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# GRAY'S ATLAS OF ANATOMY



**Richard L. Drake   A. Wayne Vogl   Adam W.M. Mitchell**  
**Richard M. Tibbitts   Paul E. Richardson**



Third Edition



# GRAY'S ATLAS OF ANATOMY

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THIRD EDITION

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# Copyright

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# Dedication

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To my wife who supports me and to my parents who are always  
with me.

*Richard L. Drake*

To my family, to my professional colleagues and role models, and to  
my students.

*A. Wayne Vogl*

Thanks, to Cathy, Max and Elsa

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To my wife Fern, Junior, Ava and Henry, to Lesley and in memory of  
AMR and JER

*Paul E. Richardson*

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# FOREWORD

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A working knowledge of anatomy is not an “optional extra” for health care professionals – it is fundamental. Acquiring that knowledge has always challenged even the most motivated students. Over many generations, learning materials that aid the process effectively have been warmly welcomed by students and their teachers (and by patients, who are the ultimate beneficiaries of that knowledge). I remember my own students’ response when I first included illustrations from *Gray’s Anatomy for Students* in a lecture – afterward, I was asked repeatedly for the source of the marvelous pictures. Looking beyond the “wow” factor that leapt from the pages of the book, it was clear that an enormous amount of thought and skill had gone into producing the artwork.

This atlas contains a series of additional outstanding pieces of anatomical art from the illustrative team of Richard Tibbitts and Paul Richardson that will complement those in *Gray’s Anatomy for Students*, combined with relevant clinical pictures, surface anatomy, and images from a range of modern imaging procedures. Of course, anatomy cannot be learned from books and interactive DVDs alone, no matter how excellent they may be. Anatomy is a practical subject, best learned by gaining hands-on experience of the body. Students should spend as much time as they can examining cadaveric dissections (if they do not have the opportunity to dissect themselves) and should always read from screen or page with the appropriate bones in front of them. They need to combine and correlate information from a wide variety of sources in order to gain the working knowledge mentioned earlier.

This atlas will provide a valuable companion to their studies, and I am confident that it will remain in their libraries long after they have completed the early stages of their training.

**Susan Standring, MBE, PhD, DSc, FKC, Hon FRCS,** Emeritus Professor of  
Anatomy, King’s College, London



مدیسکا

*Medisca*

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# FOREWORD

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We began working on *Gray's Atlas of Anatomy* in 2005 following the publication of our textbook, *Gray's Anatomy for Students*. We wanted to produce an atlas that would build on themes and concepts established in the textbook and that would couple artistic renderings of “internal” gross anatomy with actual “living” anatomy, as visualized with modern imaging techniques and with surface anatomy. We believe that the final atlas, now in its third edition, presents a fresh and integrated approach to anatomy that is accessible to entry-level students in anatomy, as well as to students at more advanced levels.

Because an atlas is used in a much different way than a textbook, we could not simply repackage figures used in *Gray's Anatomy for Students* and put them in the atlas. Consequently, most of the figures in the atlas are new and were designed to present structures in a more complete context than in the textbook, even though the color palette and overall look of the figures in both the atlas and textbook are similar. Also, figures in the atlas provide additional detail not included in the textbook and directly correlate artistic representations of anatomy with computed tomography (CT) and magnetic resonance imaging (MRI). Where appropriate, we have included endoscopic, laryngoscopic, and laparoscopic views of the anatomy and have included examples of ultrasound images. In a number of regions, we also have reconstructed the internal anatomy of patients by abstracting specific information from multiple MR or CT images, and we present these reconstructions together with artwork of the same anatomy. Although the artwork was done independently of the reconstructed images, the two types of representations are strikingly similar.

Each page of this atlas was planned prior to beginning work on the figures, and all of the artwork was generated digitally. Most of the figures were created from an extensive digital database created for the textbook. In this third edition, we have updated the images and added a few new ones in response to feedback from our readers.

We hope that the textbook and this edition of the atlas used together will provide powerful learning tools for students of human gross anatomy.

The Authors



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# PREFACE

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This 3rd edition of *Gray's Atlas of Anatomy* continues in the tradition of the first two editions, coupling artistic rendering with actual living anatomy as visualized with modern imaging techniques and surface anatomy. The combination of modern illustrations, imaging, and surface anatomy is unique among atlases available today.

At the end of every chapter, tables and schematic drawings allow for quick review of subject matter. These include major nerves plexuses throughout the body, branching patterns of major arteries, summaries of muscles organized into compartments or regions, and other helpful information. This material is designed to provide the reader quick access to information.

It's our hope that the 3rd edition of *Gray's Atlas of Anatomy* will become a valuable learning aid for students encountering anatomy for the first time or for the individual seeking to review information critical to their daily experiences.

The Authors



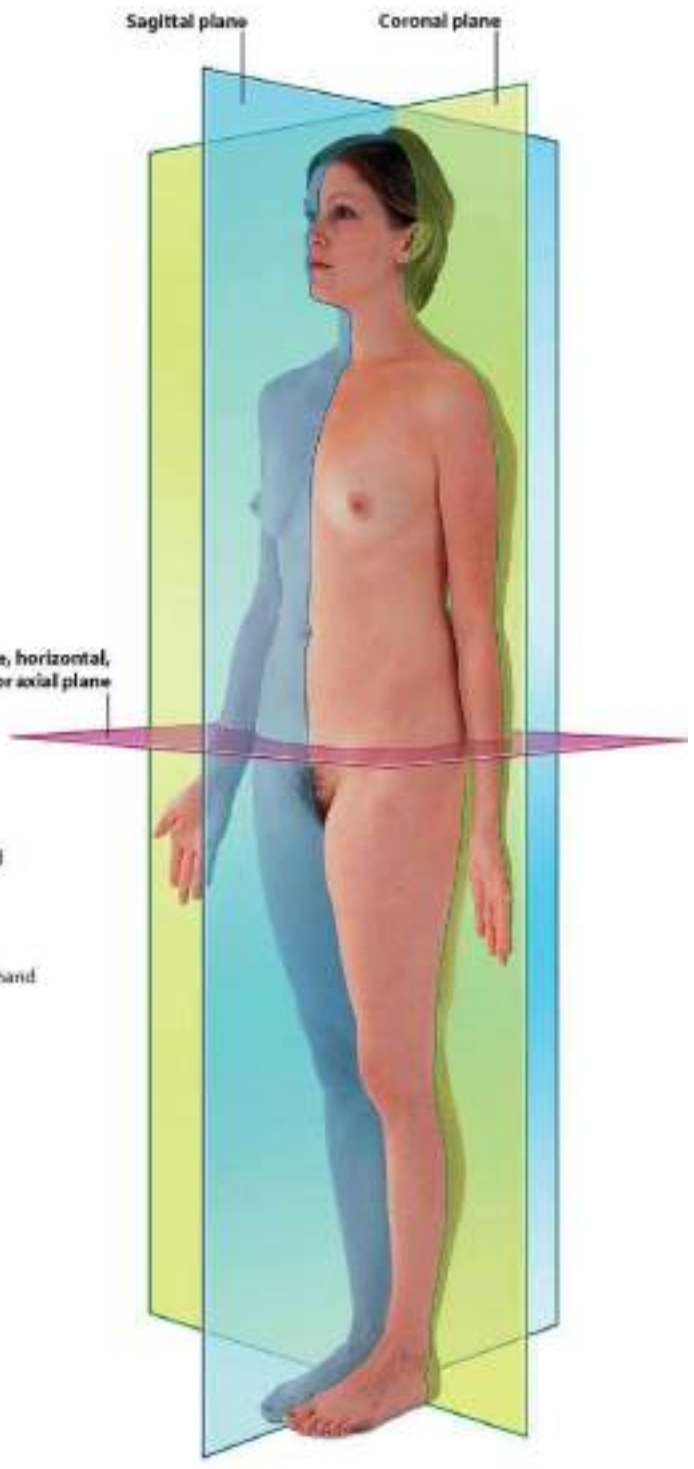
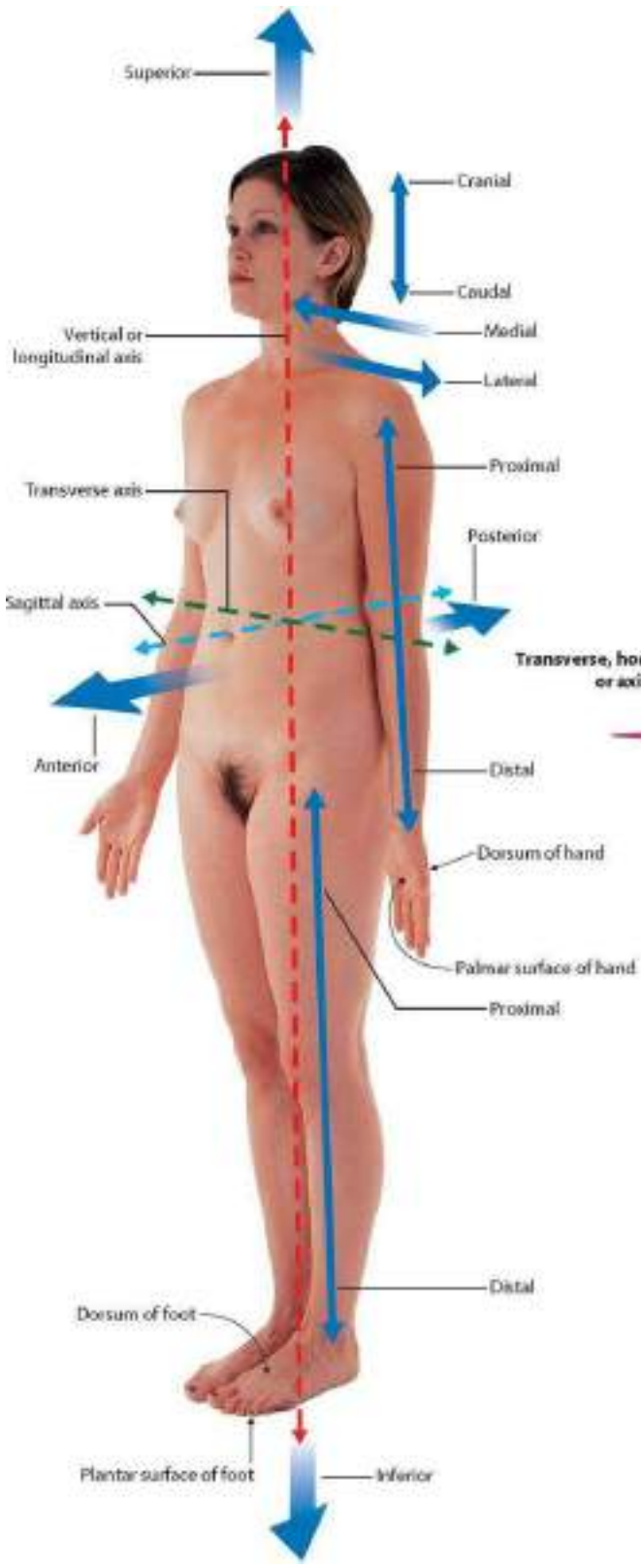
# THE BODY

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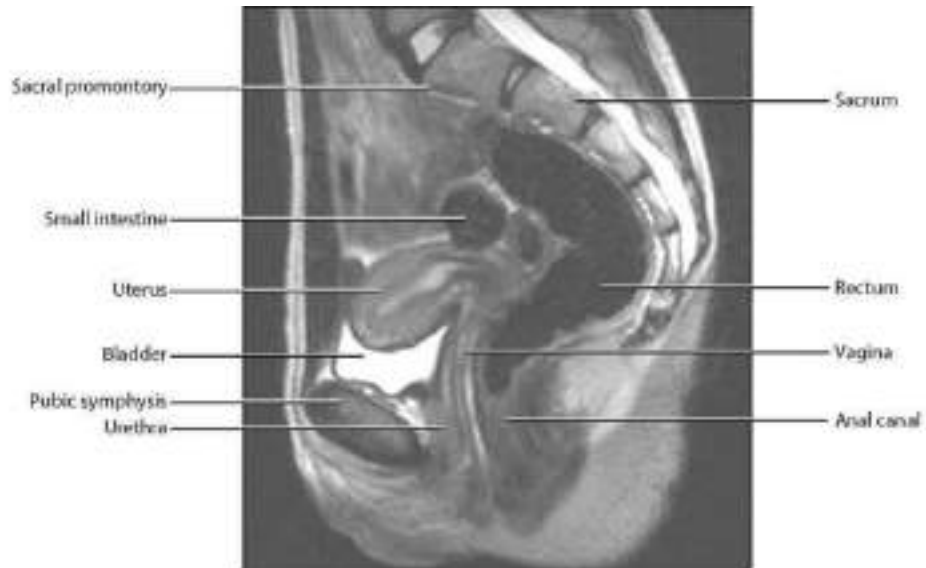
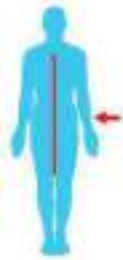
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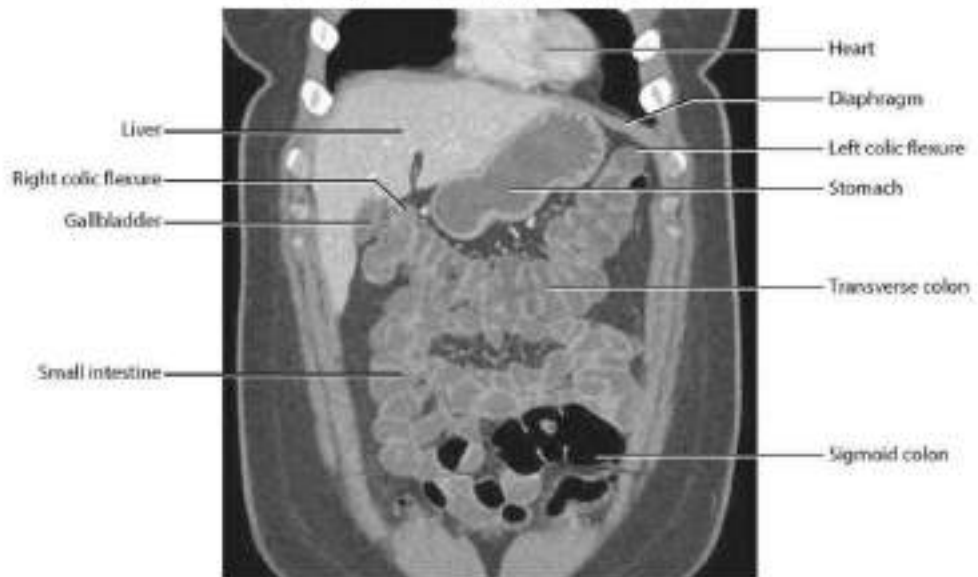
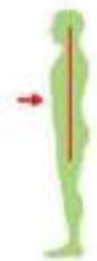
# **Anatomical position, terms, and planes**



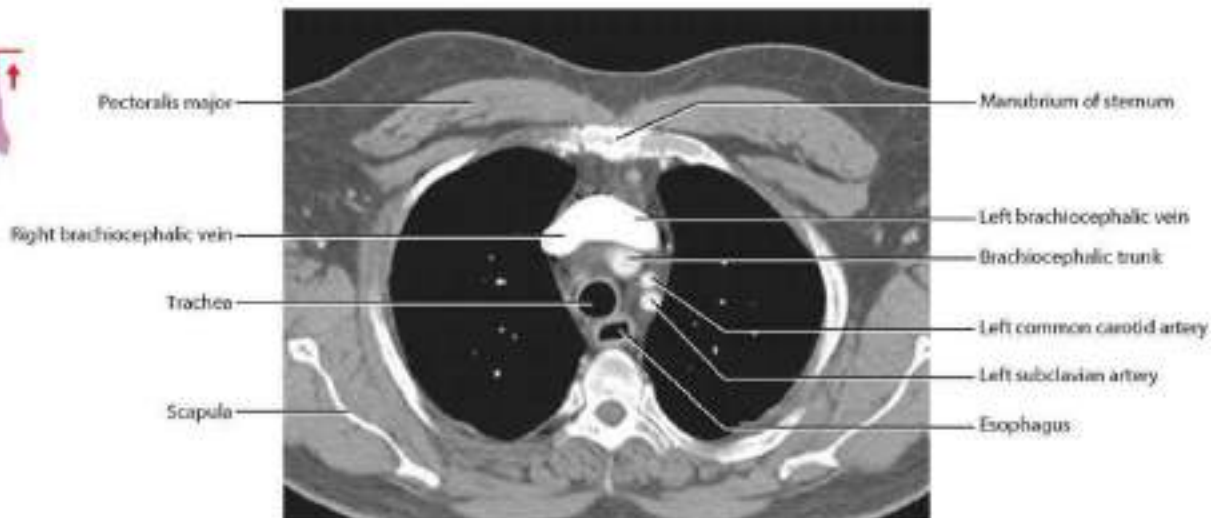
# Anatomical planes and imaging



T2-weighted MR image, in sagittal plane



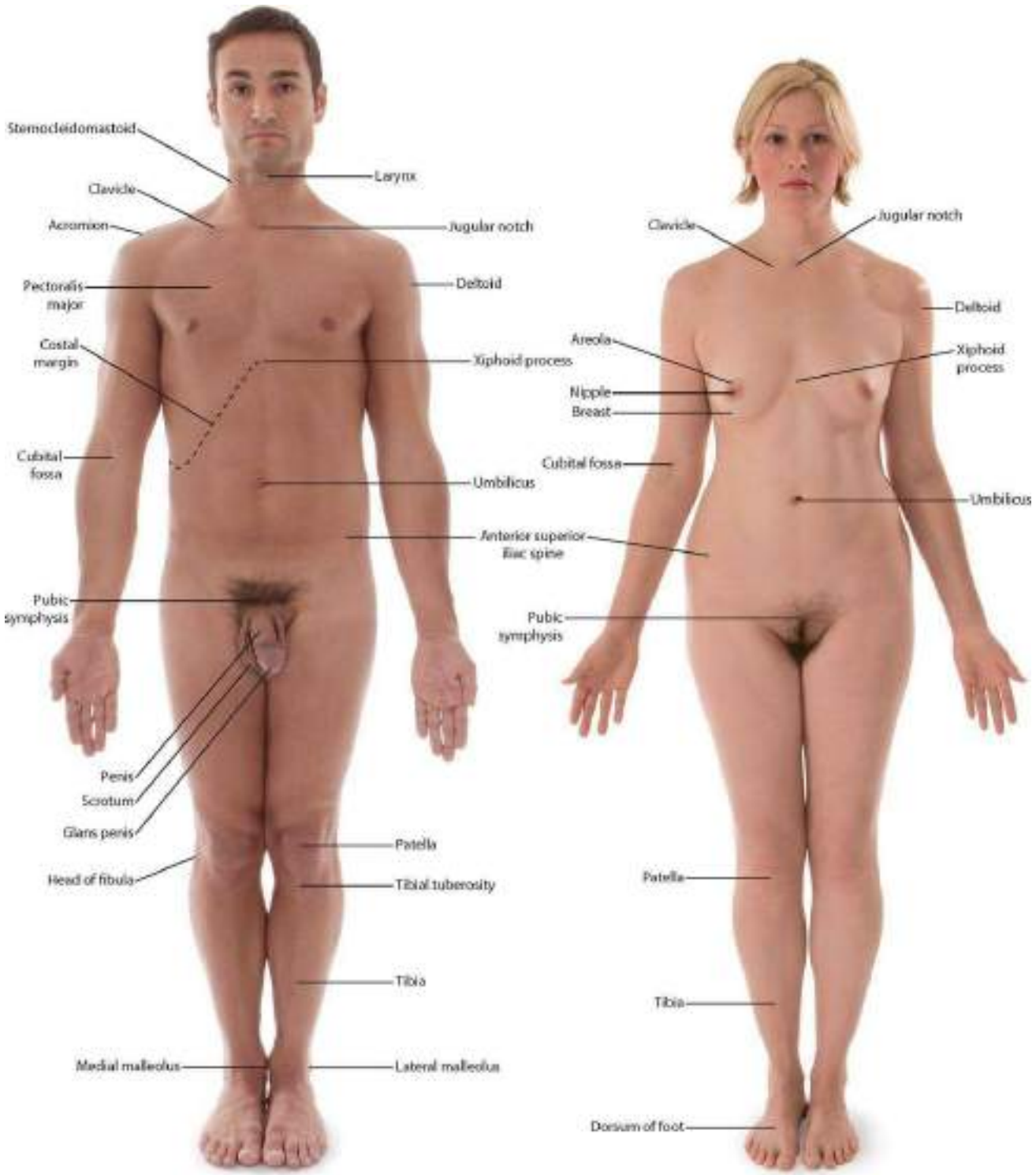
CT image, with contrast, in coronal plane



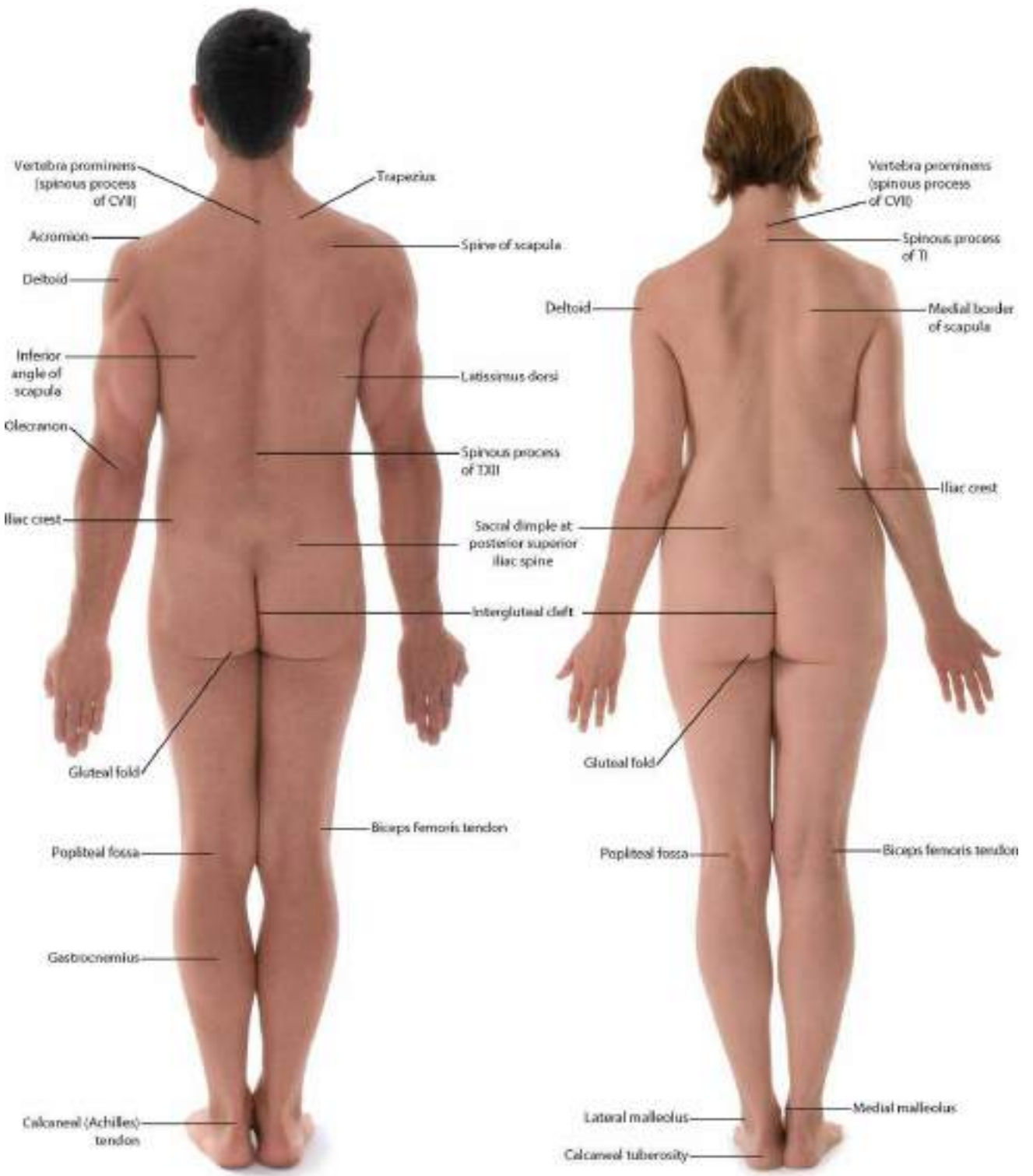
CT image, with contrast, in axial plane



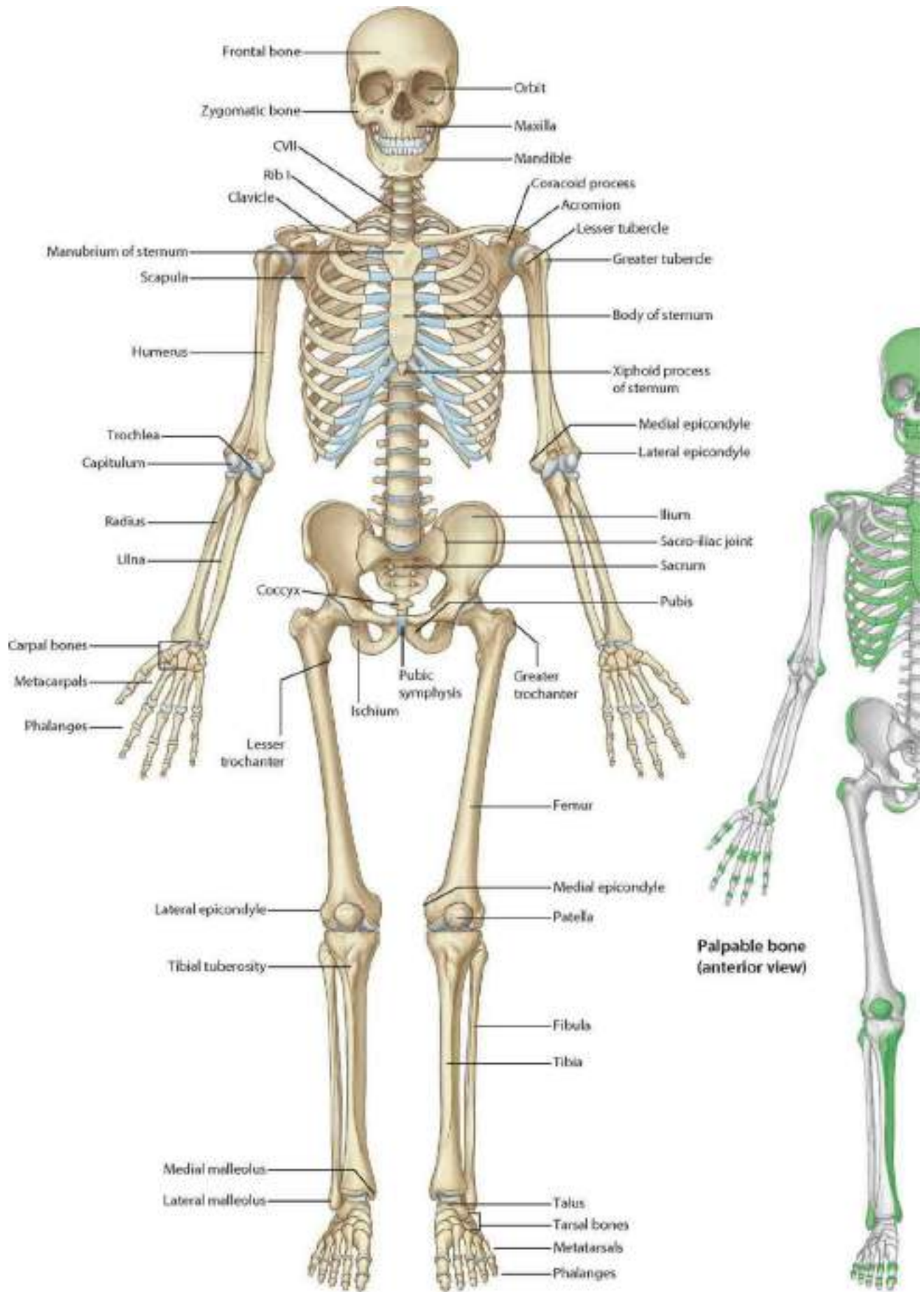
## Surface anatomy: anterior view



## Surface anatomy: posterior view

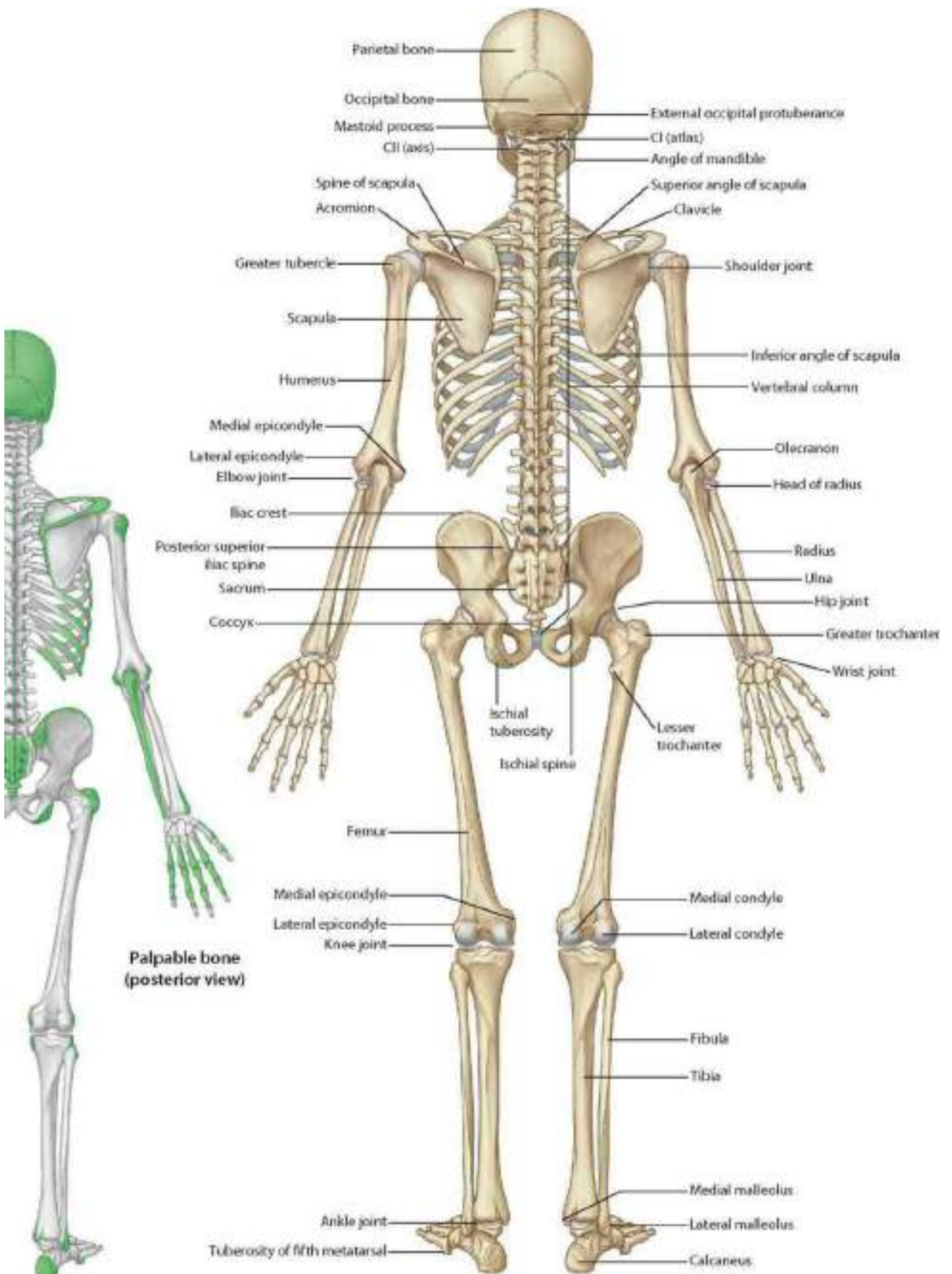


## **Skeleton: anterior**

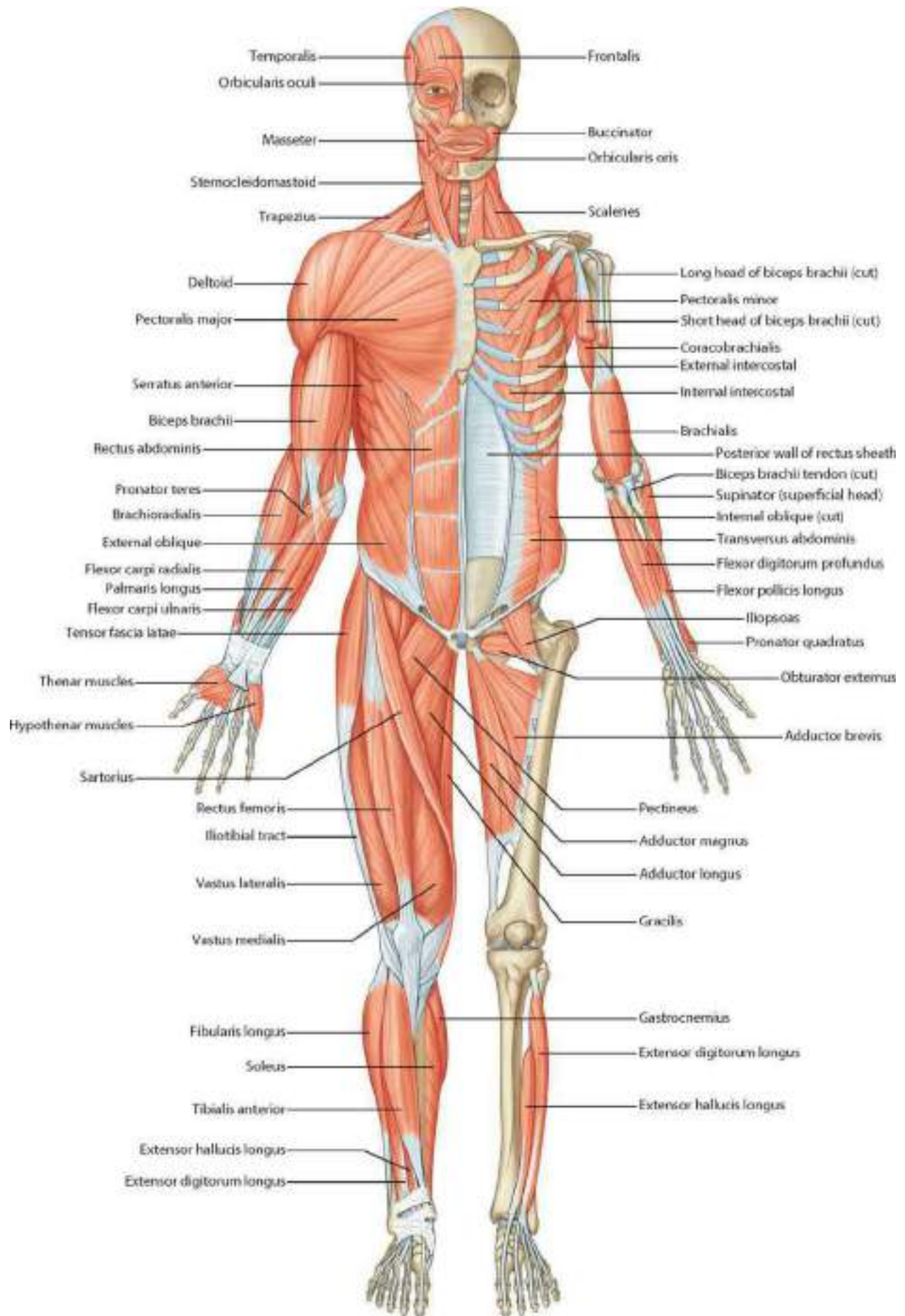




## **Skeleton: posterior**

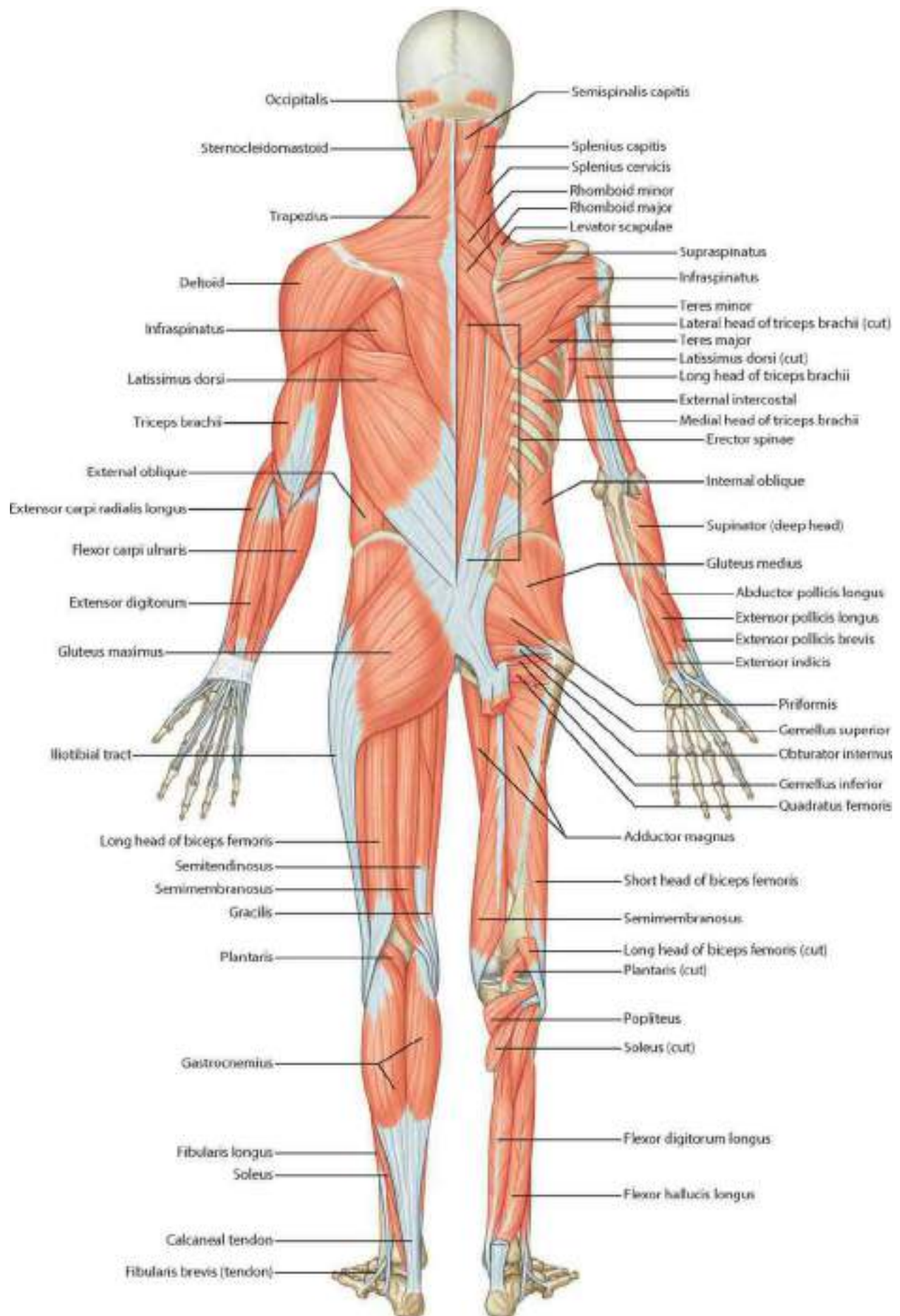


## **Muscles: anterior**





## **Muscles: posterior**



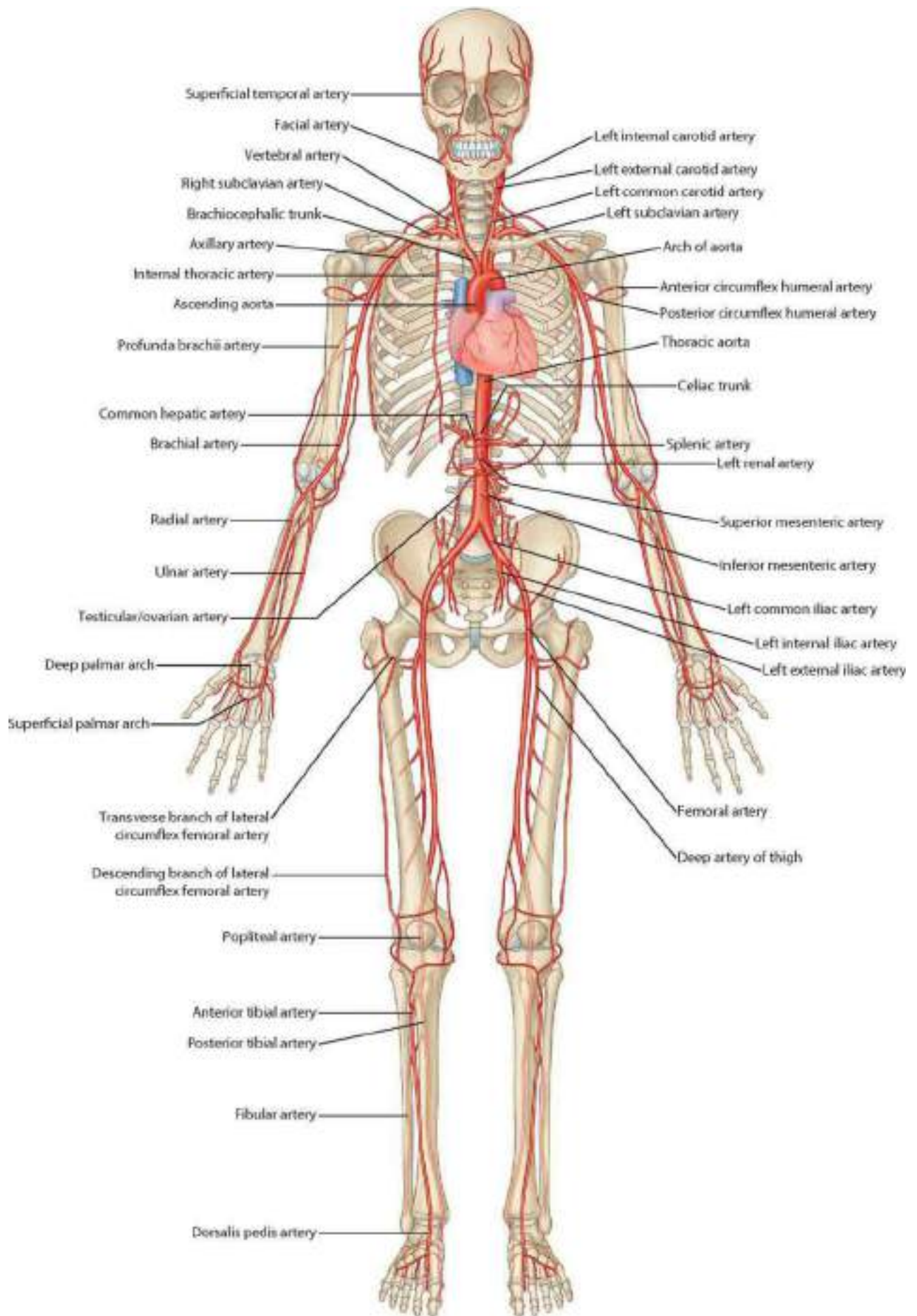


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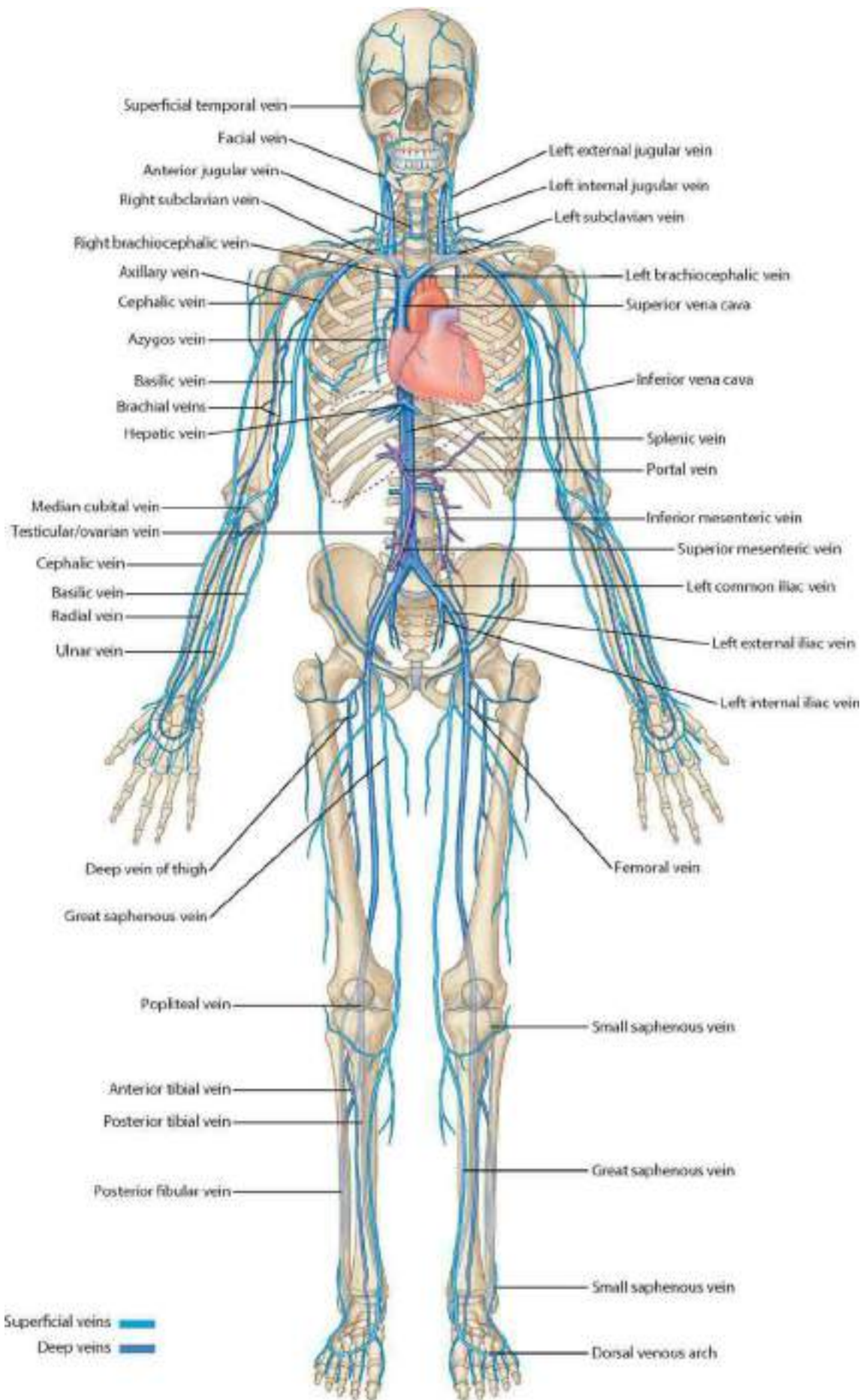
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# Vascular system: arteries



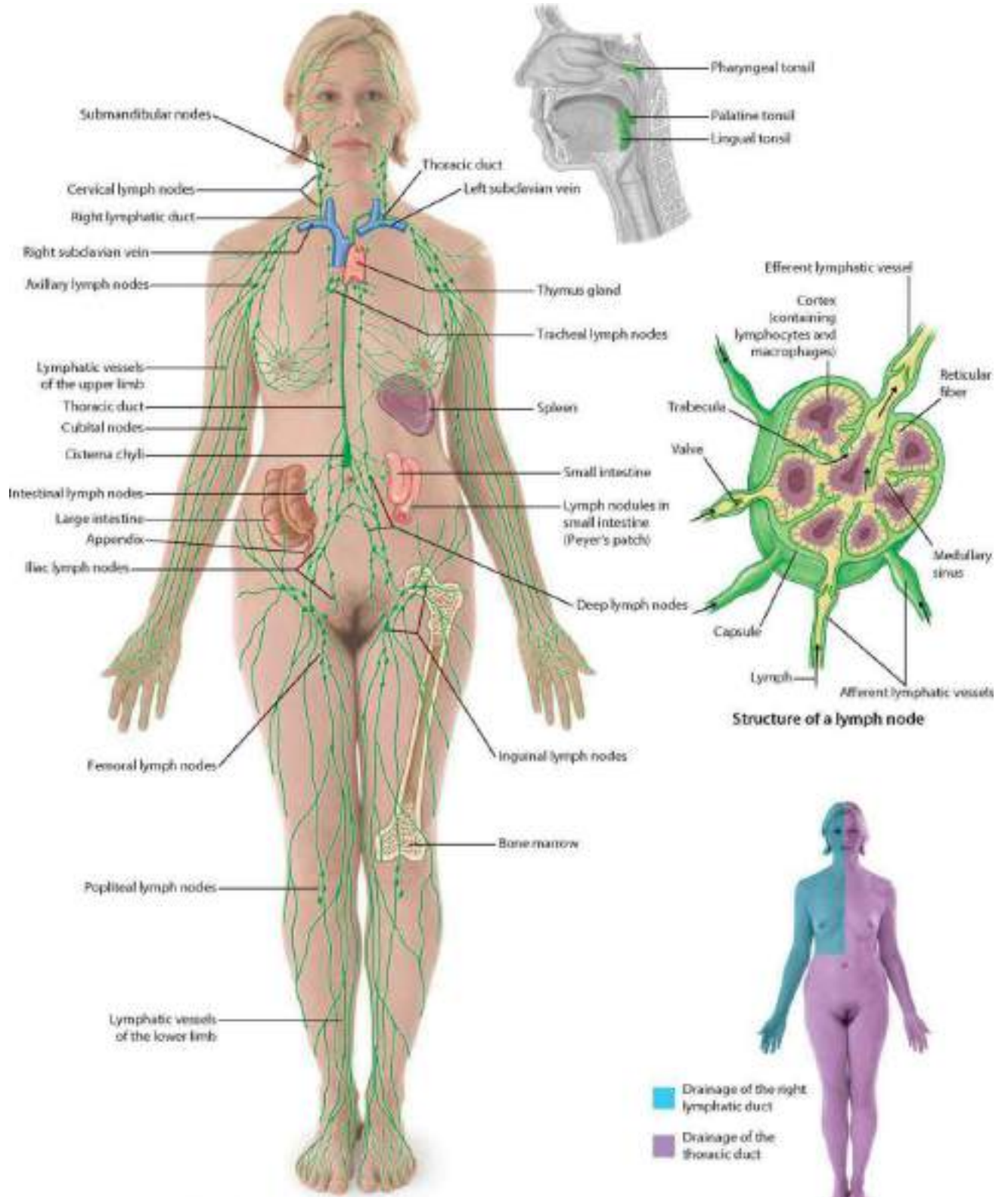


# Vascular system: veins





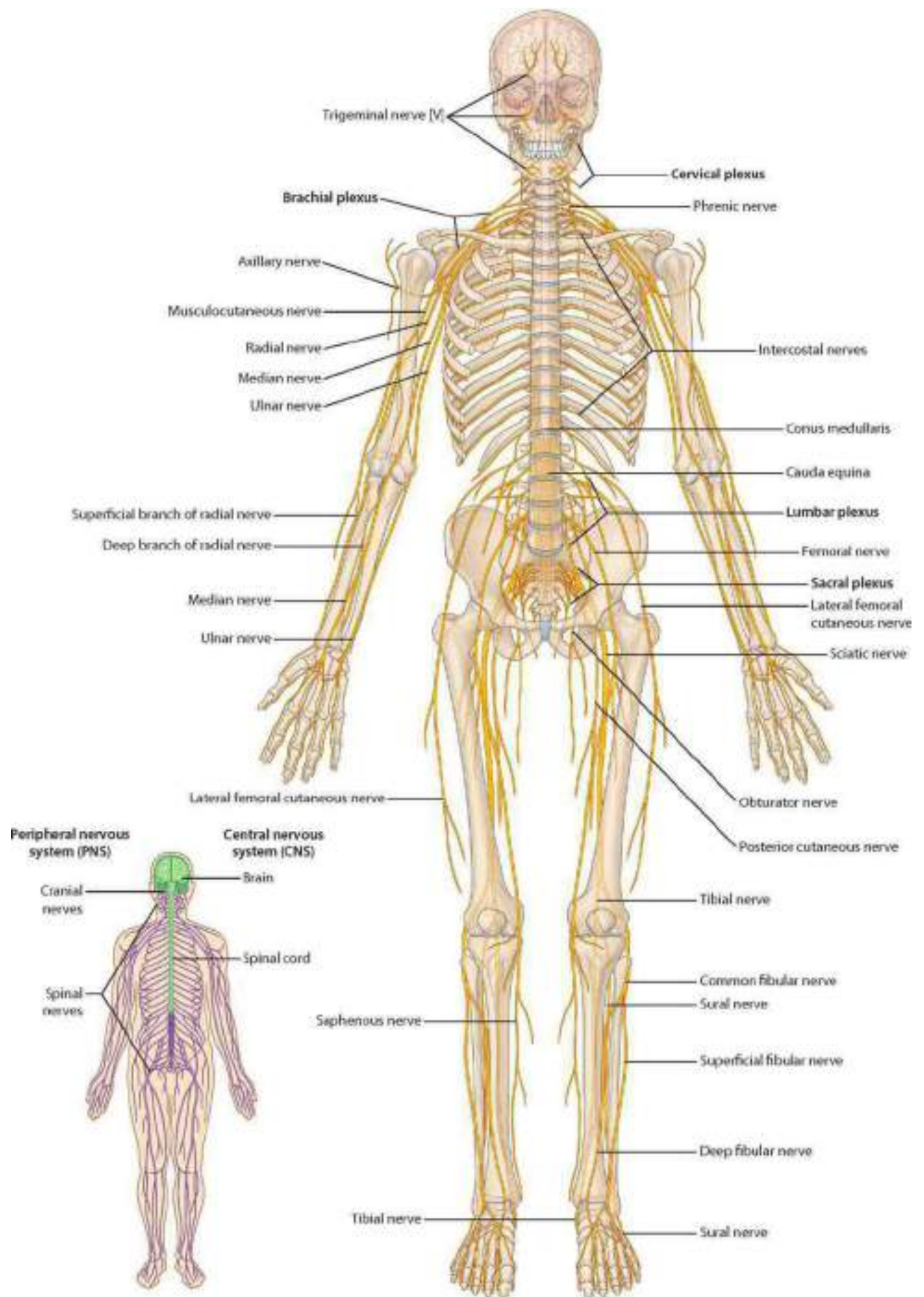
# Lymphatic system



Principal components of the lymphatic system

■ Drainage of the right lymphatic duct  
■ Drainage of the thoracic duct

# Nervous system

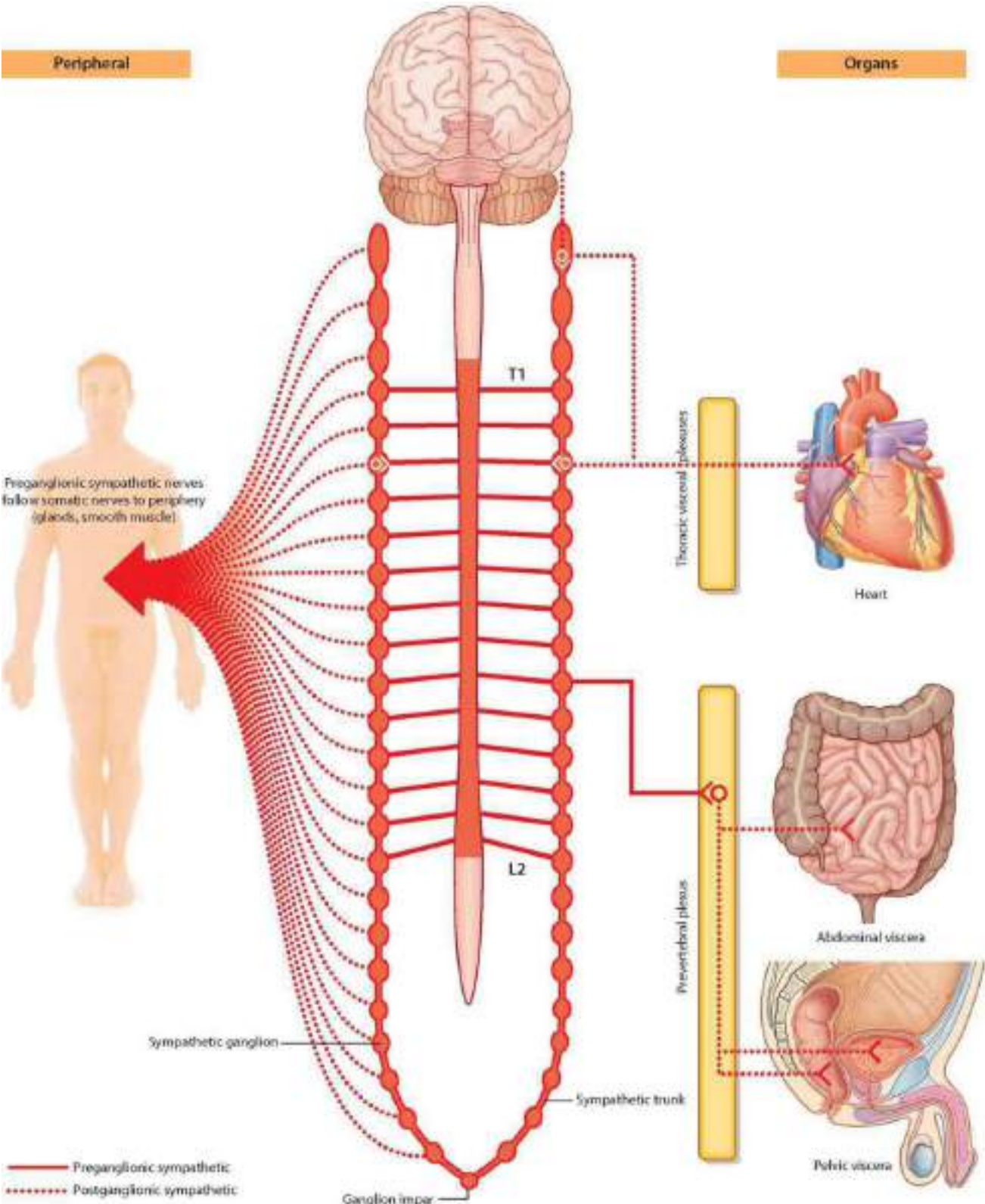




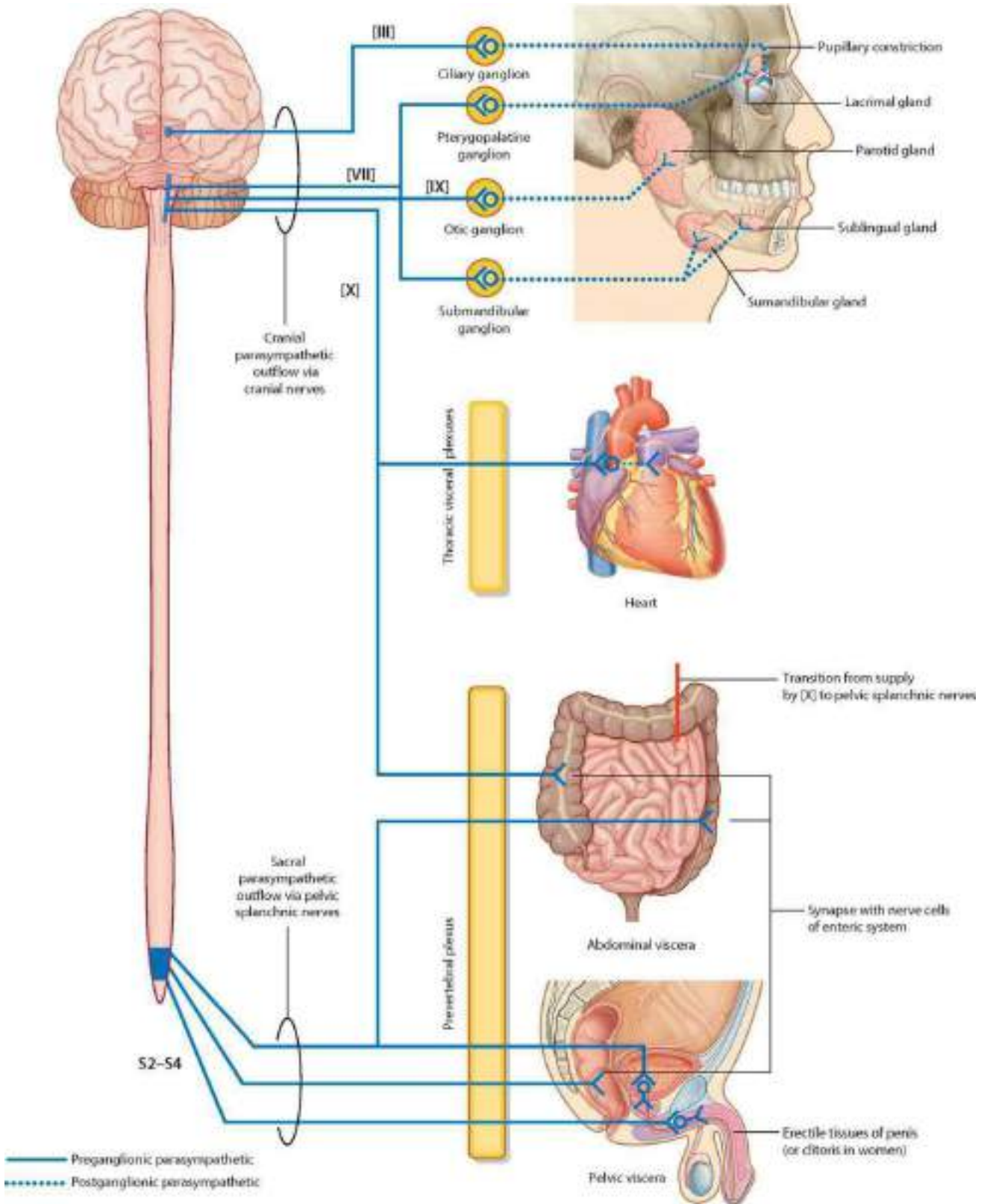
# Sympathetics

Peripheral

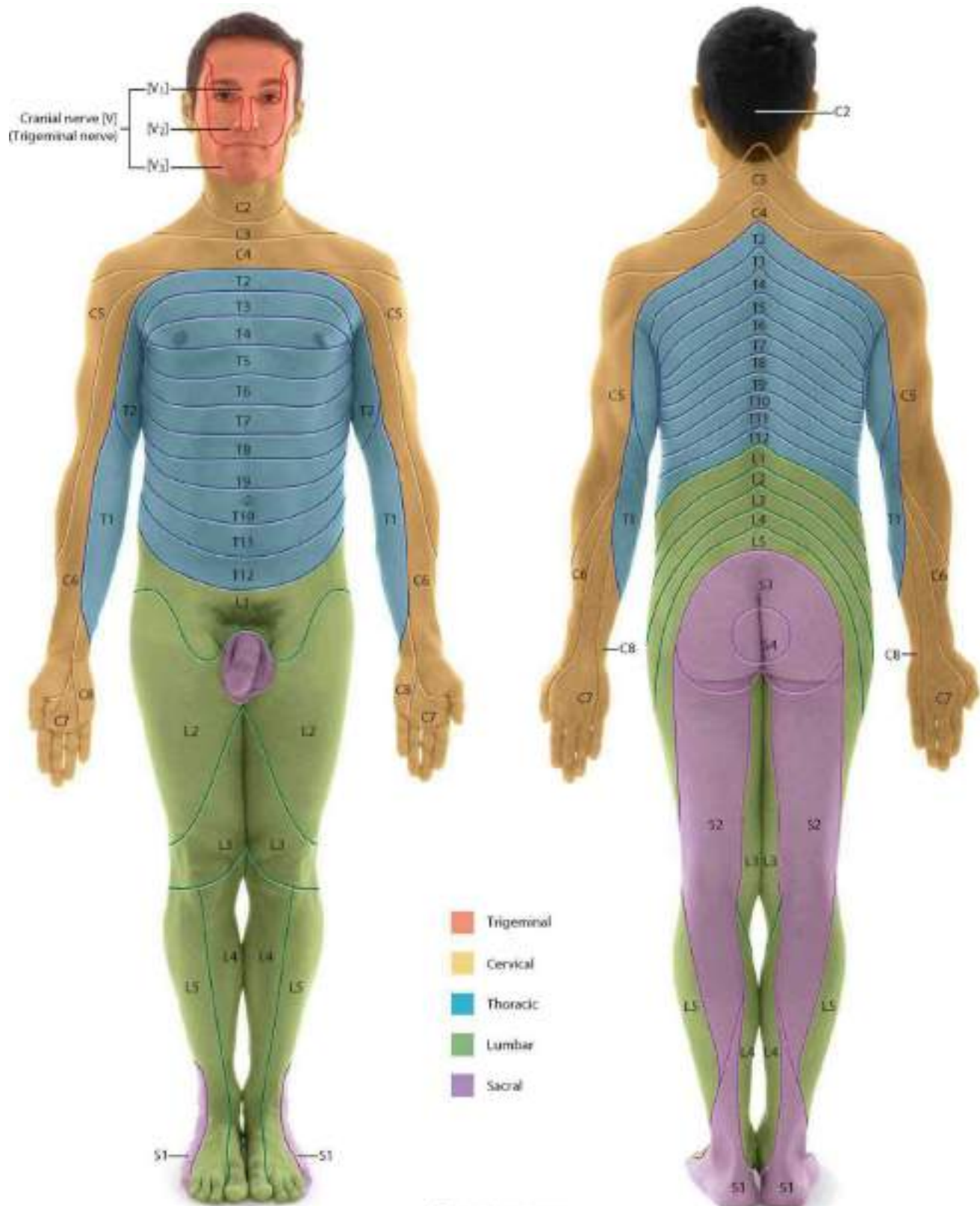
Organs



# Parasympathetics

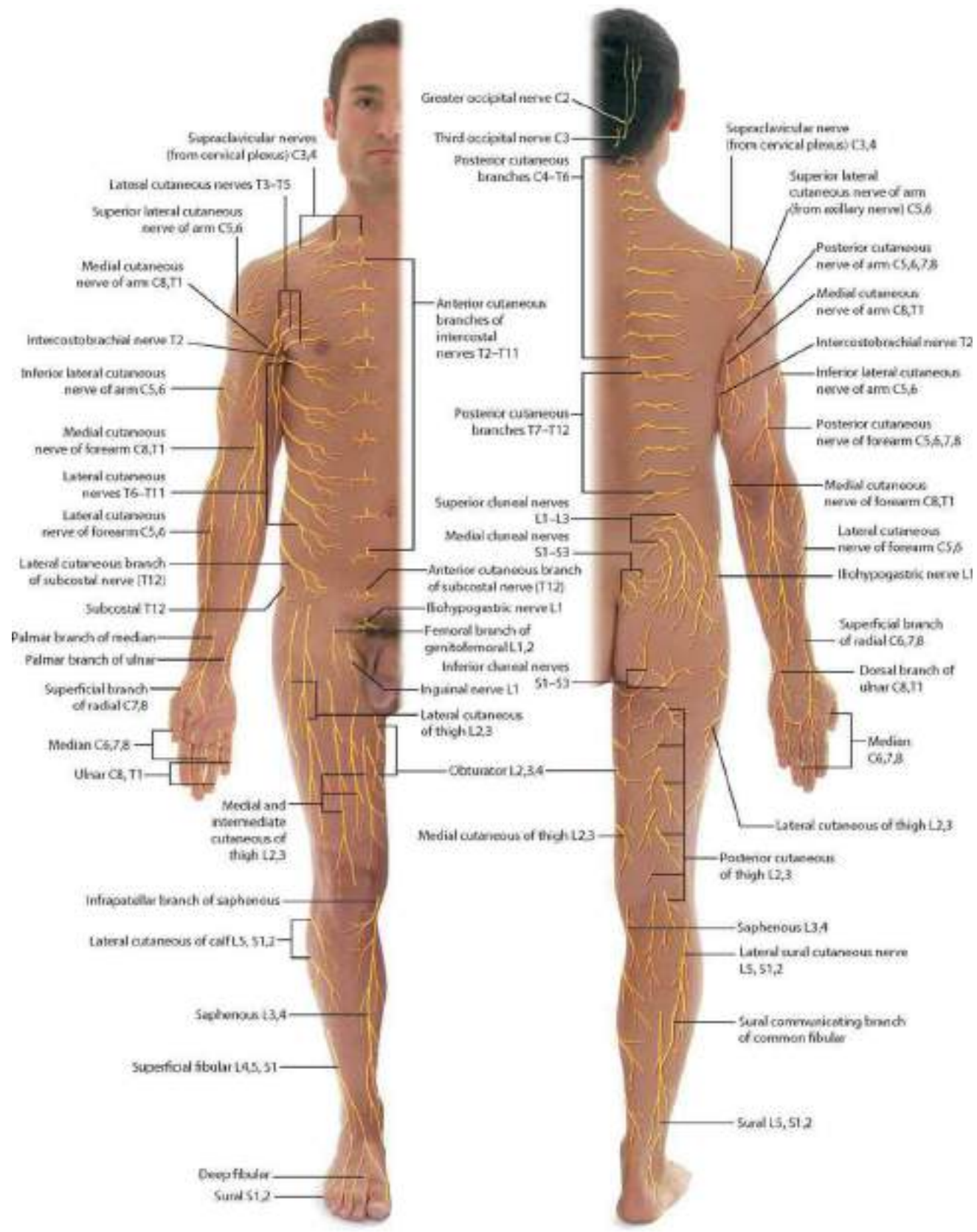


# Dermatomes



Dermatome map  
(cutaneous distribution of nerves)

# Cutaneous nerves





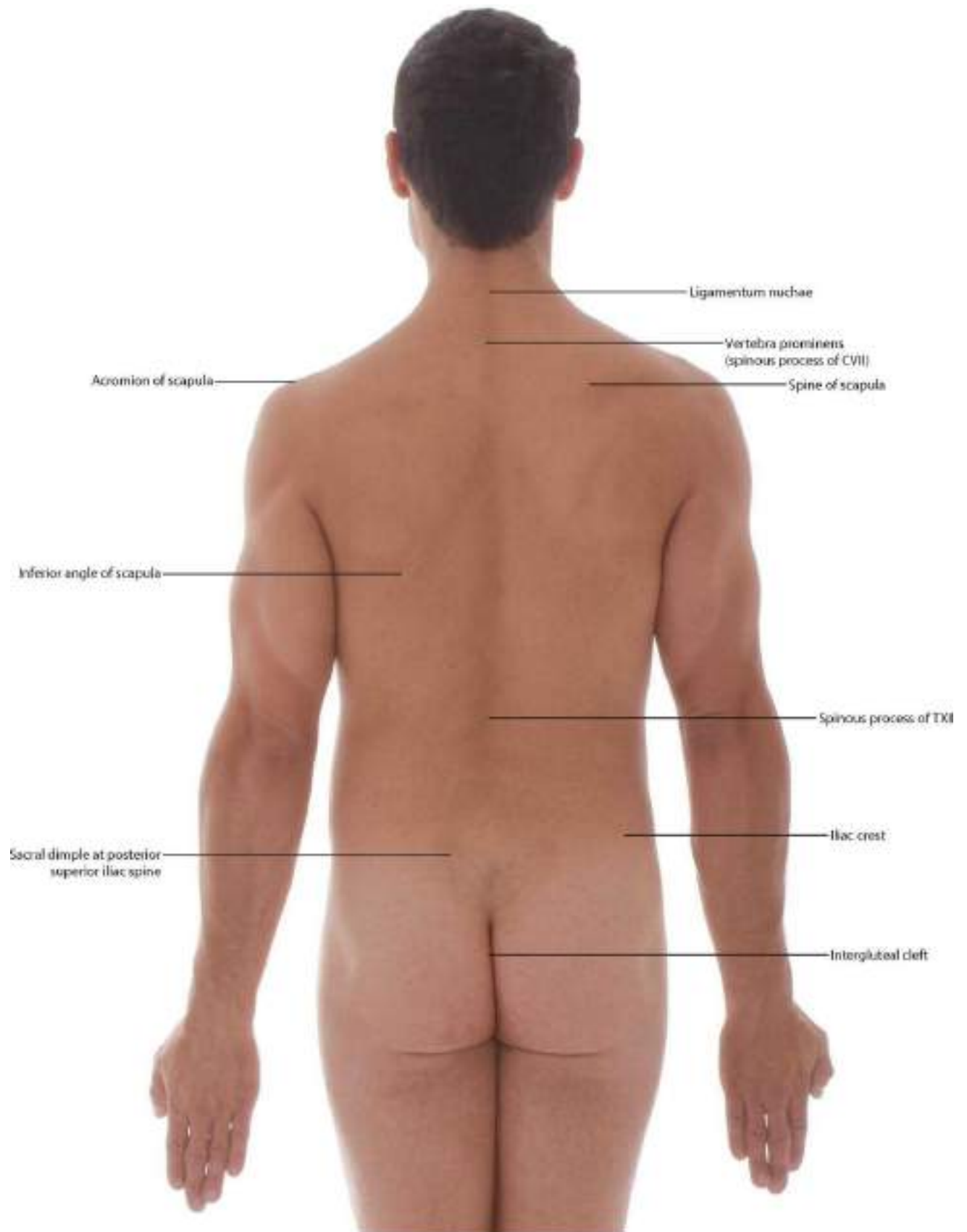
**BACK**

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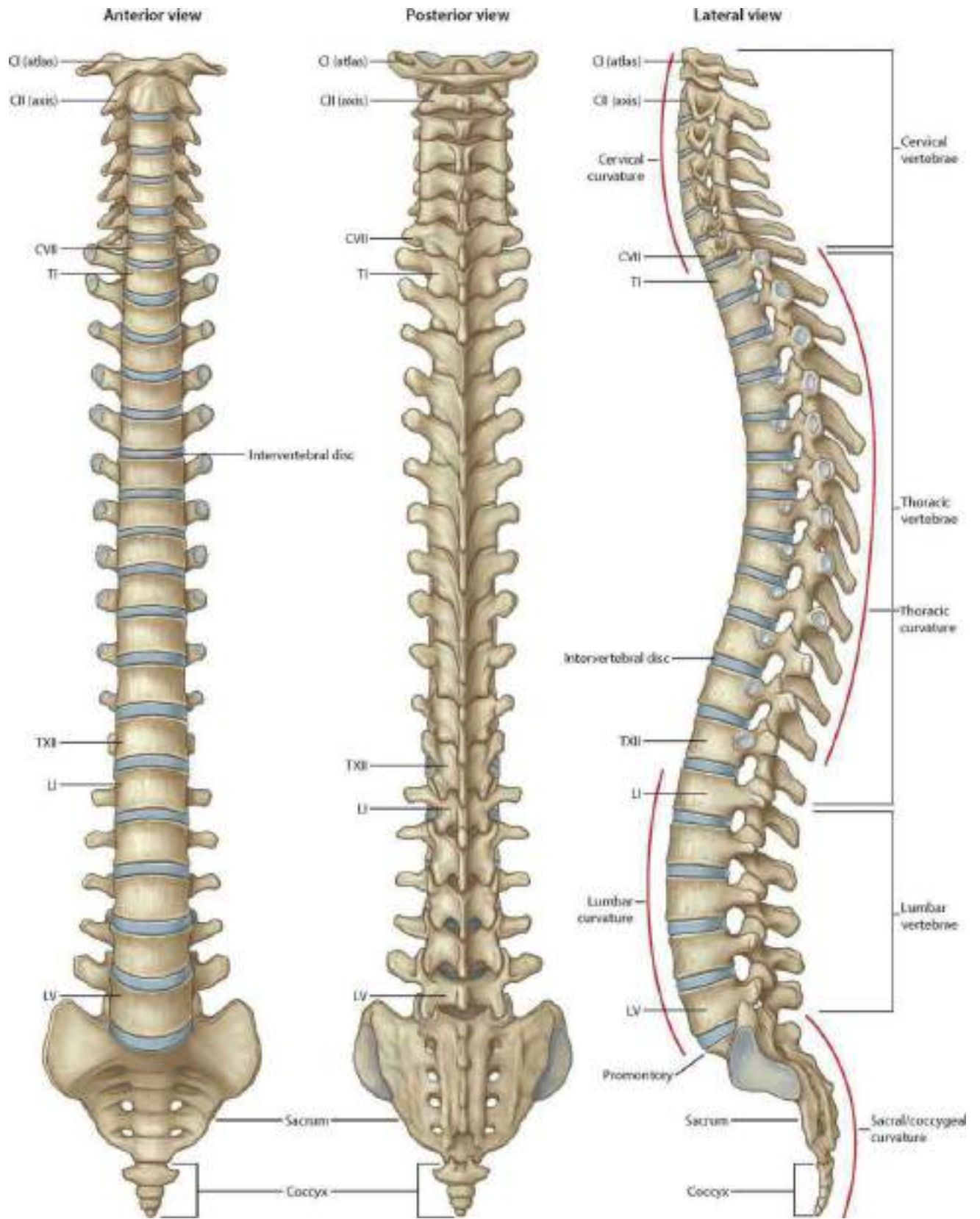
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# Surface anatomy

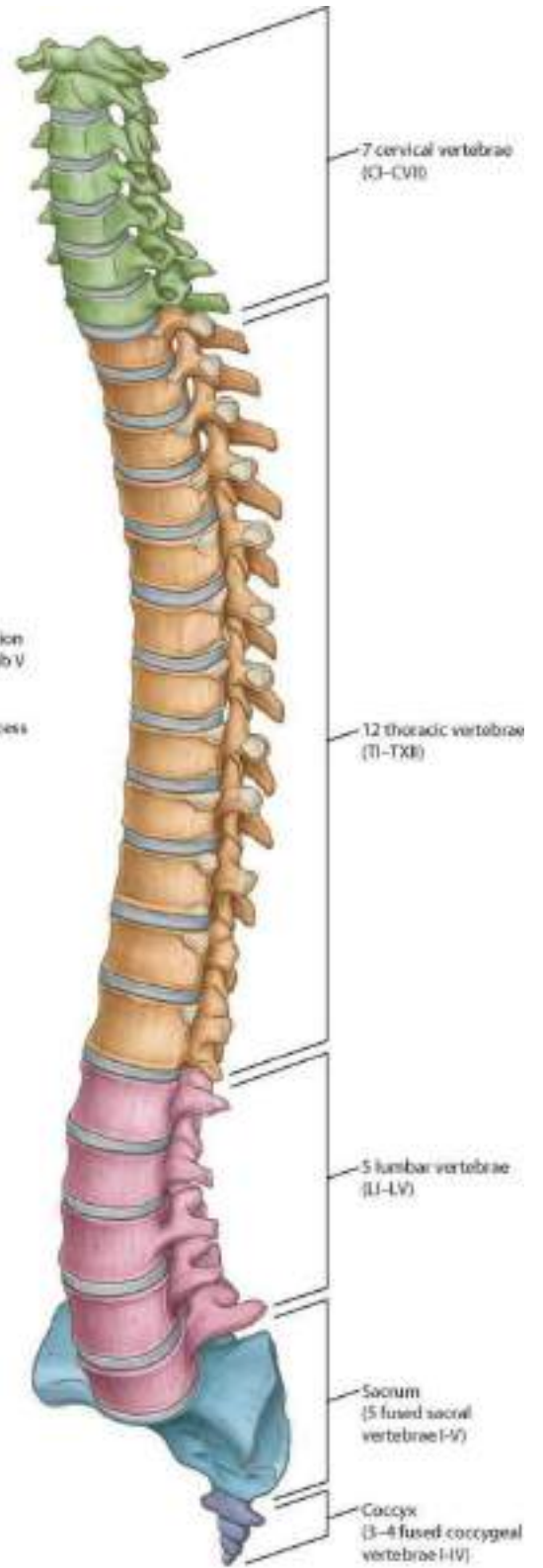
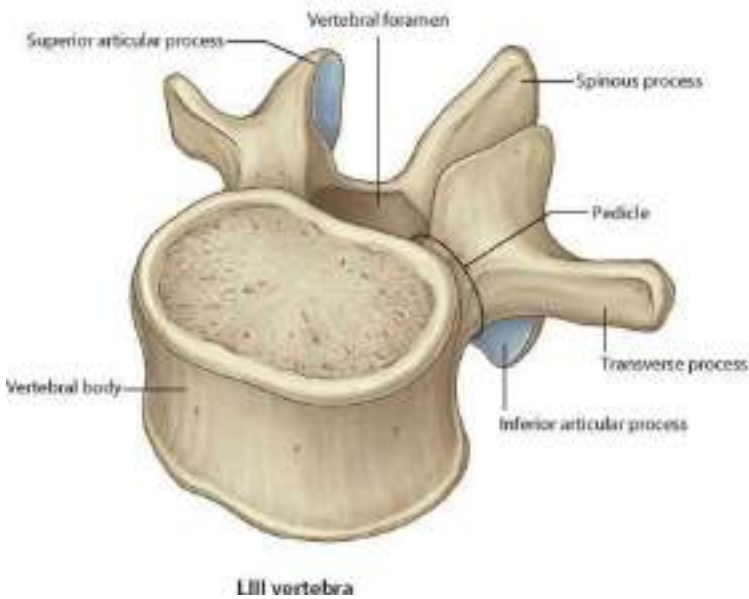


Surface anatomy of the back

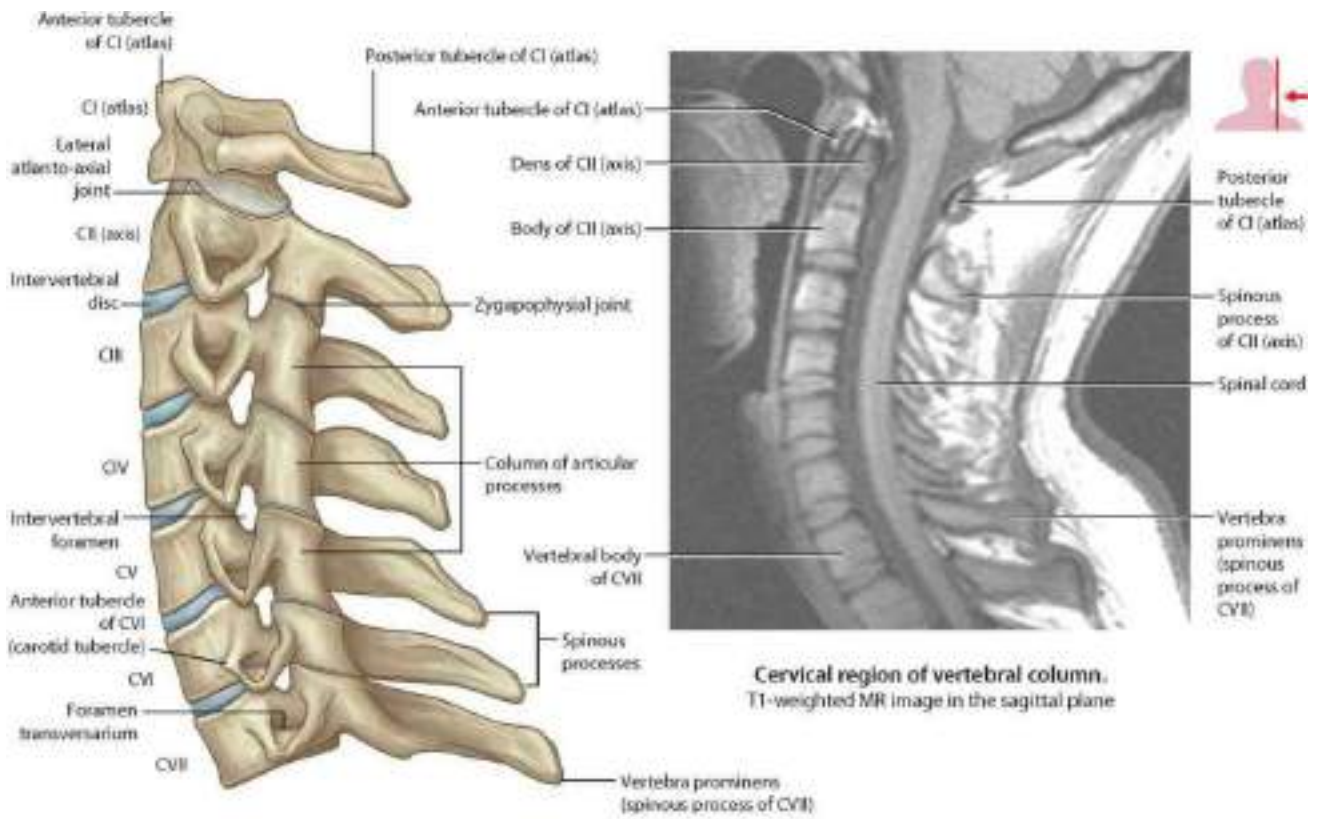
# Vertebral column



# Regional vertebrae



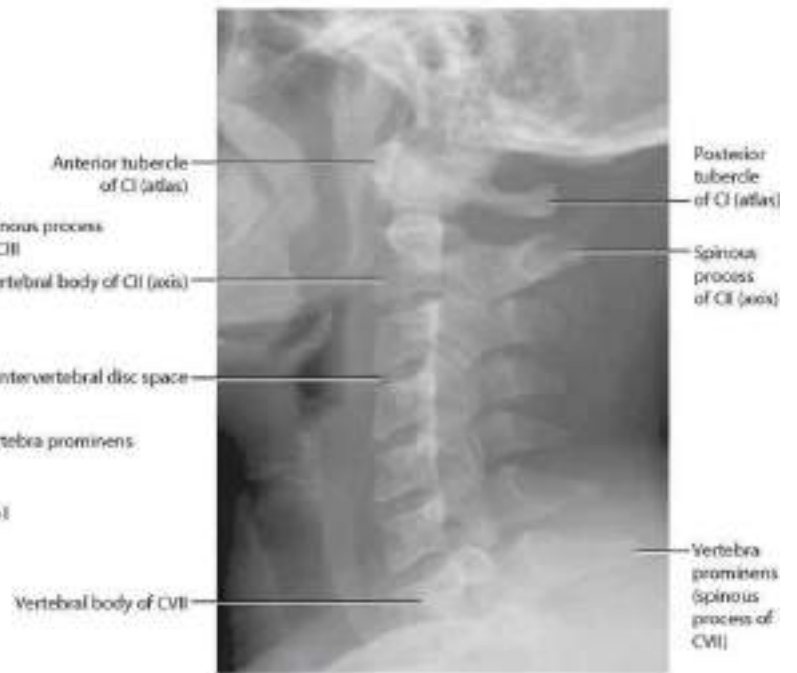
# Cervical vertebrae



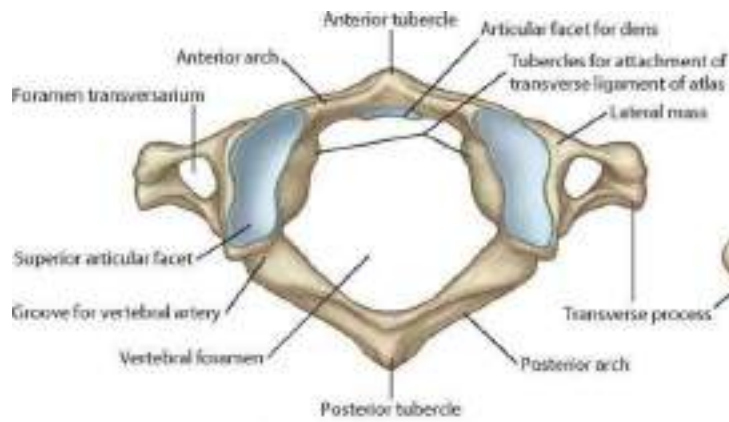
**Cervical vertebrae lateral view**



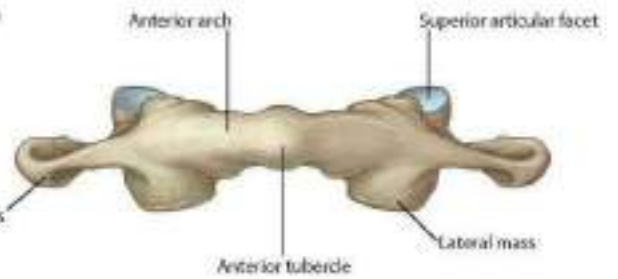
**Cervical region of vertebral column. Radiograph, AP view**



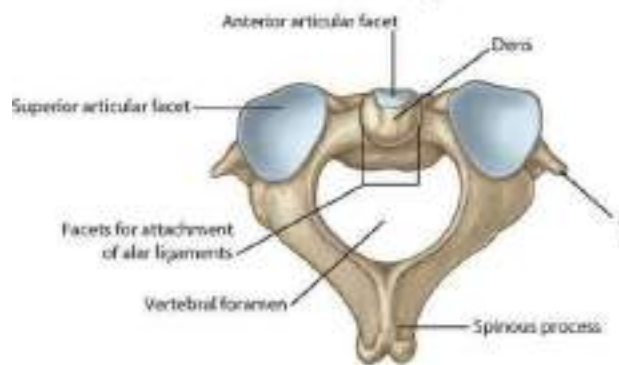
**Cervical region of vertebral column. Radiograph, lateral view**



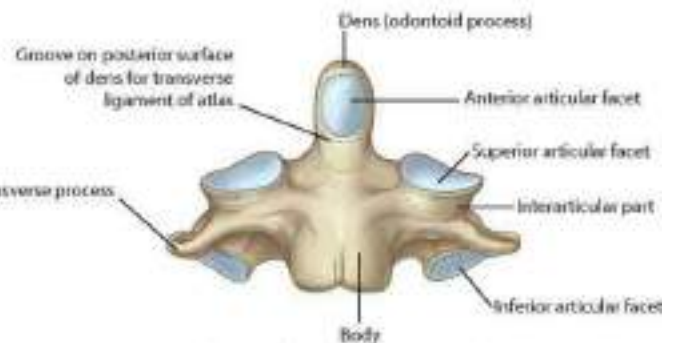
**C1 vertebra (atlas) superior view**



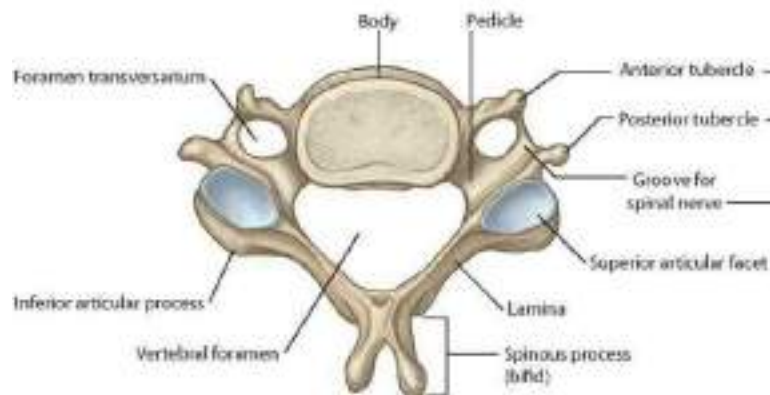
**C1 vertebra (atlas) anterior view**



**C2 vertebra (axis) superior view**



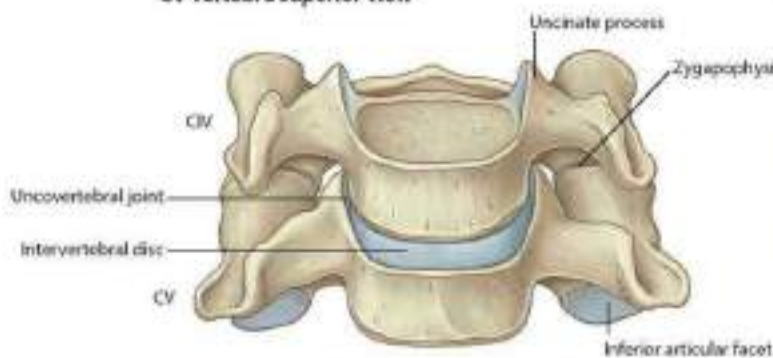
**C2 vertebra (axis) anterior view**



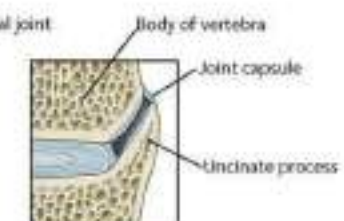
**C5 vertebra superior view**



**C5 vertebra anterior view**

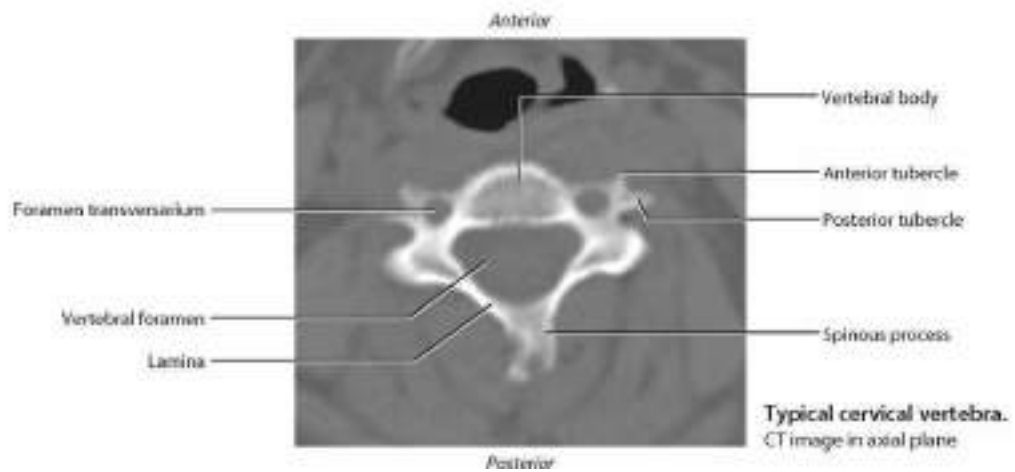
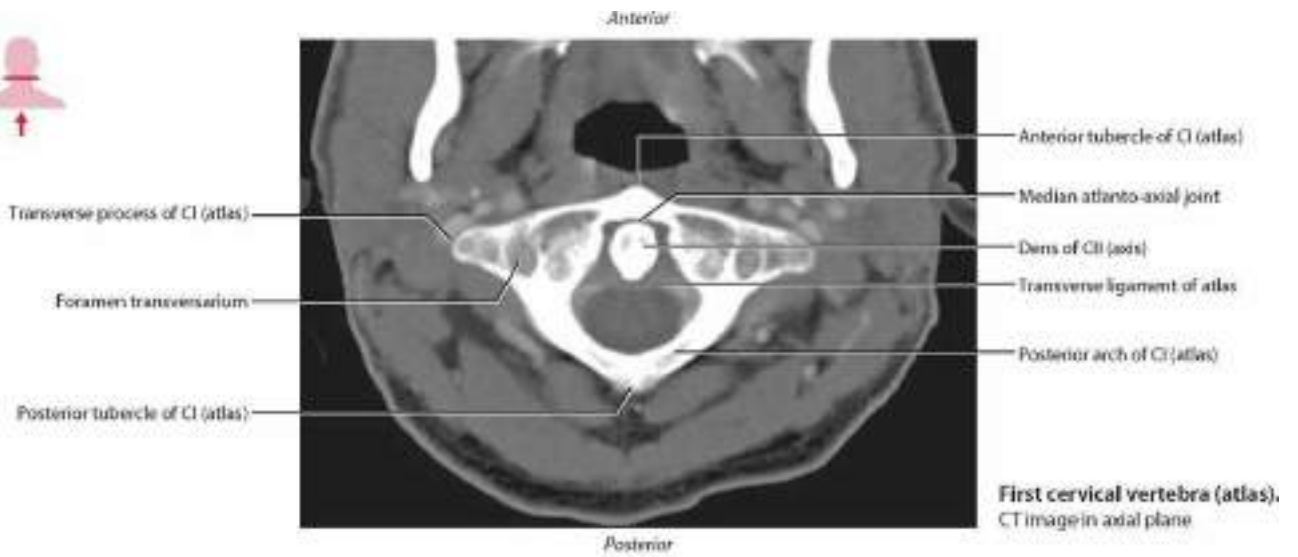


**C4/C5 vertebrae anterior view**



**Uncovertebral joint**



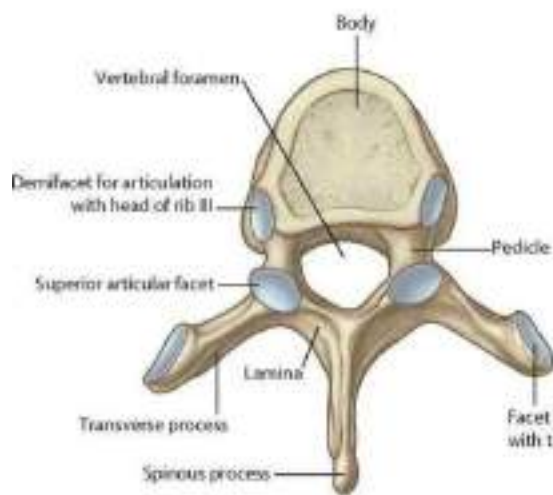


# Thoracic vertebrae

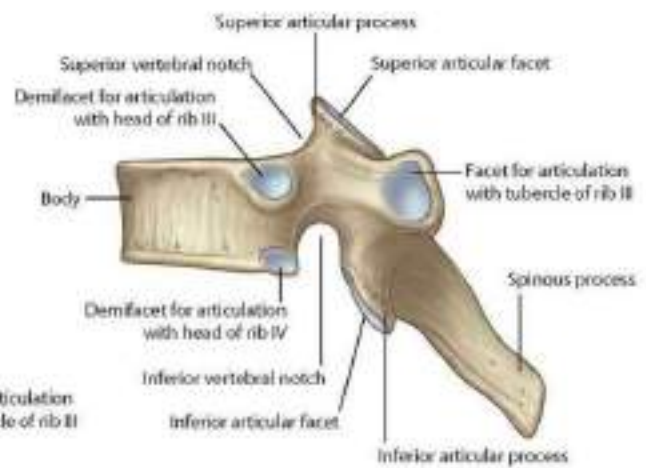


Thoracic vertebrae lateral view

Thoracic region of vertebral column.  
T2-weighted MR image in sagittal plane (compression fracture T10)



T11 vertebra superior view



T11 vertebra lateral view