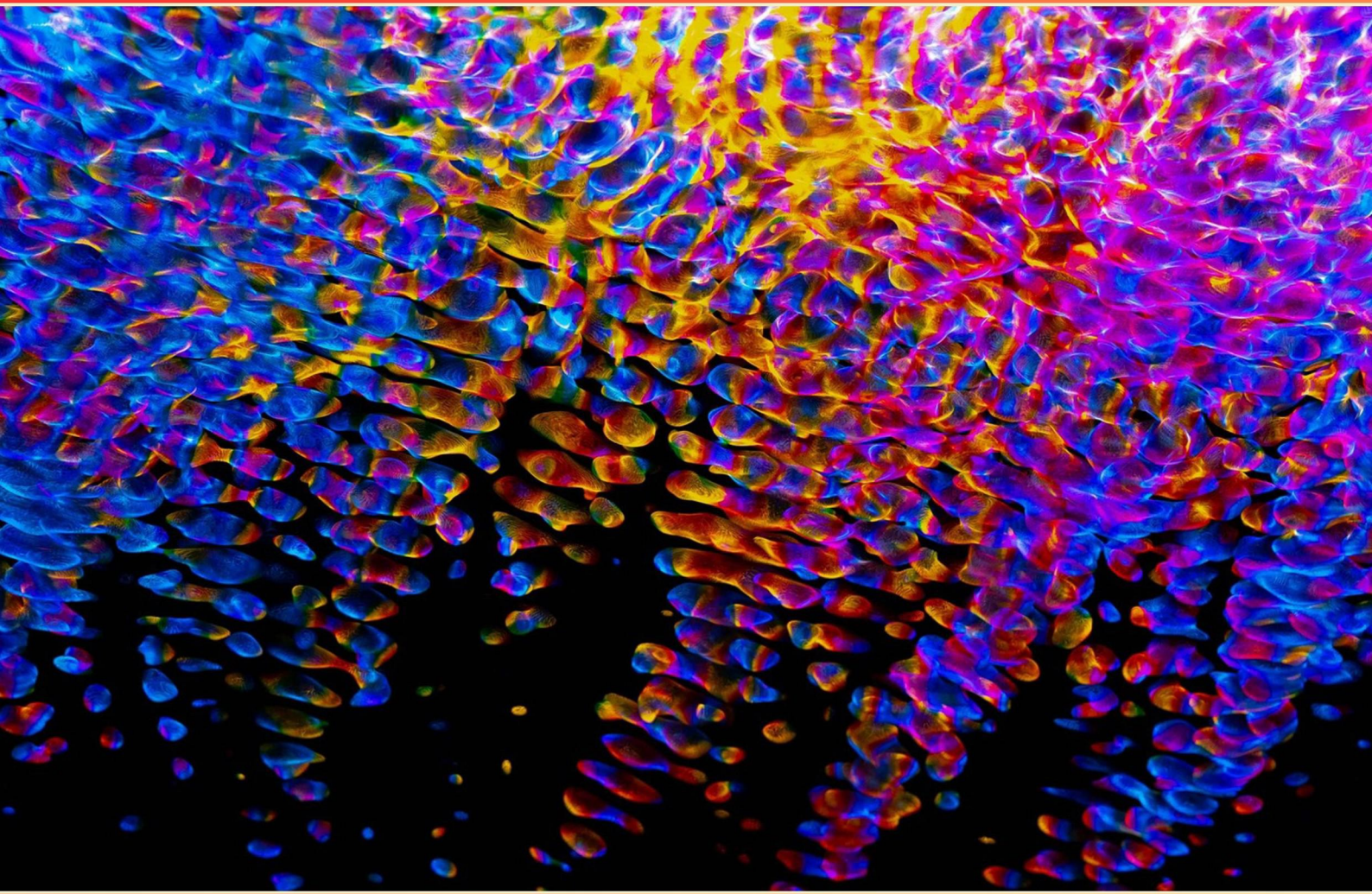


# **TCD AND CEREBRAL CIRCULATION PRACTICE TEST (SAMPLE)**

**STUDY GUIDE**



**SAMPLE STUDY GUIDE  
WITH LIMITED QUESTIONS**

**VISIT US ONLINE FOR  
THE FULL VERSION STUDY GUIDE**

<https://tcdcerebralcirculation.examzify.com>



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# Introduction

Preparing for a certification exam can feel overwhelming, but with the right tools, it becomes an opportunity to build confidence, sharpen your skills, and move one step closer to your goals. At Examzify, we believe that effective exam preparation isn't just about memorization, it's about understanding the material, identifying knowledge gaps, and building the test-taking strategies that lead to success.

This guide was designed to help you do exactly that.

Whether you're preparing for a licensing exam, professional certification, or entry-level qualification, this book offers structured practice to reinforce key concepts. You'll find a wide range of multiple-choice questions, each followed by clear explanations to help you understand not just the right answer, but why it's correct.

The content in this guide is based on real-world exam objectives and aligned with the types of questions and topics commonly found on official tests. It's ideal for learners who want to:

- Practice answering questions under realistic conditions,
- Improve accuracy and speed,
- Review explanations to strengthen weak areas, and
- Approach the exam with greater confidence.

We recommend using this book not as a stand-alone study tool, but alongside other resources like flashcards, textbooks, or hands-on training. For best results, we recommend working through each question, reflecting on the explanation provided, and revisiting the topics that challenge you most.

Remember: successful test preparation isn't about getting every question right the first time, it's about learning from your mistakes and improving over time. Stay focused, trust the process, and know that every page you turn brings you closer to success.

Let's begin.

# How to Use This Guide

This guide is designed to help you study more effectively and approach your exam with confidence. Whether you're reviewing for the first time or doing a final refresh, here's how to get the most out of your Examzify study guide:

## 1. Start with a Diagnostic Review

Skim through the questions to get a sense of what you know and what you need to focus on. Your goal is to identify knowledge gaps early.

## 2. Study in Short, Focused Sessions

Break your study time into manageable blocks (e.g. 30 – 45 minutes). Review a handful of questions, reflect on the explanations.

## 3. Learn from the Explanations

After answering a question, always read the explanation, even if you got it right. It reinforces key points, corrects misunderstandings, and teaches subtle distinctions between similar answers.

## 4. Track Your Progress

Use bookmarks or notes (if reading digitally) to mark difficult questions. Revisit these regularly and track improvements over time.

## 5. Simulate the Real Exam

Once you're comfortable, try taking a full set of questions without pausing. Set a timer and simulate test-day conditions to build confidence and time management skills.

## 6. Repeat and Review

Don't just study once, repetition builds retention. Re-attempt questions after a few days and revisit explanations to reinforce learning. Pair this guide with other Examzify tools like flashcards, and digital practice tests to strengthen your preparation across formats.

There's no single right way to study, but consistent, thoughtful effort always wins. Use this guide flexibly, adapt the tips above to fit your pace and learning style. You've got this!

## Questions

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- 1. In transcranial Doppler, how does the PCoA display and what is its mean peak velocity?**
  - A. Toward the transducer;  $36 \pm 15$  cm/sec
  - B. Away from the transducer;  $36 \pm 15$  cm/sec
  - C. Toward or away from the transducer;  $36 \pm 15$  cm/sec
  - D. No flow detected; 0 cm/sec
- 2. Which artery is the largest branch of the subclavian artery?**
  - A. Internal thoracic artery
  - B. Vertebral artery
  - C. Thyrocervical trunk
  - D. Dorsal scapular artery
- 3. Cerebral infarction in sickle cell disease is associated with occlusive vasculopathy involving which territories?**
  - A. Anterior cerebral, middle, and posterior cerebral arteries
  - B. Posterior circulation only
  - C. Basilar artery
  - D. Terminal ICA, MCA, ACA
- 4. How can transcranial Doppler differentiate vasospasm from global cerebral hyperemia after subarachnoid hemorrhage?**
  - A. Vasospasm shows elevated MFV with a high Lindegaard ratio; hyperemia shows elevated MFV with a normal or only mildly elevated Lindegaard ratio.
  - B. Vasospasm shows decreased MFV; hyperemia shows increased MFV.
  - C. Lindegaard ratio provides no useful information for differentiation.
  - D. MFV alone is sufficient to differentiate vasospasm from hyperemia.
- 5. What is the typical Doppler display and mean velocity for the anterior cerebral artery (ACA)?**
  - A. Green indicating flow perpendicular;  $40 \pm 5$  cm/sec
  - B. Red indicating flow toward the transducer;  $60 \pm 8$  cm/sec
  - C. Yellow indicating turbulent flow;  $70 \pm 12$  cm/sec
  - D. Blue indicating flow away from the transducer;  $50 \pm 11$  cm/sec

6. Which range best represents the MCA main trunk velocity given mean 62 +/- 12 cm/sec?
- A. 40-60 cm/sec
  - B. 50-74 cm/sec
  - C. 30-42 cm/sec
  - D. 60-80 cm/sec
7. How does hypoventilation affect the middle cerebral artery in terms of mean velocity and pulsatility index?
- A. Decreases the mean velocity and increases the pulsatility index
  - B. No change in velocity or pulsatility index
  - C. Increases the mean velocity and decreases the pulsatility index
  - D. Increases pulsatility index only
8. Which artery provides collateral flow between posterior and anterior circulations?
- A. Posterior communicating Artery
  - B. Anterior communicating Artery
  - C. Middle Cerebral Artery
  - D. Ophthalmic Artery
9. How can TCD be used during neurosurgical procedures for real-time flow assessment?
- A. Anesthesia monitoring only.
  - B. Only used after all surgeries.
  - C. Intraoperative or immediate postoperative monitoring of flow velocities in major intracranial arteries to detect acute changes in perfusion or vessel patency during clipping or bypass procedures.
  - D. Used to image the brain parenchyma.
10. How does the presence of severe carotid stenosis affect intracranial velocities on TCD?
- A. It decreases distal velocities.
  - B. It may alter collateral pathways and increase distal intracranial velocities via compensatory flow; exact changes depend on collateral circulation and anatomy; corroboration with imaging is advised.
  - C. It has no effect on intracranial velocities.
  - D. It only affects the ophthalmic artery.

## **Answers**

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1. C
2. B
3. D
4. A
5. D
6. B
7. C
8. A
9. C
10. B

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## **Explanations**

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**1. In transcranial Doppler, how does the PCoA display and what is its mean peak velocity?**

- A. Toward the transducer;  $36 \pm 15$  cm/sec
- B. Away from the transducer;  $36 \pm 15$  cm/sec
- C. Toward or away from the transducer;  $36 \pm 15$  cm/sec**
- D. No flow detected; 0 cm/sec

*The PCoA is a small collateral artery that can be seen in transcranial Doppler with a bidirectional appearance. Its course through the Circle of Willis means the Doppler beam can intersect it from different angles, so the flow can be recorded as moving toward the transducer or away from it depending on exactly where and how you insonate. The velocity of flow in the PCoA is relatively modest—around 36 cm/s on average, with a typical spread of about  $\pm 15$  cm/s—reflecting its smaller size compared with major arteries. So you'd expect to see the PCoA signal that can flip direction with the probe position, and its mean peak velocity sits near  $36 \pm 15$  cm/s.*

**2. Which artery is the largest branch of the subclavian artery?**

- A. Internal thoracic artery
- B. Vertebral artery**
- C. Thyrocervical trunk
- D. Dorsal scapular artery

*The vertebral artery, arising from the first part of the subclavian artery, is the largest branch. It travels upward through the transverse foramina of the cervical bones and enters the skull via the foramen magnum, where it fuses with its counterpart to form the basilar artery that supplies the posterior brain. Its relatively large size reflects its crucial role in providing the posterior circulation. In contrast, the internal thoracic artery runs along the inner chest wall and is smaller; the thyrocervical trunk is a short vessel that gives several small branches; the dorsal scapular artery, when present, supplies the scapular region and is also smaller.*

**3. Cerebral infarction in sickle cell disease is associated with occlusive vasculopathy involving which territories?**

- A. Anterior cerebral, middle, and posterior cerebral arteries
- B. Posterior circulation only
- C. Basilar artery
- D. Terminal ICA, MCA, ACA**

*Cerebral infarction in sickle cell disease reflects occlusive vasculopathy of the large arteries supplying the anterior circulation. The disease typically narrows the terminal internal carotid artery and extends into its major branches, the anterior cerebral artery and the middle cerebral artery. When the terminal ICA and these branches are stenosed, perfusion falls in the territories they supply—primarily the frontal and parietal regions—leading to infarction in those areas. This pattern often presents alongside moyamoya-like collateralization around the affected terminal ICA, but the critical feature is that the infarcts occur in the territories fed by the terminal ICA and its branches to the anterior circulation (MCA and ACA). Involvement of the posterior circulation is not the characteristic pattern here, which is why the option focusing on the terminal ICA with MCA and ACA territories is the best fit.*

**4. How can transcranial Doppler differentiate vasospasm from global cerebral hyperemia after subarachnoid hemorrhage?**

- A. Vasospasm shows elevated MFV with a high Lindegaard ratio; hyperemia shows elevated MFV with a normal or only mildly elevated Lindegaard ratio.**
- B. Vasospasm shows decreased MFV; hyperemia shows increased MFV.
- C. Lindegaard ratio provides no useful information for differentiation.
- D. MFV alone is sufficient to differentiate vasospasm from hyperemia.

*The key idea is that transcranial Doppler uses flow velocity patterns to tell apart narrowing of the arteries (vasospasm) from a global rise in blood flow (hyperemia). When arteries spasm, the narrowed vessel forces blood to move faster in the affected segment, so the mean flow velocity in the middle cerebral artery goes up. At the same time, the overall flow in the neck arteries doesn't increase in the same way, so the ratio of the MCA velocity to the extracranial internal carotid velocity—the Lindegaard ratio—becomes high (typically greater than about 3). In global hyperemia, there's a general increase in cerebral blood flow, so MFV can rise as well, but the extracranial carotid flow tends to rise proportionally too. The result is an elevated MFV with a normal or only mildly elevated Lindegaard ratio (usually below about 3). So, the combination matters: elevated MFV with a high Lindegaard ratio points to vasospasm, whereas elevated MFV with a normal or mildly raised Lindegaard ratio points to hyperemia. This is why relying on MFV alone can be misleading—the Lindegaard ratio provides the crucial context to distinguish the two scenarios after subarachnoid hemorrhage.*

**5. What is the typical Doppler display and mean velocity for the anterior cerebral artery (ACA)?**

- A. Green indicating flow perpendicular;  $40 \pm 5$  cm/sec
- B. Red indicating flow toward the transducer;  $60 \pm 8$  cm/sec
- C. Yellow indicating turbulent flow;  $70 \pm 12$  cm/sec
- D. Blue indicating flow away from the transducer;  $50 \pm 11$  cm/sec**

*The main idea tested is how color Doppler shows flow direction and what the anterior cerebral artery typically does on transcranial Doppler. In color Doppler, flow toward the transducer is coded red and flow away is coded blue. The anterior cerebral artery, when viewed through the transtemporal window, commonly shows flow moving away from the transducer, which appears blue. Its mean velocity is around 50 cm/sec, with a typical range near 40–60 cm/sec;  $50 \pm 11$  cm/sec fits that range. So blue indicating flow away from the transducer with about 50 cm/sec is the best match. The other color–velocity pairings don't align with the usual direction and typical velocity of the ACA.*

**6. Which range best represents the MCA main trunk velocity given mean  $62 \pm 12$  cm/sec?**

- A. 40–60 cm/sec
- B. 50–74 cm/sec**
- C. 30–42 cm/sec
- D. 60–80 cm/sec

*Focus on how a mean with variability describes typical values. If MCA main trunk velocity is 62 cm/s with a spread of 12 cm/s (a standard deviation), the range that best represents where most normal measurements lie is the mean plus or minus one standard deviation. In a normal distribution, about 68% of values fall within that zone, so 62 minus 12 to 62 plus 12 equals 50 to 74 cm/s. That makes 50–74 cm/s the best representation of typical MCA velocities. The other ranges either sit too far below, too far above, or don't center around the mean, missing a substantial portion of expected values.*

**7. How does hypoventilation affect the middle cerebral artery in terms of mean velocity and pulsatility index?**

- A. Decreases the mean velocity and increases the pulsatility index
- B. No change in velocity or pulsatility index
- C. Increases the mean velocity and decreases the pulsatility index**
- D. Increases pulsatility index only

*Hypoventilation raises arterial CO<sub>2</sub>, which causes cerebral vessels to dilate. In the middle cerebral artery this vasodilation lowers cerebrovascular resistance and boosts blood flow, so Doppler detects a higher mean velocity. The dilation also increases diastolic flow more than systolic flow, making the waveform less pulsatile; the pulsatility index, which compares the difference between systolic and diastolic velocities to the mean velocity, decreases. So mean velocity goes up and pulsatility index goes down.*

**8. Which artery provides collateral flow between posterior and anterior circulations?**

- A. Posterior communicating Artery**
- B. Anterior communicating Artery
- C. Middle Cerebral Artery
- D. Ophthalmic Artery

*The key idea is the connections in the Circle of Willis that allow cross-flow between different arterial territories. The posterior communicating arteries link the internal carotid system to the posterior cerebral arteries, forming a bridge between the anterior circulation (via the internal carotid/ACA territory) and the posterior circulation (via the posterior cerebral arteries). This setup provides collateral flow when one part of the system is compromised, allowing blood from the anterior side to reach the posterior side, and vice versa. The anterior communicating artery connects the two anterior cerebral arteries to allow cross-flow within the anterior circulation, not between anterior and posterior. The middle cerebral artery is a major branch supplying lateral hemispheres, not a connector between circulations. The ophthalmic artery is a branch of the internal carotid with no role as a collateral bridge between posterior and anterior circulations.*

**9. How can TCD be used during neurosurgical procedures for real-time flow assessment?**

- A. Anesthesia monitoring only.
- B. Only used after all surgeries.
- C. Intraoperative or immediate postoperative monitoring of flow velocities in major intracranial arteries to detect acute changes in perfusion or vessel patency during clipping or bypass procedures.**
- D. Used to image the brain parenchyma.

*Transcranial Doppler provides real-time information about blood flow velocity in the major intracranial arteries, so during neurosurgery it can instantly reveal how well the brain is being perfused and whether a vessel remains patent. This is why it's used intraoperatively or in the immediate postoperative period to detect acute changes in flow during procedures like aneurysm clipping or bypass operations. If a clip or graft affects flow, the velocity in the monitored arteries will change, signaling the team to adjust the technique or intervene promptly to prevent ischemia. It's not an imaging modality of brain parenchyma, nor is it limited to anesthesia monitoring or only used after surgery, which is why those other options don't fit.*

**10. How does the presence of severe carotid stenosis affect intracranial velocities on TCD?**

- A. It decreases distal velocities.
- B. It may alter collateral pathways and increase distal intracranial velocities via compensatory flow; exact changes depend on collateral circulation and anatomy; corroboration with imaging is advised.**
- C. It has no effect on intracranial velocities.
- D. It only affects the ophthalmic artery.

*Severe carotid (internal carotid) stenosis often pushes the brain to rely on collateral pathways through the circle of Willis to maintain perfusion. That rerouted flow can raise the speed of blood in distal intracranial vessels as compensatory flow increases to meet demand. Because the exact pattern depends on how well the collateral connections are developed in an individual's circle of Willis, the changes seen on transcranial Doppler can vary from person to person. In some cases, distal intracranial velocities will be higher due to this compensatory flow, while imaging (CTA/MRA/DSA) is needed to confirm the actual pattern and to understand the specific anatomy at play. This makes the notion that velocities universally decrease or remain unchanged unlikely, and it also clarifies that the effect is not limited to the ophthalmic artery.*

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## Next Steps

Congratulations on reaching the final section of this guide. You've taken a meaningful step toward passing your certification exam and advancing your career.

As you continue preparing, remember that consistent practice, review, and self-reflection are key to success. Make time to revisit difficult topics, simulate exam conditions, and track your progress along the way.

If you need help, have suggestions, or want to share feedback, we'd love to hear from you. Reach out to our team at [hello@examzify.com](mailto:hello@examzify.com).

Or visit your dedicated course page for more study tools and resources:

<https://tcdcerebralcirculation.examzify.com>

We wish you the very best on your exam journey. You've got this!

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