First Year Medical Exams

Bio-181

Human Anatomy
1. Dale (perhaps foolishly) volunteered to participate in a knife-thrower’s act. Fortunately, the Great Throwdini had a few drinks before the show to calm his nerves. **List** in the table below the nerve and the **cord of the brachial plexus** that would carry sensory information back to the spinal cord if the knife-thrower accidentally nicked Dale’s arm in the locations labeled on the picture below. (16pts) (It is worth noting that the figure below does not even begin to represent the phenomenal state of muscular development of Dale’s arm)

![Image of arm with labeled parts](image)

<table>
<thead>
<tr>
<th>Nerve</th>
<th>Cord of the plexus</th>
</tr>
</thead>
<tbody>
<tr>
<td>A lateral cutaneous n. of forearm</td>
<td>lateral</td>
</tr>
<tr>
<td>B radial n.</td>
<td>posterior</td>
</tr>
<tr>
<td>C medial cutaneous n. of forearm</td>
<td>medial</td>
</tr>
<tr>
<td>D axillary n.</td>
<td>posterior</td>
</tr>
</tbody>
</table>

Points missed: 1
2. The table below lists several injuries to the brachial plexus in the 1st column. The next two columns list muscles that may or may not be affected by the given nerve injury. For each row, circle the muscles that will lose some or all of their function. (10 pts)

<table>
<thead>
<tr>
<th>Level of injury</th>
<th>Circle muscles expected to have some weakness or loss of function</th>
</tr>
</thead>
</table>
| C5 & C6 roots                          | Deltoid  
 Flexor carpi ulnaris                                    |
| Anterior division of lower trunk       | Triceps  
 Flexor digitorum superficialis                             |
| Lower trunk                            | Palmar interossei  
 Extensor carpi ulnaris                                     |
| Lateral cord                           | Brachialis  
 Extensor pollicis longus                                   |

3a. You are a red blood cell in the lungs that has just picked up a fresh load of O₂ and dropped off a load of CO₂ in a capillary bed. You have been assigned to travel out to the nail bed of the right ring finger (4th digit). Name, in the correct order, all of the heart structures you must pass through (chambers and valves), and then all of the blood vessels you must pass through to get to your destination. (10 pts)

Example to get you started:
Pulmonary trunk → Pulmonary arteries → Capillary bed of lung → your turn

pulmonary veins → left atrium → mitral valve → left ventricle → aortic semilunar valve

○ pulmonary artery ← subclavian artery ← brachiocephalic trunk ← arch of aorta

○ brachial artery → ulnar artery → deep palmar arch → metacarpal palmar an.

○ proper digital arteries ← common palmar an.

3b. Suppose you get to mid-forearm and find your route is blocked. Describe an alternative route you could take to reach the right ring finger. No need to start back at the heart, only back-track as far as you need to. (2 pts)

You might follow the radial artery (from brachial artery). The radial a. will anastomose with the deep palmar arch and so on.
4. Provide a brief embryological explanation for 5 of the following 7 relationships/characteristics in the adult. Be sure to name embryonic tissues, structures, and processes where appropriate. Two or three sentences should suffice. (15 pts)

A. CNS is hollow

B. Potential space exists between outer lining of lung and inner lining of chest wall results from the fact that the lateral plate mesoderm in embryo is in 2 segments, each of which will eventually associate with either ectoderm or endoderm... as embryonic folding occurs, a space formed at the ecto/meso and the endo/meso will become part of the potential space

C. Ectoderm is superficial to dermis

D. Epidermis is derived from the most superficial layer of embryo, the ectoderm... dermis is derived from the dermamine, which is part of the paraxial mesoderm (deep to the ectoderm in embryo)

E. Sensory fields of skin arranged as dermatomes

F. Myotomes segmented in embryo

G. Cervical 3, 4, 5 separating heart and liver

H. At fetus develops, the transverse sphenoid (future diaphragm) aligns with cervical vertebrae... connections (motor) grow from 3, 4, 5... fetus grows, sphenoid (diaphragm) descends so that it no longer is aligned with cervical vertebrae - but the initial C3, 4, 5 motor neuron connections that...

I. Limb muscles are innervated by ventral rami

J. From hypomere... ventral outgrowths

K. Dorsal root ganglia are just lateral to the spinal cord

Dorsal root ganglia come from neural crest cells... neural crest cells have many fates, either migrate dorsally or ventrally. The neural crest cells that will become DRC take the ventral path but very shortly stop on either side of spinal cord in a segmental pattern
B. outer lining of lung (endoderm) + inner lining of chest wall

E. innervate the diaphragm are still maintained, even though the diaphragm is at the abdomen/thorax border + the cervical connections are in the neck

G. Also has to do with position of neural crest cells during neural tube formation

neural crest eventually

neural crest lateral to neural tube (eventual spinal cord)
5. Choose 5 of the 9 pairs of terms below and demonstrate you understand them by succinctly describing the differences between them. Two or three sentences should suffice. (15 pts)

A. Aponeurosis vs. Retinaculum
- CT that holds tendons in broad tendonous insertion
- MB or M>M

B. Portal circulation vs. Anastomosis
- System of circulation that allows flow directly between 2 capillary beds (so fluid does not have to return to the heart, e.g. hepatic portal sys.
- System of interconnected vessels that provide multiple pathways to a target e.g. anastomoses around bony joints like elbow so if one major vessel becomes cut off, fluid circulation can still access area just by a different route

D. Dorsal root ganglia vs. Prevertebral ganglia
- sensory post-gang. symp. cell bodies

E. Gray rami vs. White rami
- both are branches off of the ventral root, the white ramus is the "on pump" to the sympathetic (prevertebral) chain; the presynaptic motor neuron will synapse with a post-synaptic neuron, which goes (the axon) through the gray ramus (off pump) to get to the spinal nerve + to its target

F. Neural crest vs. Neural tube
- both are ectodermally derived, but go on to form different structures - neural crest → DRG, sense organs, dentine, e.g. NT = brain + spinal cord

G. Ductus arteriosus vs. Ductus venosus
- both are specialized structures of fetal circulation that become vestiges in the adult, the ductus arteriosus shunts blood directly from the pulmonary trunk to the aorta, bypassing the non-functional lungs... it becomes the ligamentum arteriosum. Ductus venosus shunts highly oxygenated blood at same joint

H. Synergist vs. Antagonist
- both are types of muscle groups ... synergists are muscles that work in concert to produce some movement (biceps brachii + brachialis both flex the forearm), antagonists are muscle groups whose contractions produce opposite movements (biceps brachii flexes forearm; I. Lymph vs. Blood (connected sys.
- fluid in lymph was in blood
6. The paragraph below contains eight mistakes. **Circle and correct** each error. (16 pts)

Sympathetic preganglionic neurons are located in the lateral horn of the gray matter of the spinal cord at spinal levels T1 - L. Their axons exit the spinal cord via the dorsal roots and reach the sympathetic chain via the white rami communicantes. Bundles of preganglionic axons leaving the chain are called splanchnic nerves, which travel to the abdomen and synapse at the paravertebral ganglia anterior to the aorta. Parasympathetic outflow is restricted to four pairs of cranial nerves and three pairs of sacral spinal nerves (S2 - S4). The vagus nerve (cranial nerve X) is the primary supplier of parasympathetic input to the thorax and upper limb. Vagal stimulation increases the rate and strength of heart contractions. Some organs are innervated by both divisions of the autonomic nervous system.

7a. A patient arrives in the ER with a fractured right humerus. You discover upon examination that they are unable to extend their wrist and digits of the right hand. What is the likely cause of the functional deficit? (2 pts)

- Damage to radial nerve

7b. What sensory test would you perform to support your diagnosis? (2 pts)

- Sensory test along dorsal side of arm (entire backside of arm) 

8. At birth, the right ventricular wall is thicker than the left. This situation contrasts directly with the adult heart, where the left ventricle has significantly thicker walls than the right. Based upon your understanding of the differences between fetal and adult circulation, explain the characteristic thick right ventricular wall in newborn children. **(One sentence will do)** (2 pts)

In the adult, the L ventricle pumps the blood (newly oxygenated) into the aorta (systemic circulation). The L ventricle must be very muscular in order to generate enough pressure to get the blood out of the heart to the body. However, in the fetus, the R ventricle will be thicker because it is responsible for both pulmonary and systemic circulation; it must pump blood out of the R ventricle with great force because the fetus needs to go to the lungs to nourish. Points missed: 4
get shunted into the systemic pathway (directly from pulmonary trunk to aorta via ductus arteriosus). The fetal L ventricle is not as large; b/c it is only pumping blood through 1 circuit (systemic), as opposed to the R ventricle b/c it must pump hard enough to get blood out pulmonary trunk (+ to lungs) out the pulmonary trunk, through the somewhat small ductus arteriosus + to the aorta to supply the body.
9. PRESTIDIGITATION: “the art of sleight of hand”
The magician who palms a coin (Figure A) suddenly reveals that it has disappeared (Figure B). Circle all the muscles on the list below that are responsible for the movements from posture A to B. For circled muscles, indicate their innervation in the space to the left. (10 pts)

- abductor pollicis longus
- palmar interossei
- extensor pollicis longus & brevis
- lumbricals
- adductor pollicis
- abductor digiti minimi
- dorsal interossei
- opponens digiti minimi
- flexor digitorum profundus
- flexor digitorum superficialis
- extensor digitorum
- adductor digiti minimi
- abductor pollicis brevis
- palmaris brevis
- opponens pollicii

\[-8 = 92\]
BIO 181 : HUMAN MORPHOLOGY

2002

Exam 2
1. **Name** the structures that develop from the embryonic foregut. Starting at the abdominal aorta, **describe** the path of blood supply to **one** of these structures. (10 pts)

   Stomach, Pancreas, Liver, Gall Bladder, Esophagus, 1st 6 of Duodenum

   **Blood Flow to Gall Bladder:**

   Abdominal aorta → Celiac trunk → Common hepatic artery

   → Hepatic artery proper → Right hepatic artery → Cystic artery

   → Gall Bladder.

2. In the following paragraph, **circle** the word or words in each set of parentheses that correctly completes the sentence. (14 pts)

   Early in development, the (splanchnic lateral plate mesoderm) that will become the gonads is located on the posterior body wall at the level of the (L1/T1) vertebra. As the gonads develop they move down along the posterior body wall toward the pelvis. The ovaries do not descend as far as the testes, and end up in the (major/minor) pelvis. As the testes and their associated blood vessels move through the inguinal canal on their way to the scrotum they pick up contributions from various layers of the body wall. The deep inguinal ring is an opening in the (transversalis fascia/ transversus abdominis aponeurosis). The (transversus abdominis/ transversalis fascia) contributes a layer of connective tissue that forms the internal spermatic fascia. The (external oblique/ internal oblique) muscle contributes muscle fibers that form the cremaster muscle. The superficial inguinal ring is an opening in the external oblique aponeurosis. The left testicular artery is a branch of the (aorta/ left renal artery).
3. Processes involved in development of the gut tube include differential growth, rotations, and endodermal budlings from the gut tube. Briefly describe examples of two of these processes. One example should be from the foregut, and one from the midgut. (10 pts)

Foregut: Part of the foregut will expand into what will become the stomach. Four buds will come off the foregut: the hepatic bud, the cystic bud, and the dorsal and ventral pancreatic buds. The hepatic bud growing into the ventral mesentery will become the liver. The cystic bud will develop into the gall bladder. The dorsal pancreatic bud will develop into the head, body, and tail of the pancreas, while the ventral pancreatic bud will become the uncinate process of the pancreas. The stomach will also rotate, first turning 90° to the right so that the left side is now the anterior side. The stomach will then make a 90° clockwise turn such that the new left side becomes the interior side, forming the greater curvature of the stomach.

Midgut: The developing midgut herniates into the umbilical cord with a cranial portion and a caudal portion superior and inferior to the superior mesentery artery. Inside the umbilical cord, the midgut makes a 90° counter-clockwise turn. The first growth of the cranial portion results in the return of the midgut into the abdomen, where it makes an additional 180° counter-clockwise turn such that the caudal portion is on the right and the cranial portion is on the left. The caudal portion will later develop into the large intestine and the structure’s primary embryonic precursor. Letters may be used more than once, or not at all.

4. For each structure on the left, fill in the blank with a single letter from the right to indicate the structure’s primary embryonic precursor. Letters may be used more than once, or not at all. (8 pts)

\[
\begin{array}{ll}
\text{a. Genital tubercle} & \quad \text{f. Labia majora} \\
\text{b. Epimere} & \quad \text{g. Erector spinae} \\
\text{c. Ureteric bud} & \quad \text{h. Testes} \\
\text{d. Allantois} & \quad \text{i. Urer} \\
\text{e. Paramesonephric duct} & \quad \text{j. Fimbriae} \\
\text{f. Labioscrotal swelling} & \quad \text{k. Bladder} \\
\text{g. Mesonephric duct} & \quad \text{l. Vas deferens} \\
\text{h. Nephron} & \quad \text{m. Psoas major} \\
\text{i. Hypomere} & \quad \text{n. Points missed: 0}
\end{array}
\]
5. You are a molecule of glucose that has just been absorbed into a capillary bed in the jejunum, and you need to make your way to the external anal sphincter. **Describe** the vascular pathway from the jejunum to the external anal sphincter (which is mainly supplied by the **inferior rectal artery**). **Note** any capillary beds along the way. You may ignore the details of the heart, just indicate when you pass through it. (10 pts)

   Capillary bed in jejunum → Intestinal vein
   → Superior mesenteric vein → Hepatic portal vein
   → Capillary bed in liver → Hepatic vein → Inferior vena cava
   → Heart → Pulmonary artery → Capillary bed in alveolus
   → Pulmonary vein → Heart → Ascending aorta
   → Descending aorta → Thoracic aorta → Abdominal aorta
   → Common iliac artery → Internal iliac artery
   → Internal pudendal artery → Inferior rectal artery
   → Capillary beds in external anal sphincter.

6. On the drawing below: (12 pts)
   A. **Label** the cervix, fallopian tubes, fimbriae, and ovaries.
   B. On one side, **draw a circle** to indicate where fertilization normally occurs.
   C. **Shade** the region of the uterus where implantation normally occurs.

   ![Diagram of female reproductive system]

   D. **What do we call** the situation wherein implantation occurs in an atypical region?

   **Ectopic pregnancy**

   E. **Why** may this atypical implantation be dangerous to the mother?

   The implantation of the developing embryo will attempt to vascularize with the mother's body cavity which is not designed to support the embryo. This could result in hemorrhage or if the pregnancy makes it through, it will create complications for birth.
7. **Discuss** the contributions of each germ layer (ectoderm, mesoderm and endoderm) to two (2) of the following three structures **(choose only 2)**. Include all elements within the boundaries of the structure. For example, the lung is primarily composed of a lining, connective tissues, blood vessels, sensory nerves, autonomic nerves and pleura. Specifically address subsets of each germ layer (e.g. splanchic lateral plate mesoderm, neural crest of ectoderm, dermatome of somite, etc.) when possible. **CHOOSE ONLY TWO!** (8 pts)

- **External oblique muscle**
- **Transverse colon**
- **Labia majora**

**Transverse colon**

**Ectoderm:** The neural crest of the ectoderm gives rise to the postganglionic neurons on the transverse colon from the parasympathetic autonomic nervous system. It also contributes to the parasympathetic sympathetic autonomic nerves that innervate it.

**Mesoderm:** The splanchic lateral plate mesoderm contributes to the visceral peritoneum surrounding the colon. It also contributes to the blood vessels, smooth muscles, and connective tissue of the transverse colon.

**Endoderm:** The endoderm forms the endothelial lining of transverse colon.

**External oblique muscle**

**Ectoderm:** The neural tube of the ectoderm gives rise to the motor neurons that innervate the muscles.

**Mesoderm:** The myotome of somite give rise to the actual external oblique muscle. The somatic lateral plate mesoderm contributes to its blood vessels (i.e., superior and inferior epigastric vessels). The somatic lateral plate mesoderm also contribute to the connective tissue of the muscle, such as its aponeurosis.

**Endoderm:** There is no endoderm associated with the external oblique muscle.

**Fill in the blanks:** (10 pts)

8. During the first few days after fertilization, the _zygote_ divides into a solid mass of cells called the _morula_. Late in the _first_ week, a blastocyst cavity forms. Cells of the blastocyst form two groups, an _embryoblast layer_ at the pole which will contact the uterine wall and an outer _trophoblast layer_. Upon implantation, some cells merge to form a multinucleated mass called the _syncytiotrophoblast_, which begins to form the utero-placental circulation. Fingerlike _villi_ increase the placenta's contact with the maternal blood supply. Meanwhile, formation of the amniotic cavity creates a bilaminar embryonic disk consisting of a dorsal layer of _epiblast_ and a ventral layer of _hypoblast_. Cells migrate between these two layers by a movement called _gastrulation_, which gives rise to the trilaminar embryo.
9. Hernias may be caused by, or aggravated by, increased intra-abdominal pressure. (10 pts)
   A. **Give three examples** of activities that involve increased intra-abdominal pressure.
      - Defecation
      - Micturition
      - Parturition

   B. **Name 5** muscles that contract to increase intra-abdominal pressure.
      - Transversus Abdominis
      - Rectus Abdominis
      - External Oblique
      - Diaphragm
      - Internal Oblique

   C. Will a weak conjoint tendon increase the chance of a **direct or indirect** inguinal hernia?
      
      Direct inguinal hernia

10. During pregnancy, the uterus undergoes an incredible enlargement, and may extend all the way to the xiphoid process of the sternum. This growth of the uterus has many consequences of varying severity. For example, venous return from a lower limb may be impaired if the uterus is lying on the iliac vein, resulting in edema (swelling) of feet, ankles, or the entire lower limb. **Provide 3 additional examples** of the anatomical consequences of the growing uterus, and indicate the symptoms that may be caused by each consequence. (9 pts)

   1. The growing uterus will compress against the bladder resulting in a greater frequency of the need to urinate because the size of the bladder is decreased.
   2. The presence of the growing uterus will increase the intra-abdominal pressure which can lead to hernias where peritoneum is pushed into a persisting vaginal process.
   3. The growing uterus will displace the abdominal viscera against the diaphragm which can prevent the diaphragm from fully contracting and descending, thus resulting in a greater frequency of breaths per minute to compensate for the decreased maximum lung capacity per breath.
BIO 181 : HUMAN MORPHOLOGY

2002

Lab Practical 1 and 2
<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>1. R</td>
<td><strong>Cervix of Uterus</strong></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Urethra</td>
<td></td>
</tr>
<tr>
<td>2. R</td>
<td><strong>Notochord</strong></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Obturator nerve</td>
<td></td>
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<tr>
<td>3. R</td>
<td><strong>Preganglionic sympathetic nerves</strong></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Intercostal nerve</td>
<td></td>
</tr>
<tr>
<td>4. R</td>
<td>Head of Right Radius</td>
<td></td>
</tr>
<tr>
<td>x</td>
<td>Subclavius Pectoralis major</td>
<td></td>
</tr>
<tr>
<td>5. R</td>
<td><strong>Sciatic nerve</strong></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Sacrotuberous ligament</td>
<td></td>
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<tr>
<td>6. R</td>
<td><strong>Left Coronary artery</strong></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Right side</td>
<td></td>
</tr>
<tr>
<td>7. R</td>
<td>Genito femoral nerve</td>
<td></td>
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<tr>
<td>B</td>
<td>Ureter (Left)</td>
<td></td>
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<tr>
<td>8. R</td>
<td>Supraspinal nerve</td>
<td></td>
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<tr>
<td>B</td>
<td>Postganglionic sympathetic neuron cell bodies</td>
<td></td>
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<tr>
<td>9. R</td>
<td><em>1st Dorsal interosseus muscle</em></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Radial nerve</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Obductor Internus muscle</td>
<td></td>
</tr>
<tr>
<td>10. R</td>
<td><em>Fibrous muscle</em></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Obductor Internus muscle</td>
<td></td>
</tr>
<tr>
<td>11. R</td>
<td>Flex elbow, Supinate forearm</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Scaphoid</td>
<td></td>
</tr>
<tr>
<td>12. R</td>
<td><strong>Aortic arch</strong></td>
<td></td>
</tr>
<tr>
<td>x B</td>
<td>Short Biceps brachii, Coracobrachialis</td>
<td></td>
</tr>
<tr>
<td>13. R</td>
<td><strong>Ulnar artery</strong></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Capitate</td>
<td></td>
</tr>
<tr>
<td>14. R</td>
<td><strong>Axillary nerve</strong></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Hold head of humerus in glenoid cavity</td>
<td></td>
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<tr>
<td>15. R</td>
<td><strong>Testicular vein</strong></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Splenic artery</td>
<td></td>
</tr>
<tr>
<td>16. R</td>
<td>Deltoid</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>C8</td>
<td></td>
</tr>
<tr>
<td>17. R</td>
<td><strong>Median nerve</strong></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Opponens digiti minimi</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Common Bile Duct</td>
<td></td>
</tr>
<tr>
<td>18. R</td>
<td><strong>Dorsal</strong></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Secondarily retroperitoneal</td>
<td></td>
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<tr>
<td>19. R</td>
<td>Extensor Indecis</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Bulb of the Vestibule</td>
<td></td>
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<tr>
<td>20. R</td>
<td><strong>Long Thoracic nerve</strong></td>
<td></td>
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<tr>
<td>B</td>
<td>C3-C5</td>
<td></td>
</tr>
<tr>
<td>21. R</td>
<td><strong>Bladder</strong></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Piviformis muscle</td>
<td></td>
</tr>
<tr>
<td>22. R</td>
<td><em>Supination</em></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Radial nerve (superficial branch)</td>
<td></td>
</tr>
<tr>
<td>23. R</td>
<td><strong>Green</strong></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Internal Thoracic artery</td>
<td></td>
</tr>
<tr>
<td>24. R</td>
<td><strong>Rectum</strong></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Seminal Vesicle</td>
<td></td>
</tr>
</tbody>
</table>
25. R Ligamentum Teres
   B Left Renal vein
26. R Pectoralis minor
   B Left Main Bronchus
27. R Ilium
   B Superior Mesenteric vein
28. R Renal papilla
   B Phrenic nerve
29. R Recurrent Laryngeal nerve
   B Musculocutaneous nerve
30. R Corpus cavernosum
    B Nerve to the Obturator Internus
31. R Deep palmar arch
   B Proper palmar digital artery of 3rd dig
32. R Interventricular Septum
   B Prevent collapse of Mitral valve into left atrium
33. R Left gastric artery, Splenic artery, Common hepatic
   B Vagus nerve
34. R Inferior vesical artery
   B Prostate
1. R genoglossus muscle
   B hypoglossal nerve (XII)
2. R frontal sinus
   B nasal cavity
3. R flexor digitorum longus
   B lumboinfl muscle
4. R basilar artery
   B posterior cerebral artery
5. R pia mater
   B arachnoid granulation
6. R epiglottus
   B posterior cricoarytenoid muscle
7. R subclavian artery
   B anterior scalene muscle
8. R tibialis anterior muscle
   B anterior tibial artery
9. R V3 (mandibular 
  B stylopharyngeus muscle
10. R cerebellum
    B 3rd ventricle
11. R femoral artery
    B iliopsoas muscle
12. R mandible
    B medial pterygoid muscle
13. R superior sagittal sinus
    B middle cerebral artery
14. R maxillary sinus
    B infraorbital nerve (V2)
15. R orbicularis oris muscle
    B platysma muscle
16. R calcaneus bone
    B plantarflexion
17. R carotid canal for carotid artery
    B greater palatine foramen
18. R posterior alveolar nerve (V3)
    B chorda tympani nerve
19. R tentorium
    B sigmoid sinus
20. R quadriiceps femoris
    B semimembranosus + semitendinosus
21. R adductor longus
    B femoral nerve
22. R optic nerve
    B temporalis muscle
23. R postorbital process
    B greater wing of sphenoid bone
24. R soleus muscle
    B plantaris muscle
25. R  maxillary artery
   B  middle meningeal artery
26. R  obturator nerve (VI)
   B  III- occulomotor
27. R  abductor helicis
   B  flexor digiti minimi
28. R  opening to eustachian tube
   B  levator veli palatini
29. R  extensor digitorum brevis
   B  deep peroneal nerve
30. R  flexor hallucis longus
   B  tibial nerve
31. R  thyrohyoid
   B  cricothyroid
32. R  gracilis
   B  obturator n.