- There are 33 bones or **vertebrae** in the spine:
  - 7 **cervical** vertebrae in the neck
  - 12 **thoracic** vertebrae in the upper back corresponding to each pair of ribs
  - 5 **lumbar** vertebrae in the lower back
  - 5 **sacral** vertebrae are fused together to form 1 bone called the sacrum
  - and 4 **coccygeal** vertebrae that are also fused to form the **coccyx** or tailbone.
- We refer to the vertebrae by their name and number so that the cervical vertebrae are C1, C2, C3.....C7 where "C" stands for "cervical" and the number is the position of the vertebrae counting down from the head.
  - Therefore the thoracic vertebrae become T1 -T12
  - The lumbar are L1 - L5
  - And the sacrum and coccyx do not have numbers and each is thought of as one bone.

### ▪ The Spinal Cord

- Is an extension of the brain that runs down the back and is surrounded and protected by the bony vertebral column.
- It is surrounded by fluid that acts as a buffer to protect the delicate nerve tissues.
- It consists of millions of nerve fibres that transmit information to and from the limbs, trunk and organs of the body.
- Nerves called the **spinal nerves or nerve roots** come off the spinal cord and pass out between the bones to carry the information from the spinal cord to the rest of the body:

- **cervical nerves** (nerves in the neck) supply movement and feeling to the arms, neck and upper trunk
- **thoracic nerves** (nerves in the upper back) supply the trunk and abdomen
- **lumbar and sacral nerves** (from the lower back) supply the legs, the bladder, bowel and sexual organs.

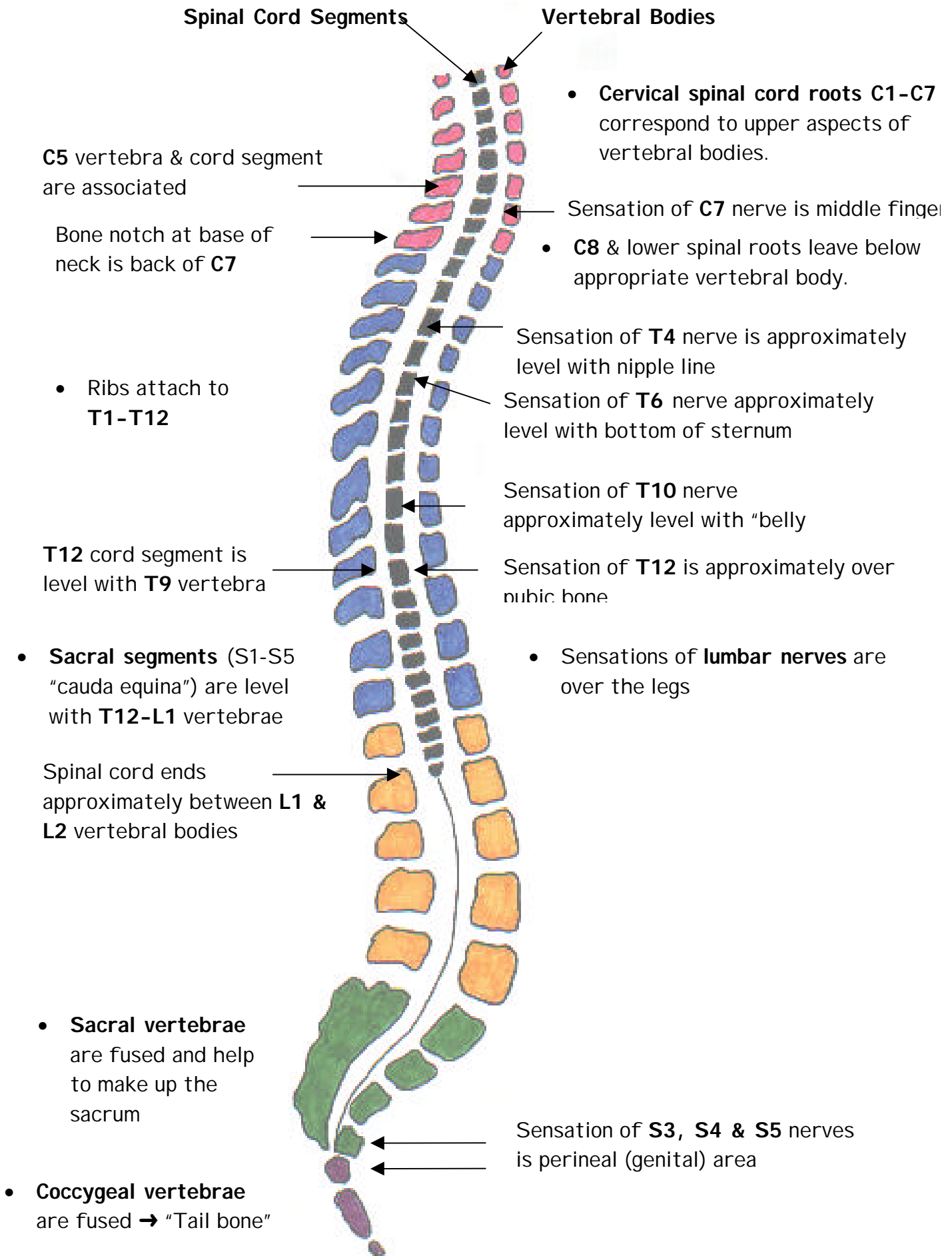
- The spinal nerves carry information from different levels (segments) in the spinal cord. Both the nerves and the segments in the spinal cord are numbered in the same way as the bones:
  - So the cervical nerves and spinal cord segments are called C1-C8, the thoracic are T1-T12, lumbar are L1-L5 and sacral are S1-S5.



## The Vertebral Column and Spinal Cord

## • How do the vertebrae relate to the spinal cord ?

- The level of the spinal cord segments do not relate exactly to the level of the vertebral bodies i.e. damage to the bone at a particular level e.g. L5 vertebrae does not necessarily mean damage to the spinal cord at the same level.
- This is because there are:
  - 7 cervical vertebrae but 8 cervical nerve roots leaving the cord
  - the thoracic spinal cord segments are compressed into the level between the T1-T10 vertebrae
  - the lumbar and sacral segments are at the level of the T11 and T12 vertebrae
  - the spinal cord ends around the level of the disc between T12 and L1 vertebrae
  - below this level is an extension of the spinal cord called the **cauda equina** (which means “horses tail” in Latin). The cauda equina consists of some of the spinal nerves that are continuing down before they pass out between the vertebrae.



**Relationship between spinal cord segments and vertebral bodies**

## What are the myotomes ?

- Each muscle in the body is supplied by a particular level or segment of the spinal cord and by its corresponding spinal nerve. The muscle, and its nerve make up a **myotome**.
- This is approximately the same for every person:
  - C3,4 and 5 supply the diaphragm (the large muscle between the chest and the belly that we use to breathe)
  - C5 also supplies the shoulder muscles and the muscle that we use to bend our elbow
  - C6 is for bending the wrist back
  - C7 is for straightening the elbow
  - C8 bends the fingers
  - T1 spreads the fingers
  - T1 -T12 supplies the chest wall and abdominal muscles
  - L2 bends the hip
  - L3 straightens the knee
  - L4 pulls the foot up
  - L5 wiggles the toes
  - S1 pulls the foot down
  - S3,4 and 5 supply the bladder, bowel and sex organs and the anal and other pelvic muscles

## What are the dermatomes ?

- each part of the skin is supplied by a particular segment of the spinal cord and its corresponding spinal nerve.
- This is approximately the same for every person.

The Dermatomes (areas of the skin supplied by each segment of the spinal cord and the corresponding spinal nerve)

