

Kidney glomerulus and podocytes

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Kidney glomerulus and podocytes

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Lessons

1

Videos

All

Skill Level

4 hours

Duration

English

Language

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The Kidney and Podocytes

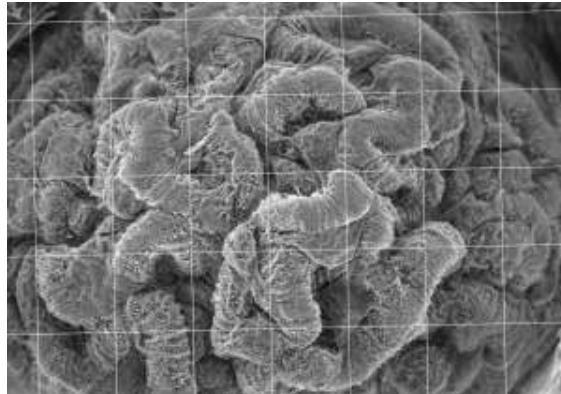
To finish off this series of close observations around the kidney, we will be looking at the glomerulus in closer detail and getting to know those things called

podocytes.

Today's task is to draw the glomerulus - there are 2 options- either a simpler model or a scanning electron micrograph (EM) of the podocytes, if you're feeling the urge to stretch your artistic skills.



Depending on which one you choose, the final piece of work should take you from 2 hours (above is at the 1 hour mark)- or ages: the scanning EM took me ages



Each capillary is covered totally with a number of podocytes- the ultrafiltrate filters through the gaps between their little digits

Look through all the accompanying tabs to decide what you will draw, and label that image accurately.

Lets Begin!

For todays exercise- you may want to use your shading skills- click below to refresh your techniques

shading and drawing



Kidney in context

Below is the physiological information you need to label your drawing with.

Kidney glomerulus

The glomerulus and Bowmans Capsule are the beginning of the nephron and its role is to filter your blood, a lot like a colander filters water from larger cooked items.

To help filter there are these little cells with finger-like protrusions called podocytes, which interlace, creating small gaps for small particles to pass through.

HOW SMALL?

What passes into your Bowmans Capsule and onwards into the nephron are most small peptides but larger proteins stay in the blood (like albumin).

You can work out how efficient the Bowmans capsule is by calculating something called the **GLOMERULAR FILTRATION RATE (GFR)**- Actually that can be a little tricky so we can estimate it. (eGFR)

Working out your GFR

GFR(glomerular filtration rate) is equal to the total of the filtration rates of the functioning nephrons in the kidney,

Normally, your kidneys filter creatinine from your blood and send it out of the body in your urine, so high levels of creatinine can indicate that your kidneys aren't working well.

What is creatinine?

Creatinine is a waste product made by your muscles as part of regular, everyday activity- so typically women often have a lower creatinine level than men. This is because women often have less muscle mass than men. Because creatinine level varies based on a person's size and muscle mass- if you are a particularly hench individual you will produce a lot of creatinine- regardless of your gender.

The Equation

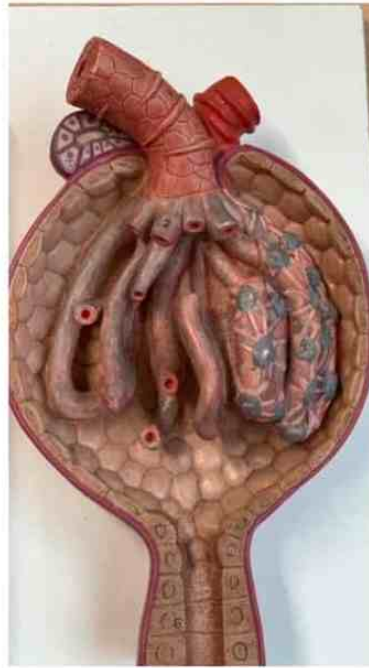
Clearance = (urine creatinine x urine flow rate (mL/min) / plasma creatinine) this will vary according to size.... A typical result is 0.7 to 1.3 mg/dL (61.9 to 114.9 $\mu\text{mol/L}$) for men and 0.6 to 1.1 mg/dL (53 to 97.2 $\mu\text{mol/L}$) for women.

LETS DRAW!

Below are the images, grids, contrasted images and cheat sheets- all for you to have a go and see if you can draw the ever tricky Bowmans capsule.

Model of a Bowmans capsule

We've only got a model to draw and label as it is typically so tiny you cannot see it with the naked eye.



You need to label:

Afferent Arteriole

Efferent Arteriole

Podocytes

capsular epithelium

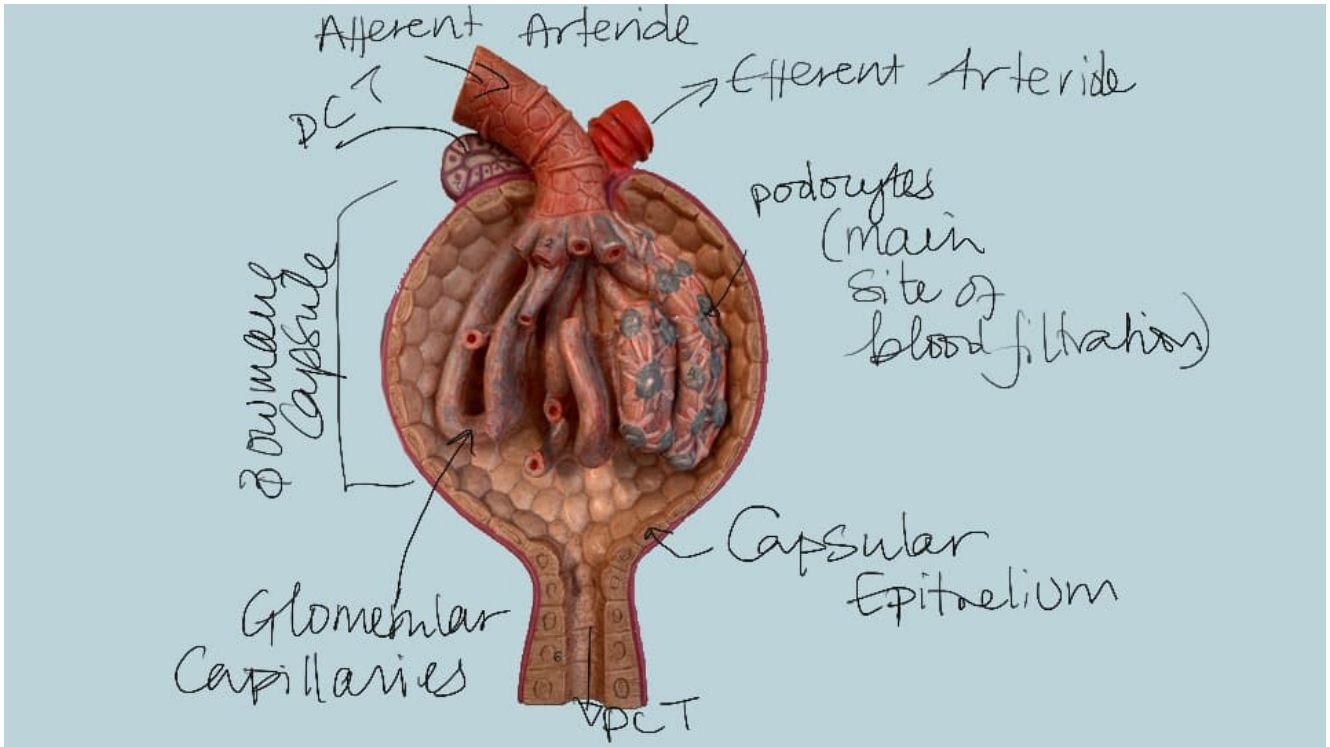
Proximal convoluted tubule

Distal convoluted tubule

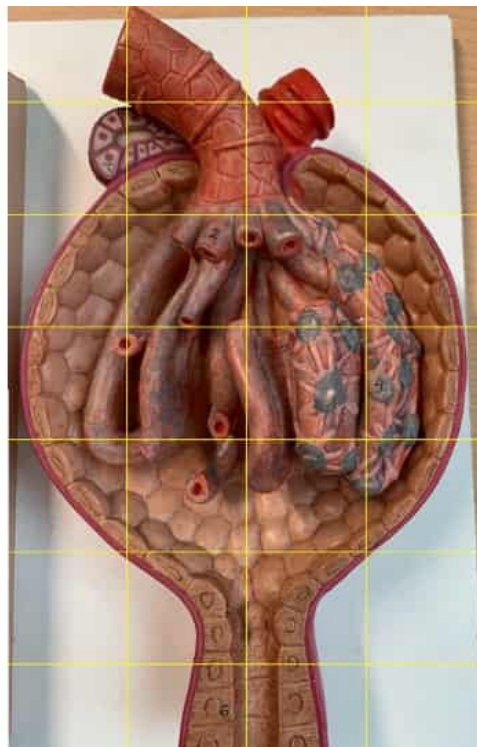
Glomerular capillaries

Glomerulus cheat sheet

Did you get all of the structures correct?



With a Grid



When you start drawing, in order for it to be accurate you can use a grid or tracing.

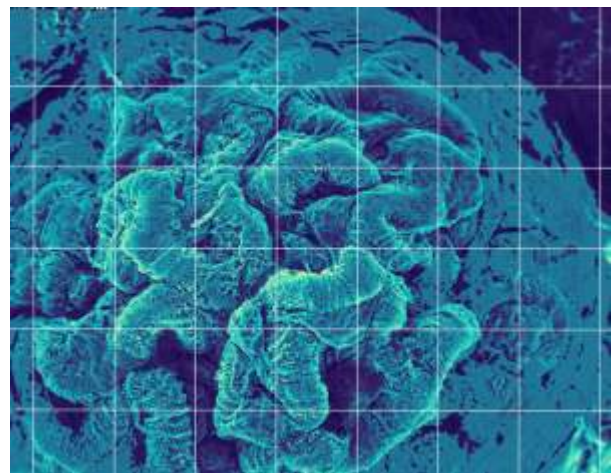
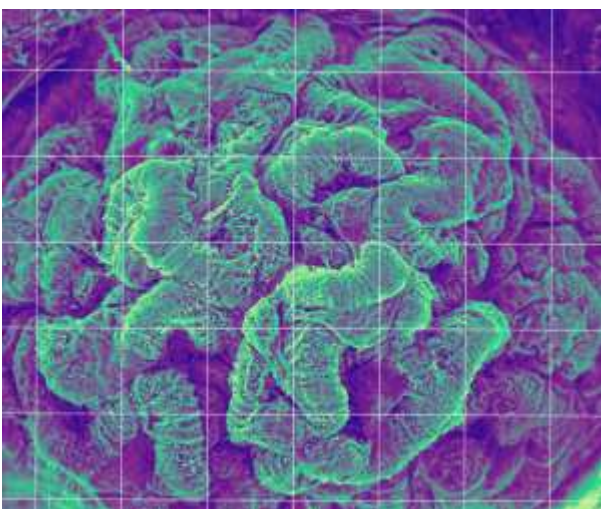
Using a grid enables your drawings to be kept to scale. Draw a grid 7×4 and then see if you can place the organ and vessels accurately

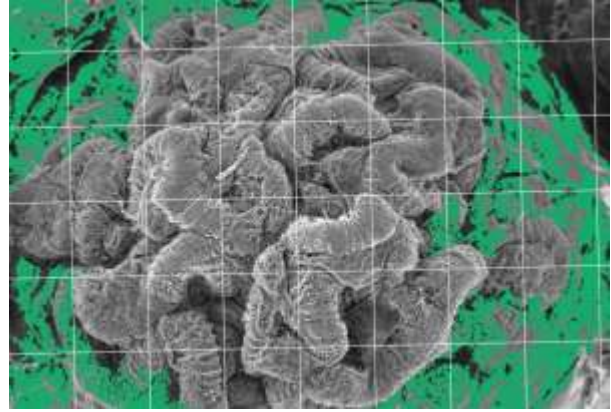
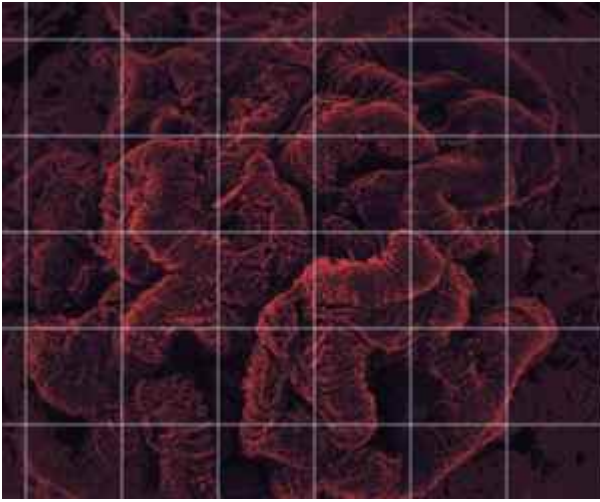
Image for creating tonal range



When drawing in colour it can be really trick to spot the darkest tones in order to orient yourself. This image should help you. If you have graded pencils start with the lightest shades. Don't worry if the positioning is a little off, you will find that as you proceed with darker shades, everything lighter, in contrast will appear to disappear off.

Scanning EM





If you fancy being adventurous- why not draw this high resolution image of a glomerulus.

The colours have been enhanced in order to make the drawing easier.

Notice how tortuous it is and how closely the podocytes interdigitate.

Video of drawing podocytes and glomerulus

Have a watch below to see how I got on.

<https://franscienceart.com/wp-content/uploads/2021/09/kidney-podocytes.mp4>

Once you've finished- upload your work to the forum or send it on to me.

Forum

Upload your work to the forum here

[Click Here](#)

Other weeks

Part 1: bACKGROUND INFORMATION

General instructions

Get the kit required and find out any course requirements

Background

Loads of reading- 4 hours

[View Week](#)

Part 2: Practice sketching

Learn to sketch & draw

Learn how to sketch using a wide range of pencil grades and also a variety of sketching techniques

Brush up on your sketching techniques

5 lessons - 2 hours

[View Week](#)

“I worked with Fran for many miserable years, but I should emphasize that it wasn’t her fault. She is without doubt one of the nicest and most talented scientists that I have ever met and what sets her apart from the others is the mysterious hold she has over me.”



Philip Miller Tate Surrey, UK

“She puts students at the heart of what she does and is an amazing role model for them. As well as a sparky and inspiring colleague.”



Hilary Wason Kingston University, London

“This course is amazing. Why is it free?”



anon London

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