



PQJ2020 出題問題(一部)

Part of questions of PQJ2020

作成：東京医科歯科大学 PQJ2020運営委員会

Produced by PQJ 2020 committee of Tokyo Medical and Dental University

お知らせ

以下、PQJ2020の予選で出題された問題&解説の一部です。
参考にして頂けると幸いです。

<注意>

- ・ この問題集の作成者・編集者はPQJ2022の問題作成には一切関わっておりません。
- ・ PQJ2022のルール・問題形式はこれと異なる可能性がございます。
- ・ PQJ2020運営委員会は活動を終了しています。この問題集に関する質問・抗議は受け付けておりません。

Notification

- Below are some of the questions and explanations given in the PQJ2020.

<Caution>

- Makers and editors of this question list are not involved in question making for PQJ2022.
- The rules and question formats may change in PQJ2022.
- The PQJ2020 Committee has ended its activities, so we cannot accept questions or protests about the questions and explanations on this list.

~PQJ2020 Setting Checklist~

- ✓ <display name>
 - “☆team name_your name” (the answerer)
 - “team name_your name” (other members)
- ✓ Turn the video on
- ✓ Mute the microphone
- ✓ a white board / a notebook / a tablet
- ✓ a pen which is thick enough to write clearly
- ✓ The chatting tools for communicating with your team members

~This room is for group ● of the following teams~



PQJ 2020 First Round Group ●

What do we need for this round ?

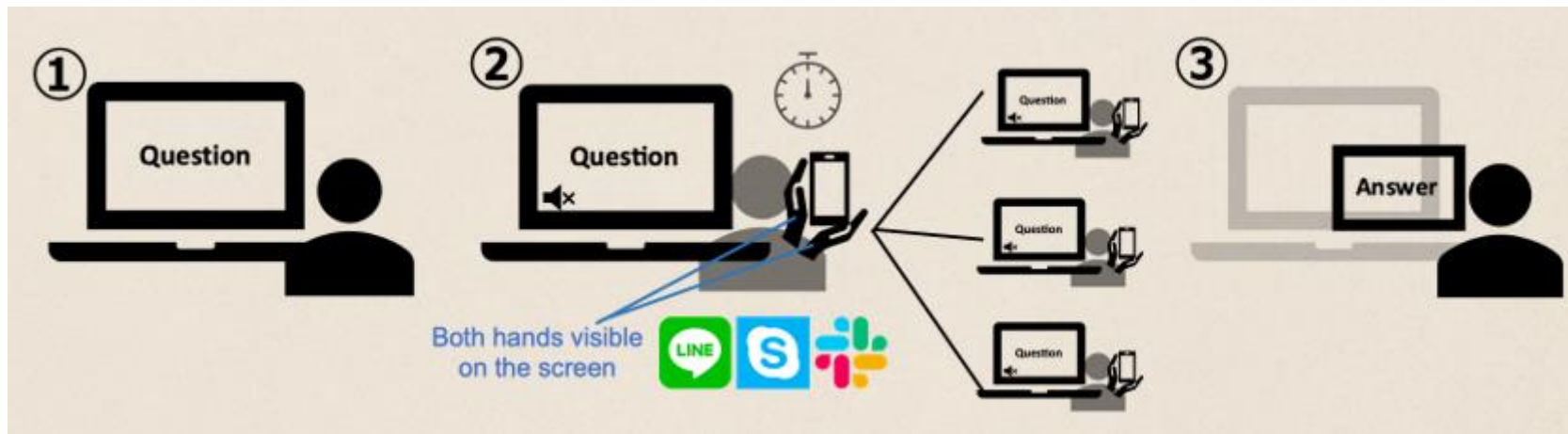
Prepare the white board or note to
write down the answer.

~Regulations~

- ✓ The participants **cannot search the answers** by using the Internet or reference materials.
- ✓ If you have some questions or appealing, please **speak up before moving on to the next question or send a message** in Zoom's chat until the end of the round.
- ✓ When a team cannot show the answer due to connection trouble, **the points the team gets for the question is 0.**
- ✓ The participants can leave the desk temporally anytime **with the video on.**

~Regulations~

- ✓ The Question is **proposed in the Zoom meeting room.**
- ✓ Talk with the team members **using group chatting tools (e.g. Line, skype)** for 1min.
Turn the **video on**, but **mute the microphone** during the discussion.
Except answerer, try to **make your both hands visible on the screen during thinking time.**
- ✓ The answerer **writes the answer on a white board/notebook** and show it to the monitor. Wait for a moment until the grading staffs take a screen shot to calculate the scores.



First Round

- ✓ The first rounds consist of **18 quizzes** (**6 multiple choices + 12 free descriptive questions**).
- ✓ The answers have to be given **in English basically**.
- ✓ Each question has **10 points**. If answering **in Japanese, 5 points** is given. When there are some **spelling mistakes or answering other than in English or Japanese, the point is 0**.
- ✓ **1st-3rd place teams** in each first round group qualify for semifinals.
- ✓ When the scores of 3rd & 4th are the same, both of the teams qualify for semifinals.
- ✓ Teams who cannot go on to the next rounds have to exit the main Zoom meeting room and watch the following rounds on YouTube live.

First Round

~Multiple choices~



The answer is... “A” or “C”, definitely.

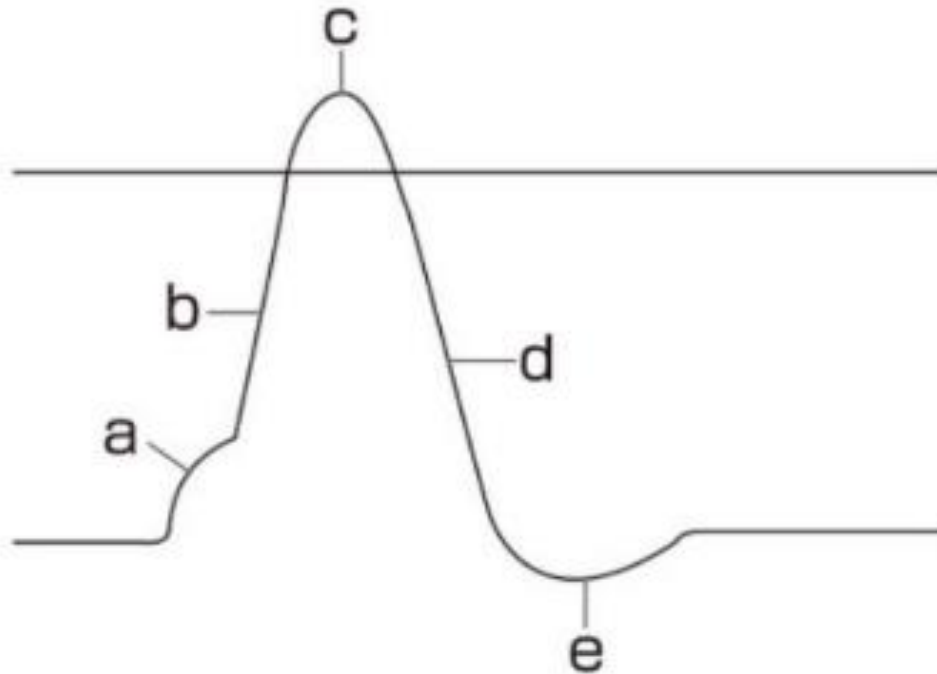
NO, it’s “B”.



Question.1

This is the potential change at motor nerve ending.
At “e” phase, which ion affects?

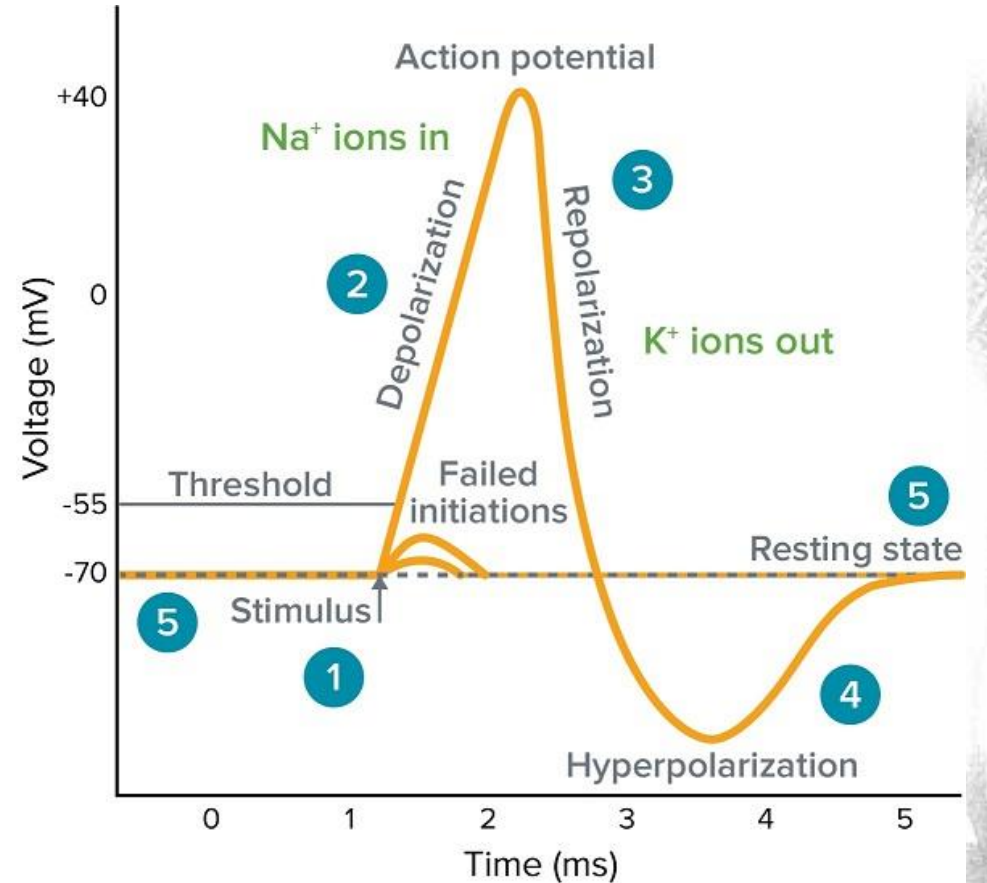
- A. Ca^{2+}
- B. K^+
- C. Na^+
- D. Cl^-



Answer.1

B. K^+

Hyperpolarization is a lowered membrane potential caused by the efflux of potassium ions and closing of the potassium channels.



Question.2

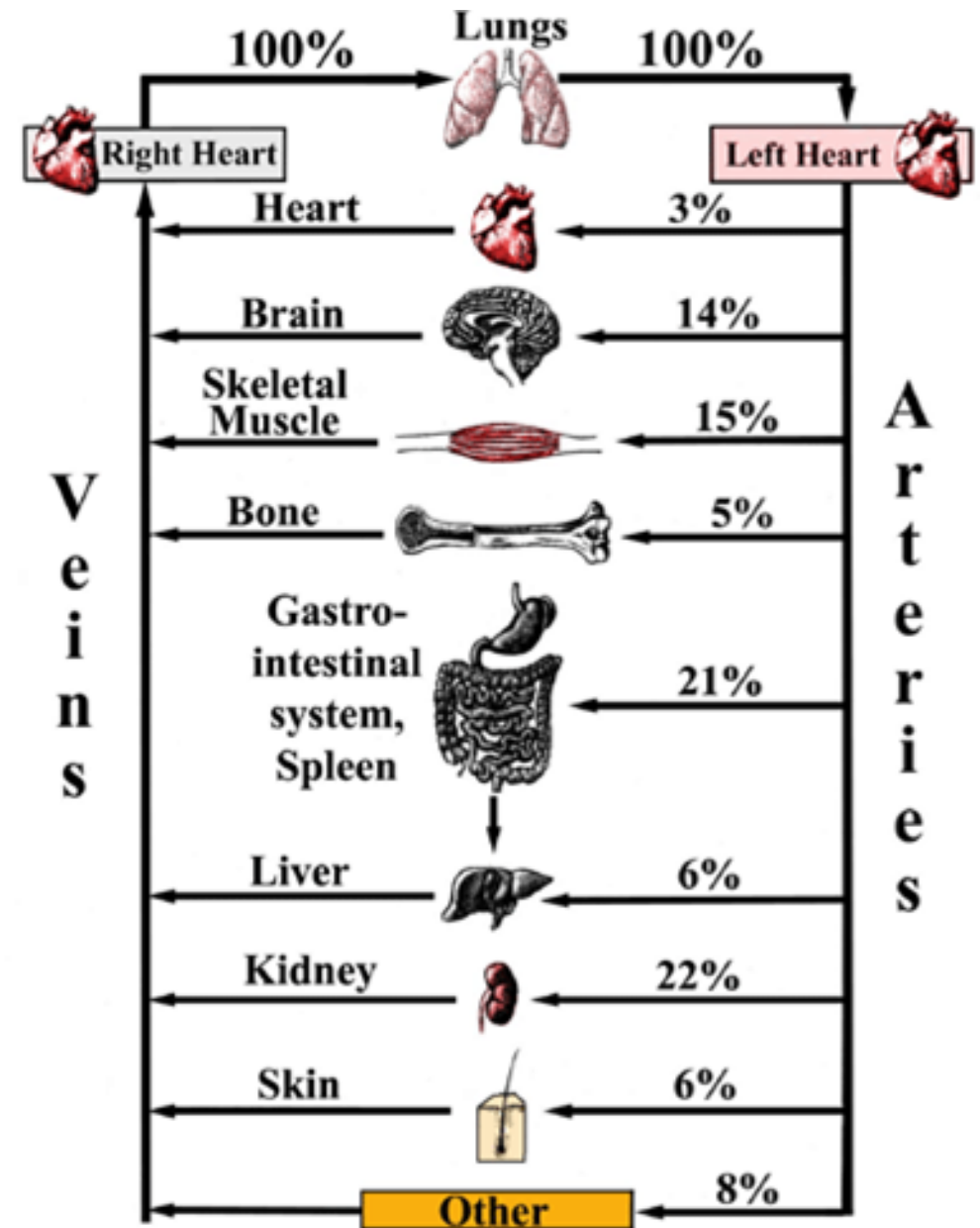
Which organ has the highest blood flow per unit time at rest?

- A. Brain**
- B. Liver (including blood supply from both portal vein and hepatic artery)**
- C. Kidney (the sum of right and left)**
- D. Skeletal muscle (at rest)**

Answer.2

B. Liver

The liver accounts for 27% of cardiac output, 6% from hepatic artery and 21% from portal vein.



<http://www.vhlab.umn.edu/atlas/physiology-tutorial/cardiovascular-function.shtml>

Question.3

Figure shows a schematic diagram of a glomerulus.
Where are the hormones that regulate blood pressure secreted?
Choose one.

- A. ①
- B. ②
- C. ③
- D. ④
- E. ⑤

Sorry, this image
cannot be posted
due to copyright
issues

Granular cells

Answer.3

C. ③

- × ① is macula densa.
- × ② is mesangial cells and substrate.
- ③ Renin is secreted into the blood from the granule cells of ③.
- × ④ is extraglomerular mesangial cells.
- × ⑤ is a glomerular epithelial cell.

Sorry, this image cannot be posted due to copyright issues

Question.4

Choose the correct combination for the two blanks.

(①) and (②) directly suppress TSH secretion.

	①	②
a	TRH	Somatostatin
b	T3,T4	Somatostatin
c	T3,T4	TRH
d	GH	Somatostatin

Answer.4

Choose the correct combination for the two blanks.
(①)and (②) directly suppress TSH secretion.

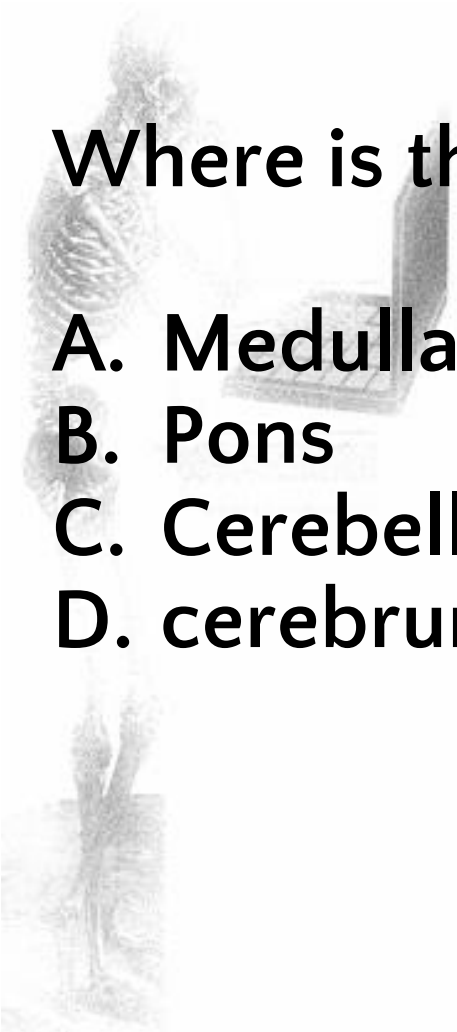
B. ①T3, T4 ②somatostatin

生理学テキスト第8版p422-423より (2017.2.7株式会社文英堂発行)

Question.5

Where is the respiratory center that controls breathing?

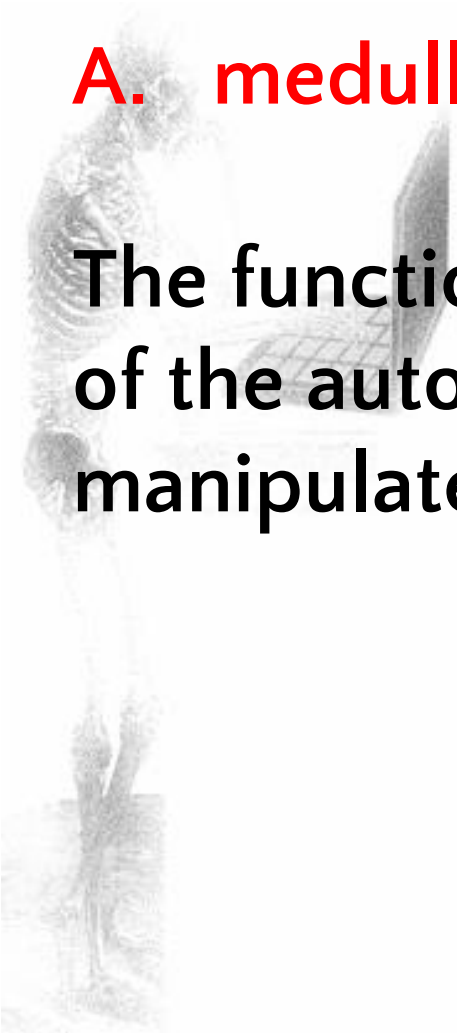
- A. Medulla
- B. Pons
- C. Cerebellum
- D. cerebrum



Answer.5

A. medulla

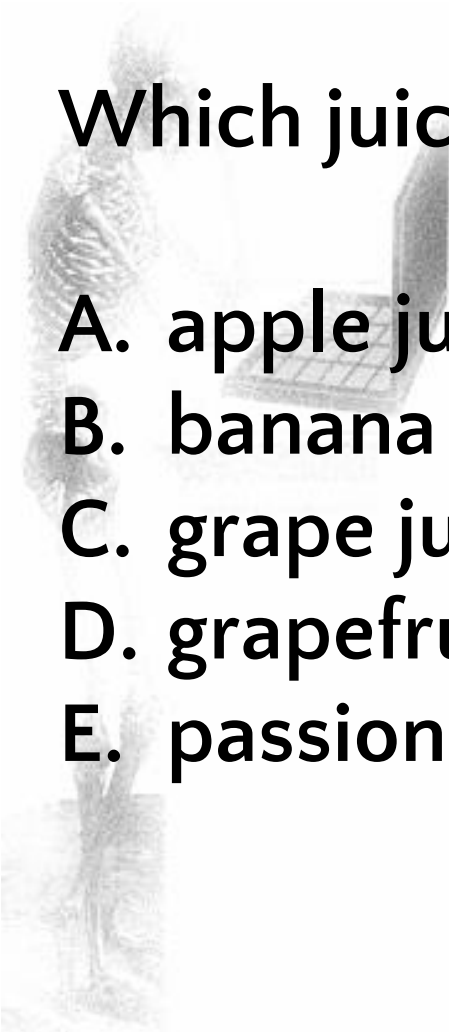
The function of the respiratory center is the one of the automatic control centers, and it cannot be manipulated with will.



Question.6

Which juice can inhibit CYP3A4?

- A. apple juice
- B. banana juice
- C. grape juice
- D. grapefruit juice
- E. passion fruit juice



Answer.6

D. grapefruit juice

- ★ CYP3A4 is an enzyme including in CYP450 in digestive tract.
- ★ CYP450 metabolized many kinds of drug.
- ★ Several days after drinking grapefruit juice,
The concentration of some drugs (e.g. Ca blocker) will elevates
and the drug work excessively.

First Round ~Flip quiz~



The answer is... “A” or “C”, definitely.



Hey, answer in words.

Caution!

- ✓ The answers have to be given **in English basically**.
- ✓ Each question has **10 points**.
- ✓ If answering **in Japanese, 5 points** is given.
- ✓ When there are some **spelling mistakes or answering other than in English or Japanese, the point is 0**.

Question.1

What is a type of cell that breaks down bone tissue by secreting H^+ and collagenases?



Answer.1

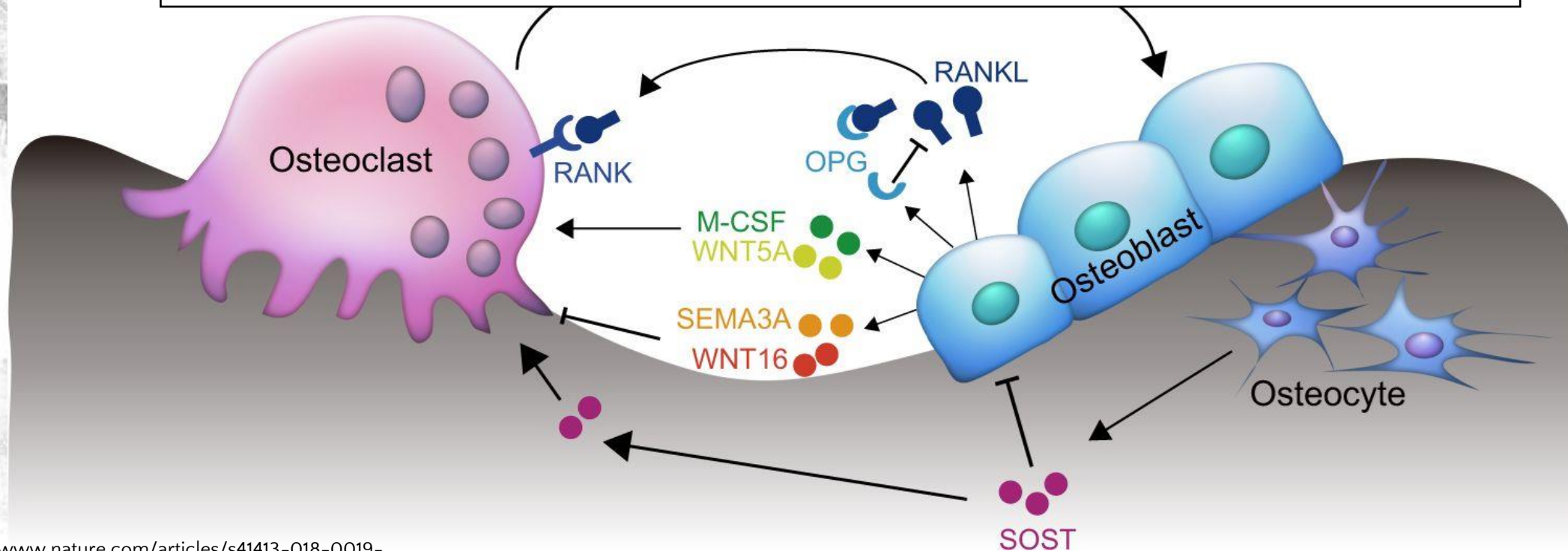
Osteoclast



Answer.1

Osteoclast
Bone resorption

Osteoblast
Bone formation

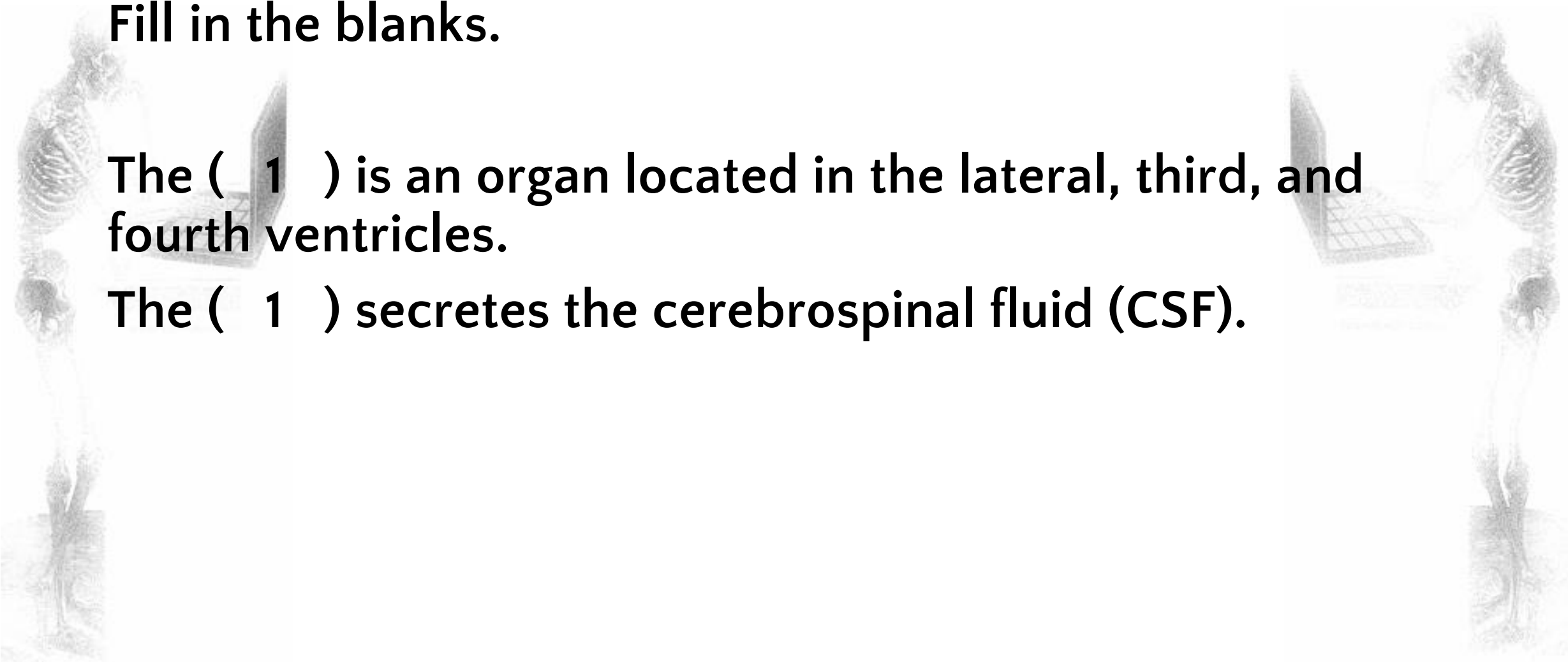


Question.2

Fill in the blanks.

The (1) is an organ located in the lateral, third, and fourth ventricles.

The (1) secretes the cerebrospinal fluid (CSF).

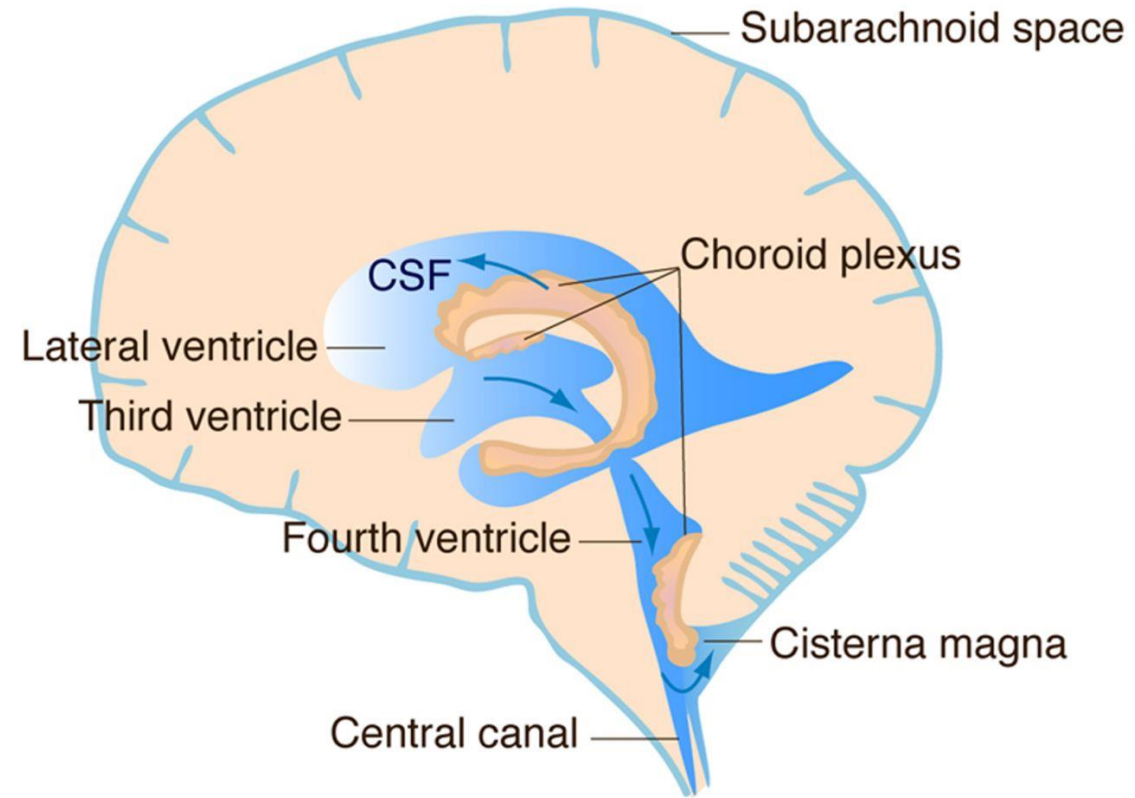


Answer.2

Choroid plexus

The (**Choroid plexus**) is an organ located in the lateral, third, and fourth ventricles. The (**Choroid plexus**) secretes the cerebrospinal fluid (CSF).

- 500ml of CSF is made in a day.
- The choroid plexus secretes 70% of CSF. (30% is secreted from capillaries of brain.)
- The total volume of ventricles is 130ml.



<https://www.jneurosci.org/content/jneuro/33/45/17553/F1.large.jpg>

Source :

<https://bsd.neuroinf.jp/wiki/%E8%84%B3%E8%84%8A%E9%AB%E6%B6%B2>

Question.3

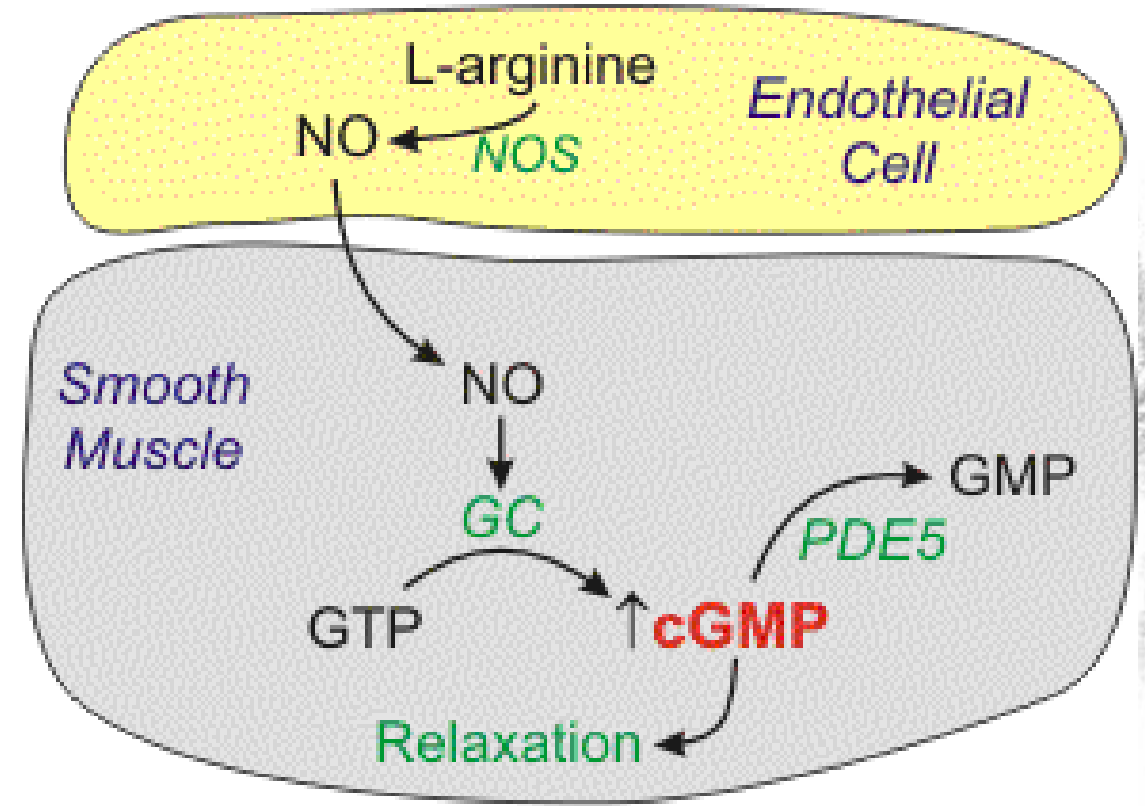
Fill in the blanks.

The function of (1) in smooth muscle cell is to let it contracted, with decomposing cyclic GMP

A drug that inhibit (1) is used for erectile dysfunction.

Answer.3

PDE (Phosphodiesterase)



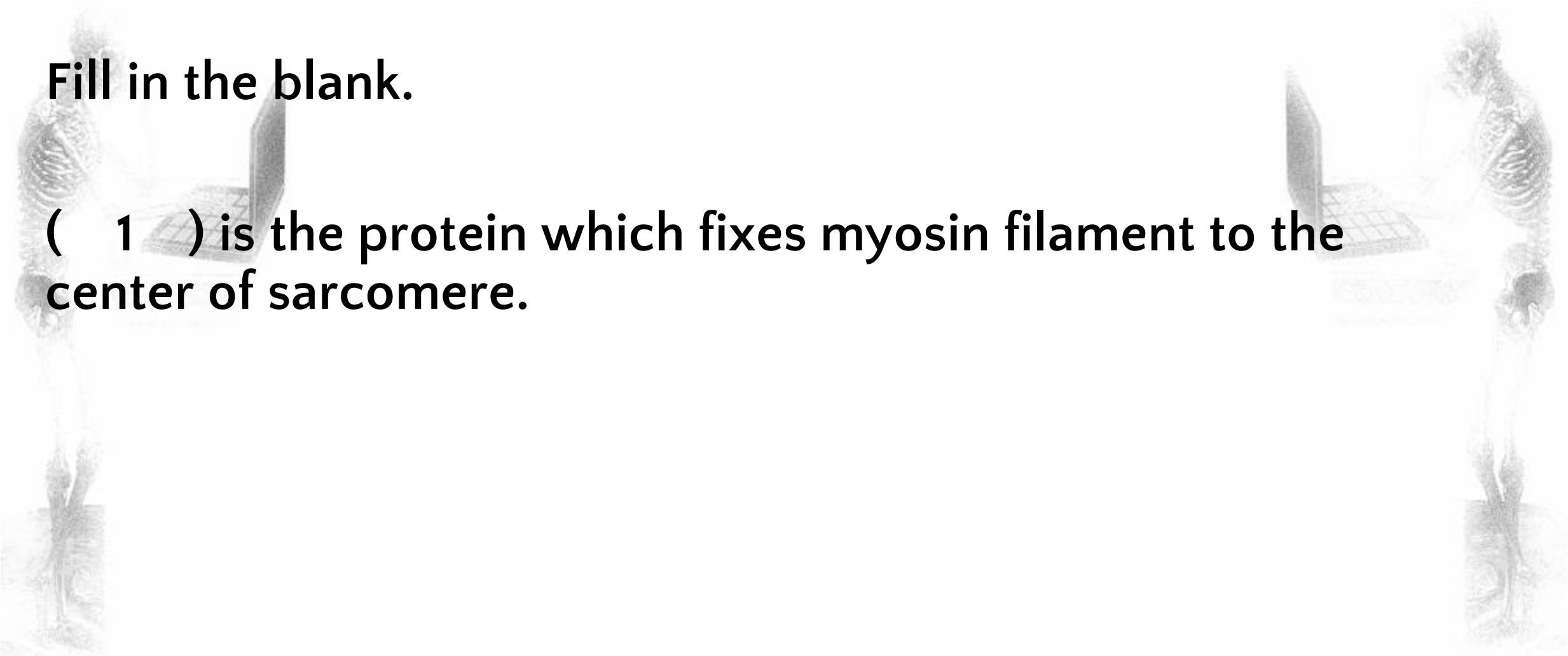
Abbreviations: NO, nitric oxide; NOS, nitric oxide synthase; GC, guanylyl cyclase; PDE5, cGMP-dependent phosphodiesterase (type 5)

<https://cvpharmacology.com/vasodilator/PDEI>

Question.4

Fill in the blank.

(1) is the protein which fixes myosin filament to the center of sarcomere.

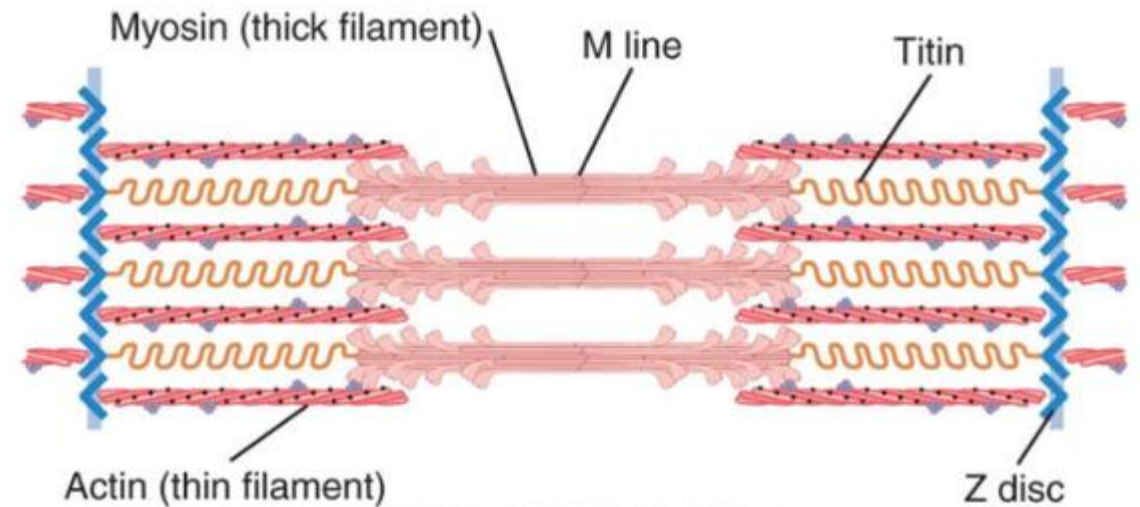


Answer.4

Connectin/Titin

(**Connectin/Titin**) is the protein which fixes myosin filament to the center of sarcomere.

The Sarcomere

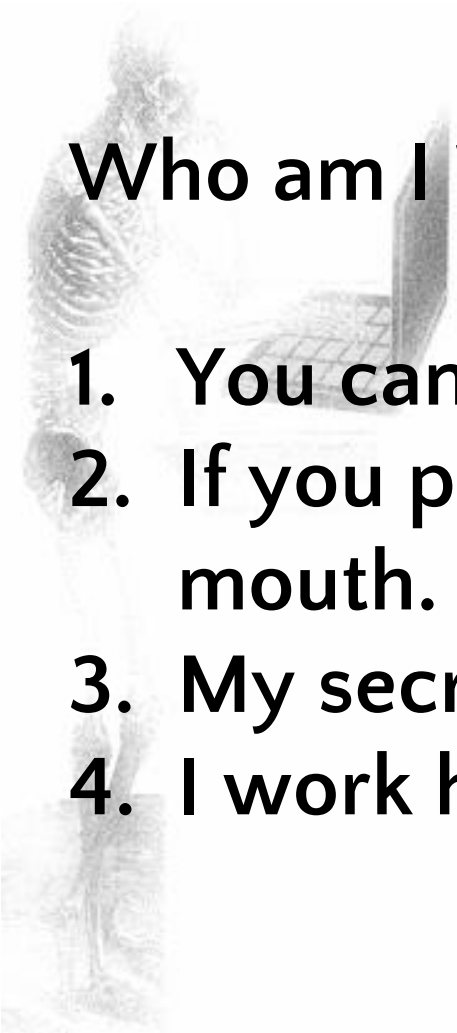


Hall: Guyton and Hall Textbook of Medical Physiology, 12th Edition
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Question.5

Who am I ?

1. You can touch me through your skin.
2. If you push me hard, something happens in your mouth.
3. My secretions include little mucoprotein.
4. I work hard when you eat food.



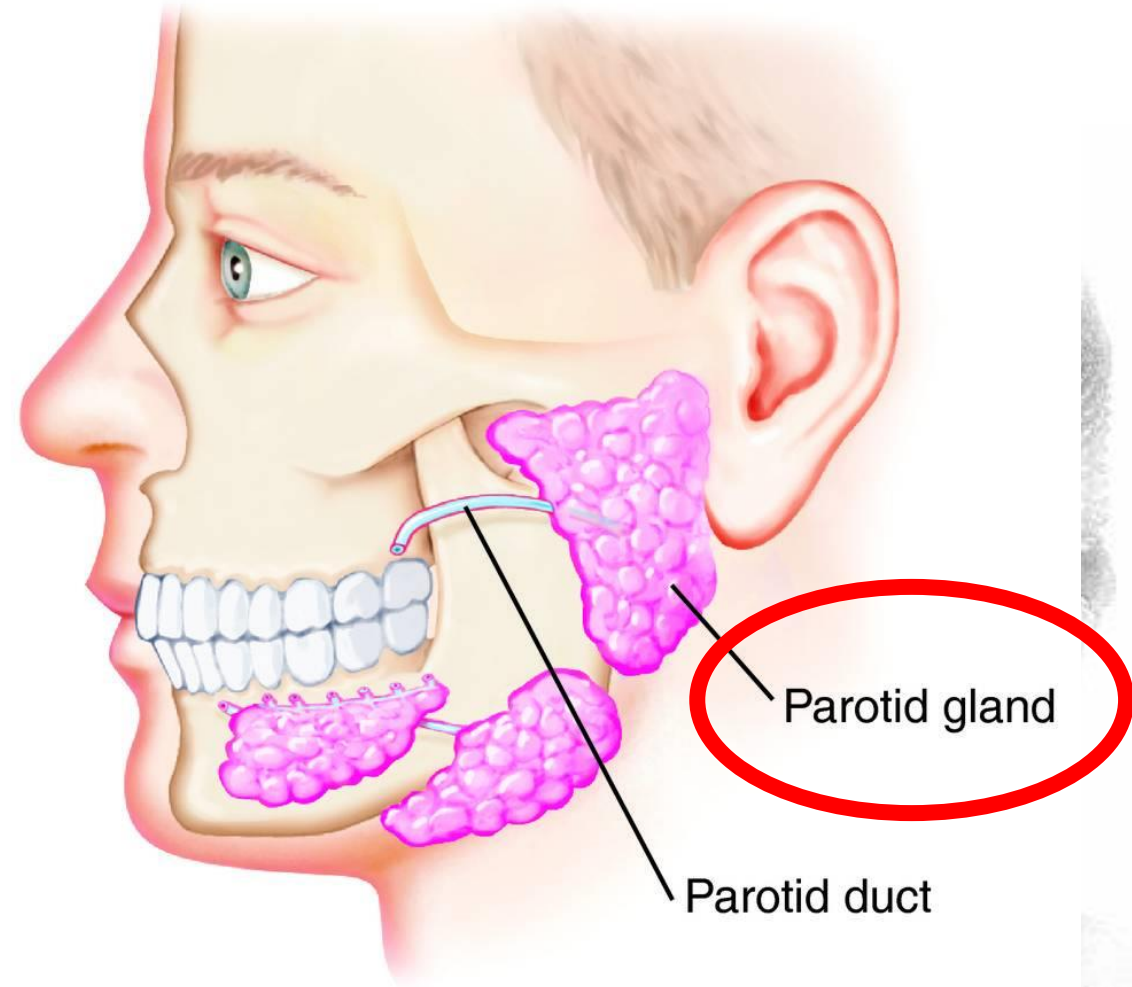
Answer.5

parotid gland

★ There are 3 types of gland which secrete saliva.

★ Saliva from parotid gland is watery.

On the other hand, one from sublingual and submaxillary gland is sticky because of mucoprotein.



Question.6

Fill in the blank.

(1) nerve is the only cranial nerve that runs from the dorsal aspect of brain stem.



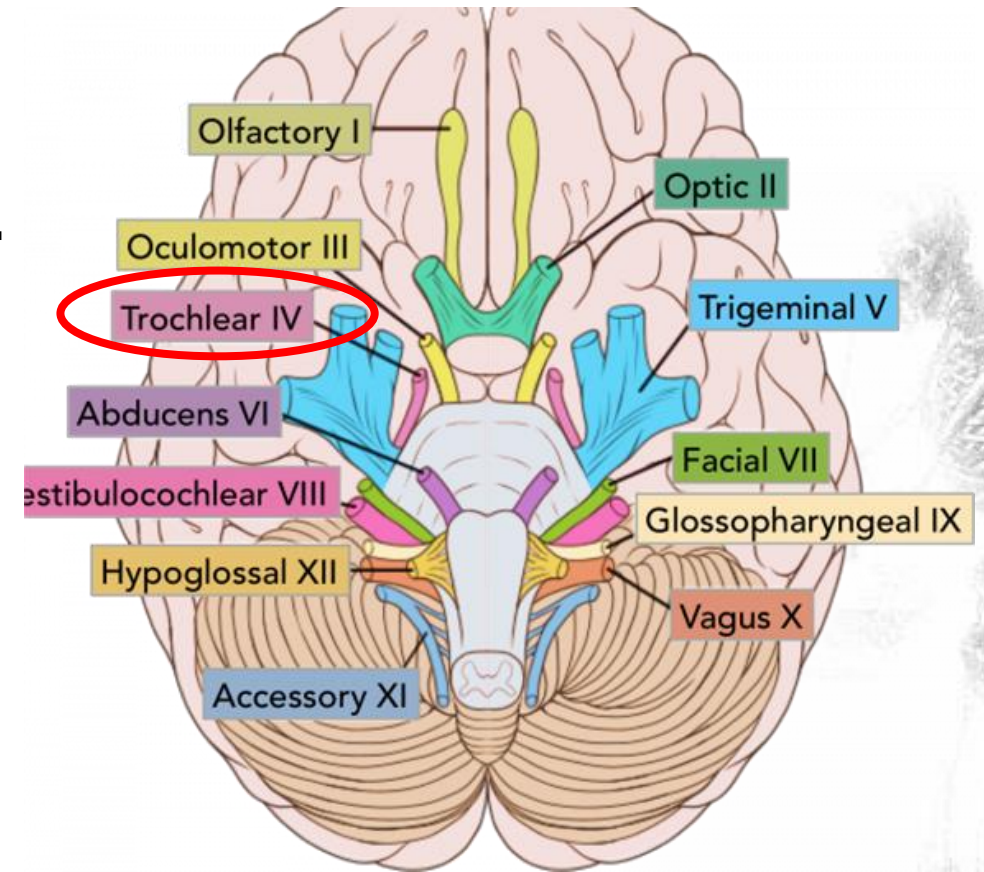
Answer.6

Trochlear nerve (IV)

(**Trochlear**) nerve is the only cranial nerve that runs from the dorsal aspect of brain stem.

Trochlear nerve moves superior oblique muscle, and rotate the eyeball downwards.

IV



<https://teachmeanatomy.info/head/cranial-nerves/summary/>

Source : 神経解剖学講義ノートp91

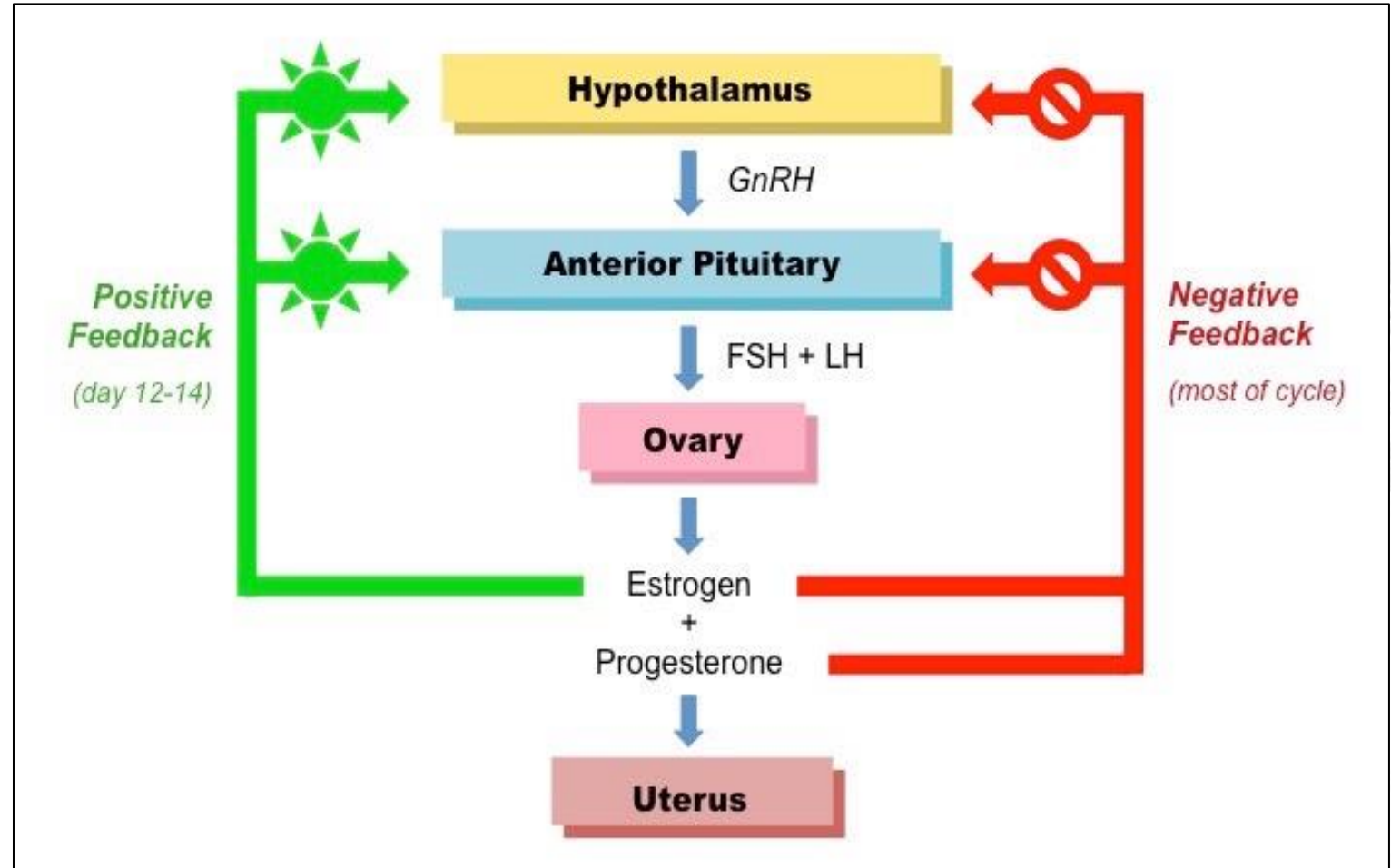
Question.7

Fill in the blanks.

When estrogen and progesterone secretions from ovaries increase, (1) and (2) secretion from pituitary gland will be suppressed due to negative feedback.

Answer.7

1/2. LH/FSH

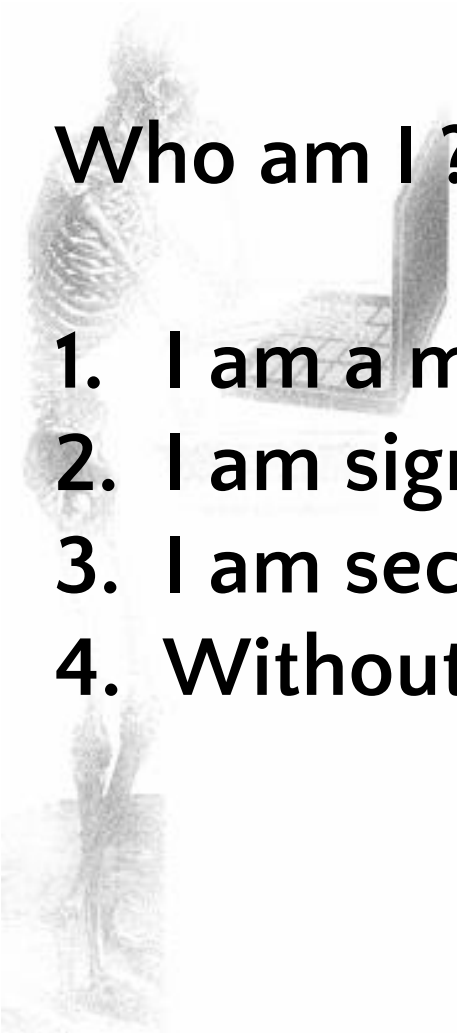


https://ib.bioninja.com.au/_Media/menstrual-flowchart_med.jpeg(200322閱覽)

Question.8

Who am I ?

1. I am a mucoprotein.
2. I am significant for absorption of a vitamin.
3. I am secreted from gastric parietal cell.
4. Without me, palpitations and short breath will occur.



Answer.8

intrinsic factor

- ★ Intrinsic factor helps absorption of Vit. B12.
- ★ Shortness of Vit. B12 leads to anemia.



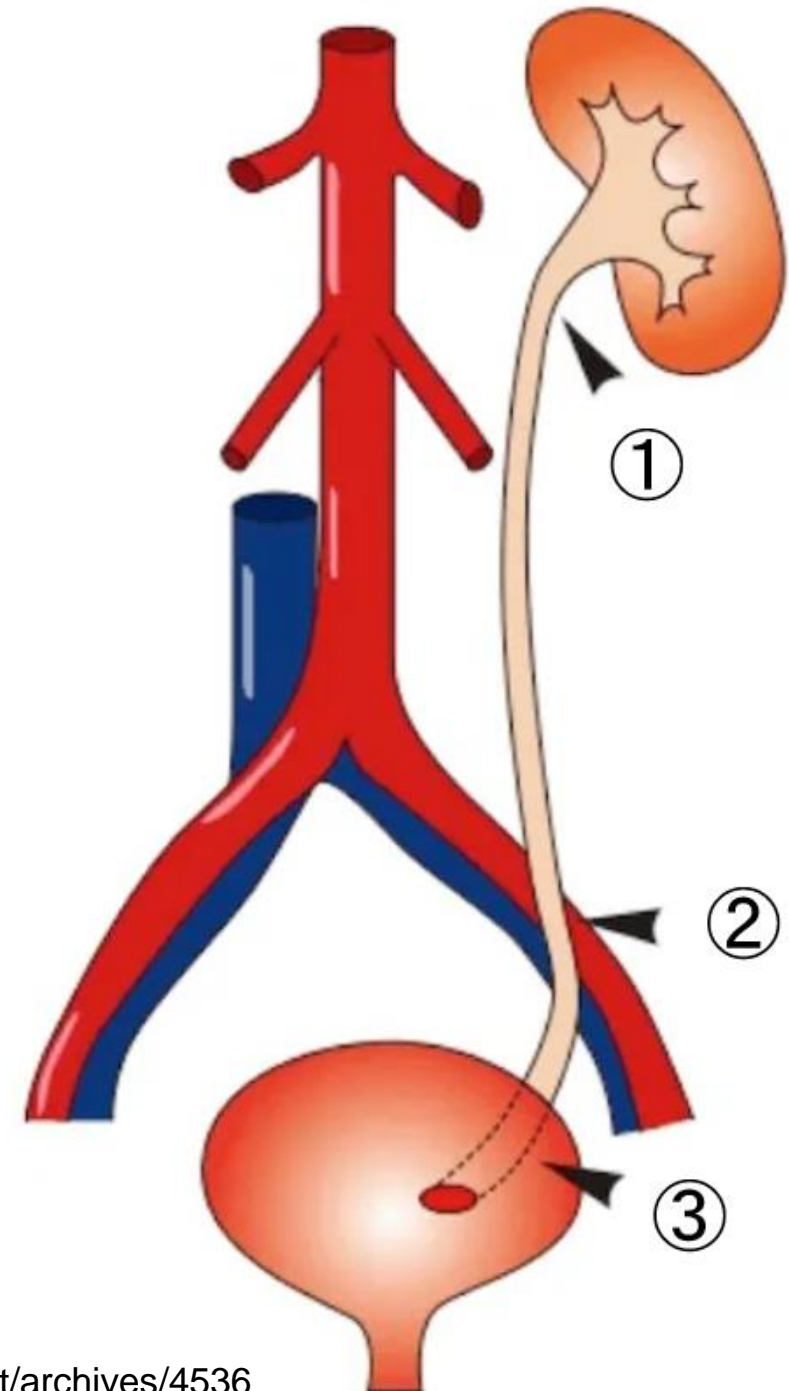
Question.9

Write down as much of the place of the ureteral stricture as you can think of.



Answer.9

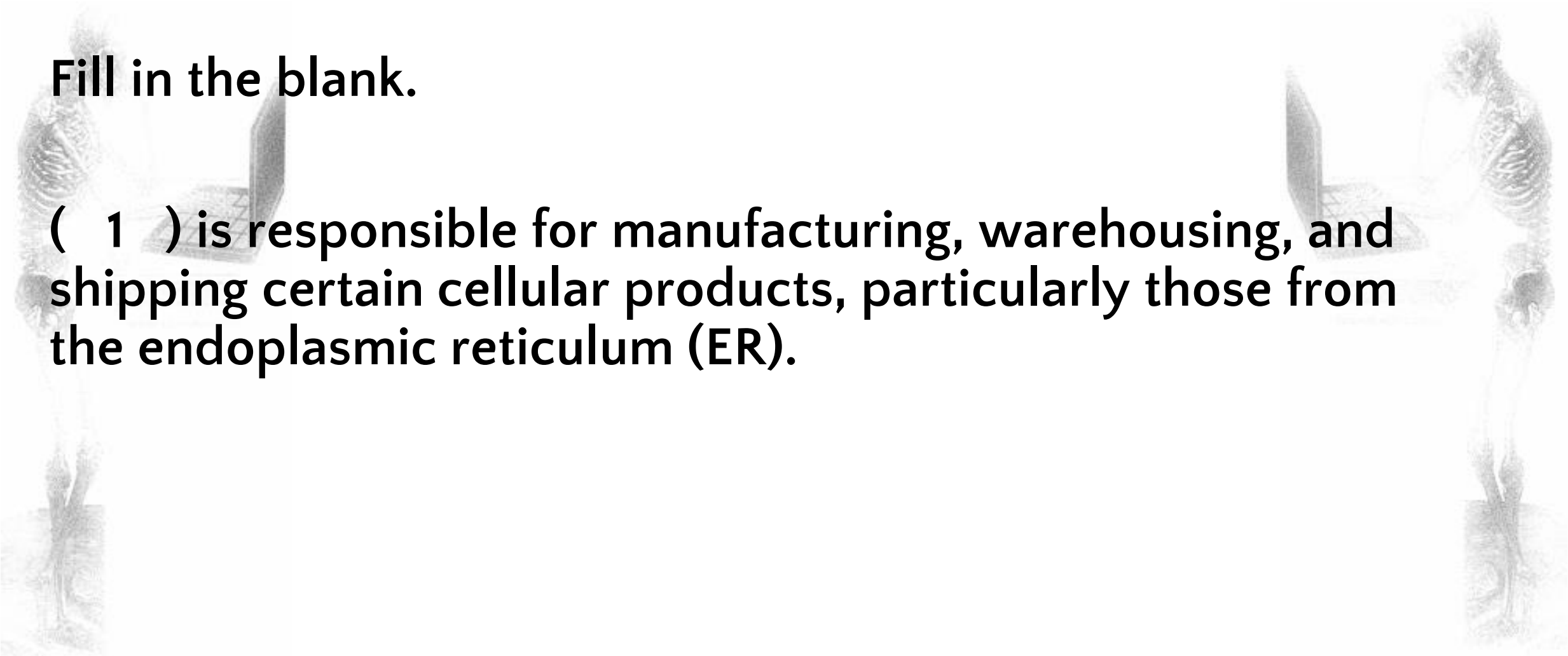
1. Renal pelvis and ureteral junction
2. Crossing with the common iliac artery (or, pelvic inlet)
3. Ureter bladder junction



Question.10

Fill in the blank.

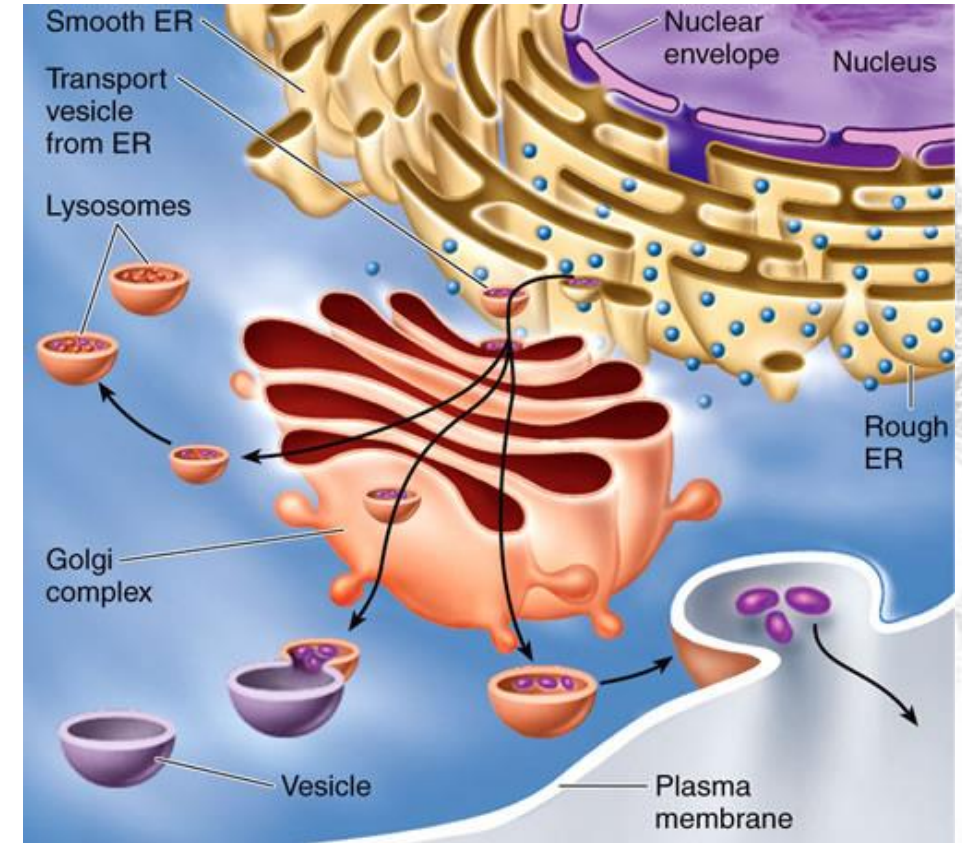
(1) is responsible for manufacturing, warehousing, and shipping certain cellular products, particularly those from the endoplasmic reticulum (ER).



Answer.10

Golgi apparatus/complex

(**Golgi apparatus/complex**) is responsible for manufacturing, warehousing, and shipping certain cellular products, particularly those from the endoplasmic reticulum (ER).

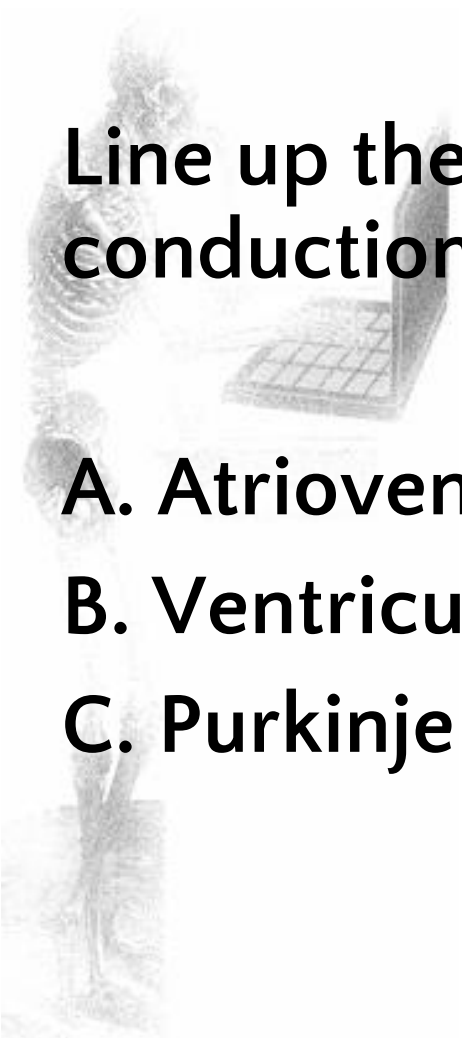


<https://www.wssd.k12.pa.us/downloads/b2%20remediation%20packet.pdf>

Question.11

Line up the following cardiomyocytes in order of conduction velocity. (Faster→Slower)

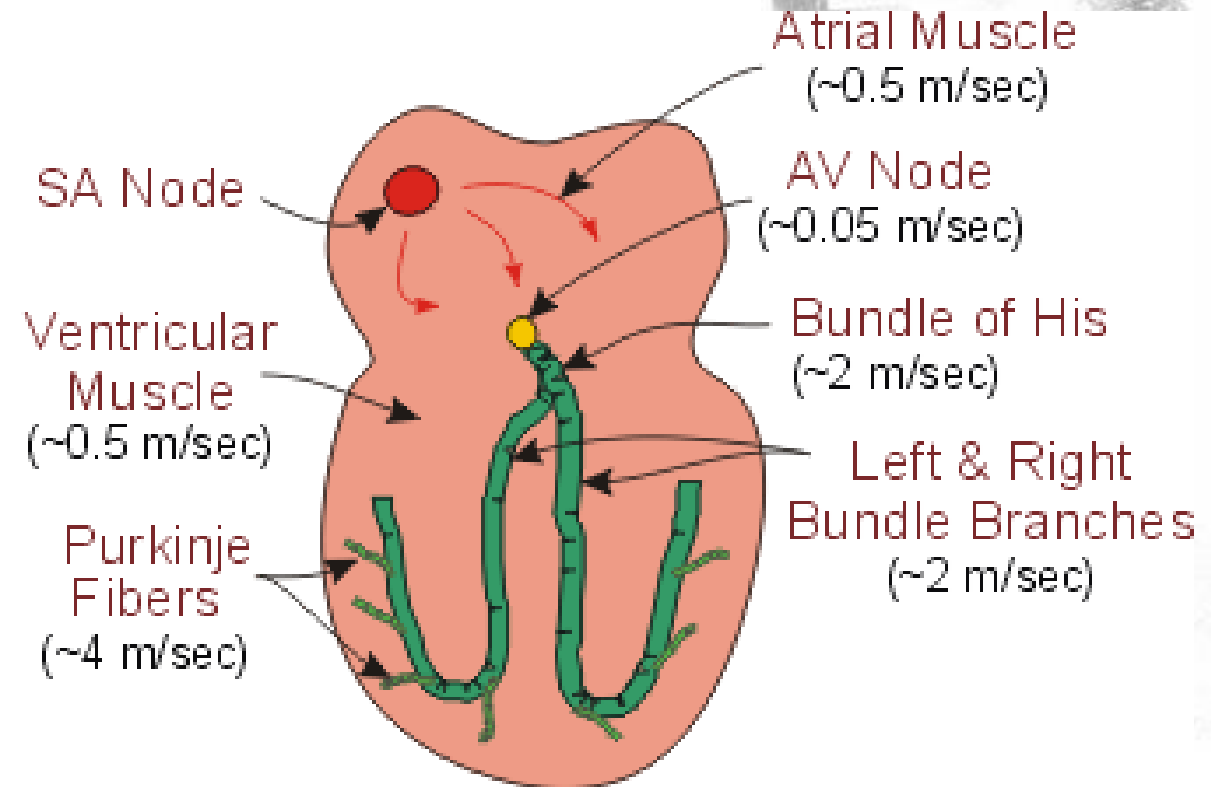
- A. Atrioventricular node cell
- B. Ventricular cell
- C. Purkinje fiber



Answer.11

(faster) C > B > A (slower)

(Purkinje fiber > ventricular cell > AV node)

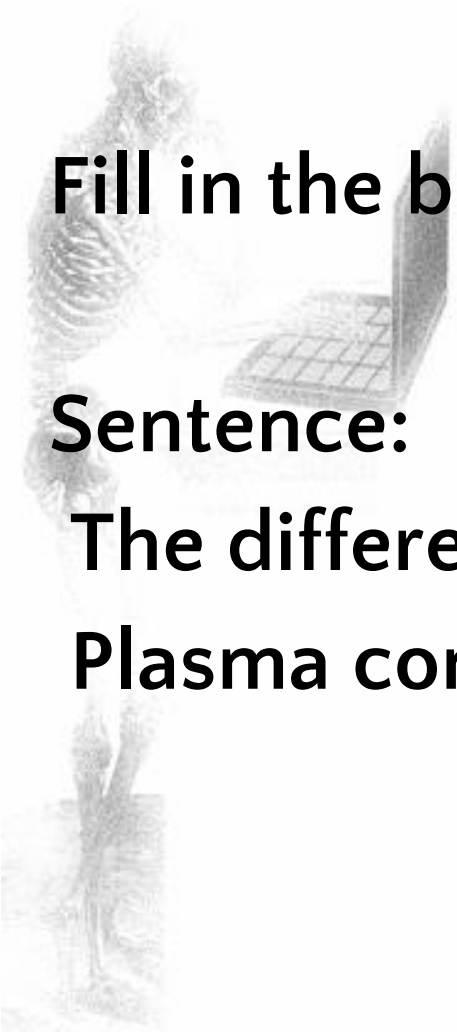


Question.12

Fill in the blank.

Sentence:

**The difference between plasma and serum is existence of (1).
Plasma contains (1), but the other does not.**



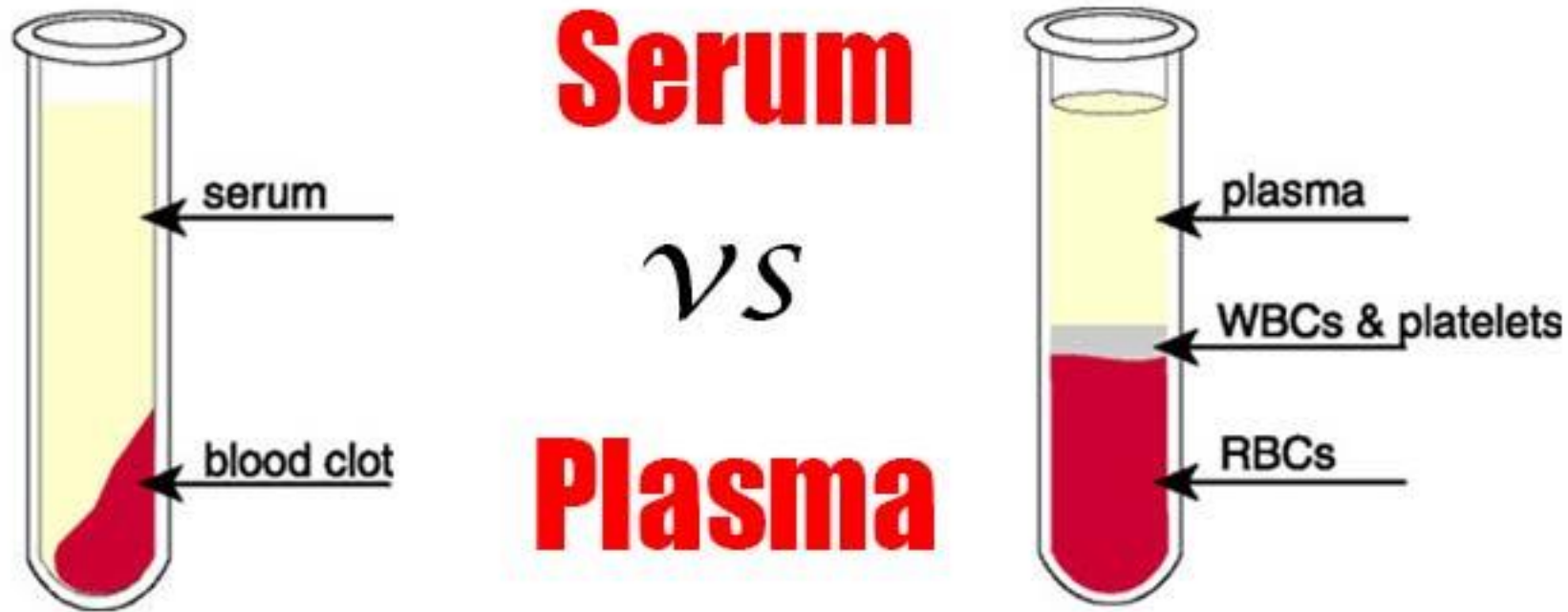
Answer.12

The difference between plasma and serum is existence of (**coagulation factors**).

✕ **clotting factors / fibrinogen**

Plasma contains (**coagulation factors**), but the other does not.

Answer.12



Serum = Plasma – Clotting Factors