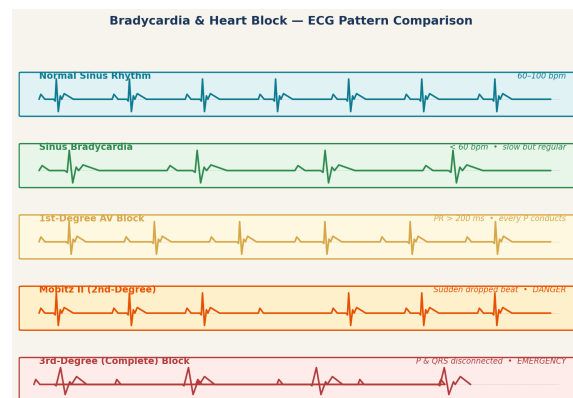


Understanding Bradycardia and Heart Block

When the heart beats too slowly — or signals get blocked along the way

A slow pulse can be normal in athletes. But when it causes symptoms — or when the heart's signals are blocked — that is a medical problem. This guide explains the difference and what to do.



Online: <https://go.riasalimd.com/bradycardia-guide>

Rias KS Ali, MD FACC

Board Certified in Interventional Cardiology & Cardiovascular Disease

4740 Mile Stretch Drive, Holiday FL 34690 | Office: (727) 943-5200 | Fax: (727) 943-5201 | RiasAliMD.com

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Names & Terms You Will Hear

Term	Meaning
Bradycardia	Any heart rate below 60 beats per minute. Normal at rest in fit people; a concern when it causes dizziness, fainting, or fatigue.
AV Block (Heart Block)	A delay or interruption in the electrical signal that travels from the upper heart chambers (atria) to the lower chambers (ventricles). Graded 1st, 2nd, or 3rd degree.
Sick Sinus Syndrome (SSS / SND)	The sinus node — the heart's natural pacemaker — fires too slowly, erratically, or fails to fire. Also called sinus node dysfunction (SND).
Tachy-Brady Syndrome	A pattern of Sick Sinus Syndrome where episodes of fast rhythm (usually atrial fibrillation) alternate with very slow rates. Needs a pacemaker to make drug treatment safe.
Stokes-Adams Attack	A sudden blackout or fainting spell caused by a very slow heart rate or a pause in the heart's rhythm — often complete heart block. Usually brief; patient recovers quickly. Emergency if the pause is prolonged.
Escape Rhythm	A backup rhythm that lower parts of the heart generate when the sinus node or AV node fails. Slow (20–40 bpm in complete block); unstable without a pacemaker.
PR Interval	The distance on an ECG from the start of the P wave to the start of the QRS. Normal: 120–200 milliseconds (ms). Over 200 ms = 1st-degree block.
Bundle Branch Block (LBBB/RBBB)	A delay in conduction through one of the two main electrical branches below the AV node. Left bundle branch block (LBBB) is clinically more significant and can precede complete block in older patients.

FAINTING from a slow heart rate is a medical emergency.

If you or someone near you faints unexpectedly — especially without warning — **call 911 immediately**. A Stokes-Adams attack (sudden blackout from complete heart block or a cardiac pause) can progress to cardiac arrest. Do not drive to the ER. Call 911.



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What Is Bradycardia and Heart Block?

- The heart runs on electricity. The sinus node fires a signal. It travels to the AV node, then to the ventricles. Bradycardia means fewer than 60 beats per minute (bpm).
- SINUS BRADYCARDIA: the sinus node fires slowly. In athletes at rest, this is normal. When it causes fatigue, dizziness, or fainting, it needs evaluation.
- SICK SINUS SYNDROME (SSS): the sinus node fires too slowly or pauses. It may swing between fast and slow rates (tachy-brady). Often needs a pacemaker.
- 1ST-DEGREE AV BLOCK: the signal slows through the AV node (PR > 200 ms). Every P wave still produces a QRS beat. Usually benign — no treatment needed.
- 2ND-DEGREE MOBITZ I (Wenckebach): the PR gets longer with each beat until one is dropped. The cycle repeats. Usually benign. Linked to vagal tone or inferior heart attack.
- 2ND-DEGREE MOBITZ II: the PR stays the same, but beats drop without warning. This is DANGEROUS — it can turn into complete block at any time. Almost always needs a pacemaker.
- 3RD-DEGREE (COMPLETE) HEART BLOCK: the upper and lower heart chambers beat on their own. The lower chambers use a slow backup rhythm (20–40 bpm). This is an EMERGENCY. Without a pacemaker, the patient may faint or have cardiac arrest.
- BUNDLE BRANCH BLOCKS (LBBB, RBBB): a delay in one branch below the AV node. Right bundle block (RBBB) is often benign. Left bundle block (LBBB) may signal heart disease. When two branches are blocked, the risk of complete block goes up.



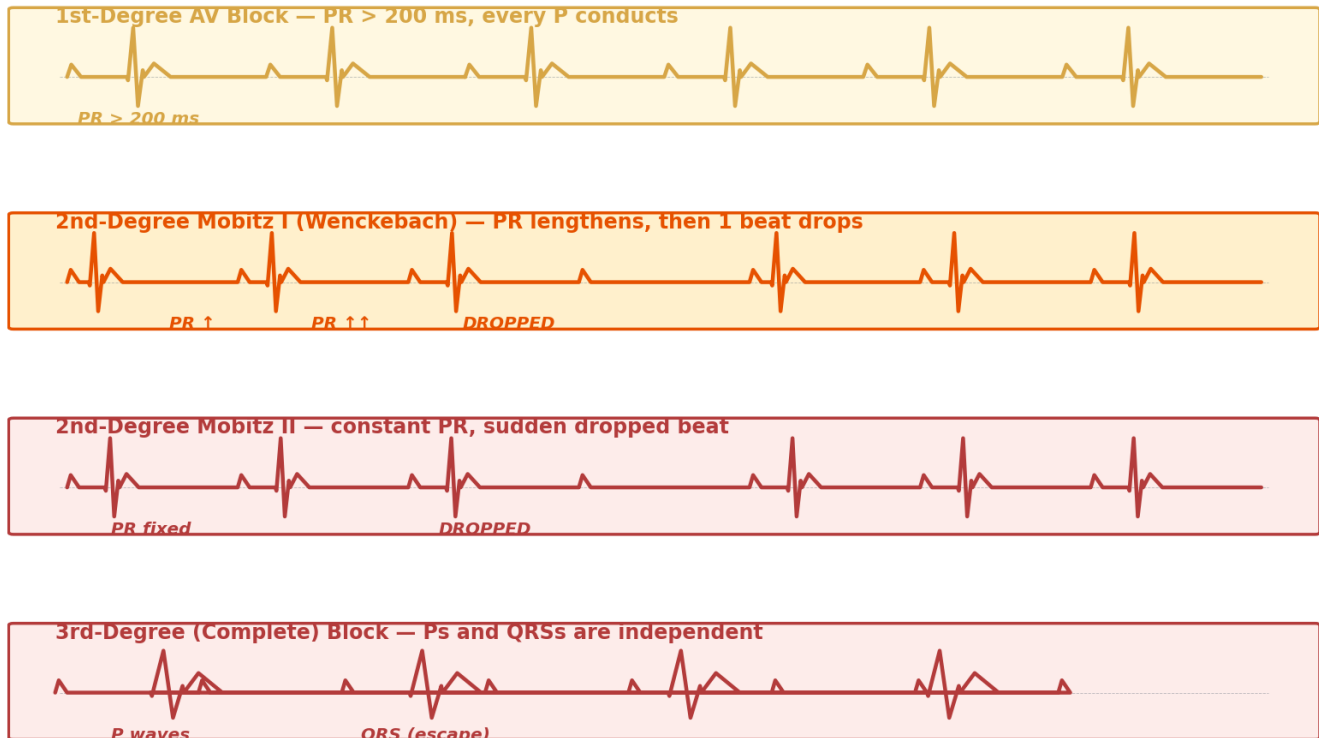
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AV Block Patterns — ECG Teaching Strips



Four schematic ECG teaching strips showing the four main types of AV block. Note the progressively lengthening PR in Mobitz I (Wenckebach), the sudden dropped beat with constant PR in Mobitz II, and the fully dissociated P waves and slow QRS complexes in 3rd-degree (complete) block.



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AV Block Grades — ECG Signs, Danger Level, and Required Action

Block Type	ECG Sign	Danger	Action
1st-Degree AV Block	PR > 200 ms; every P conducts	Low — usually benign	Monitor; treat cause if present; no pacemaker needed
2nd-Degree Mobitz I (Wenckebach)	PR lengthens then 1 beat drops; cycle repeats	Low-moderate — usually benign; rarely progresses	Treat underlying cause; pacemaker if symptomatic
2nd-Degree Mobitz II	PR stays constant; beats drop without warning	HIGH — can progress to complete block suddenly	Pacemaker usually required; urgent evaluation
3rd-Degree (Complete) Block	P waves and QRS complexes fire independently; slow QRS (< 40 bpm)	EMERGENCY — cardiac arrest if escape rhythm fails	Urgent pacemaker; temporary pacing if unstable



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Sick Sinus Syndrome and Tachy-Brady

- Sick Sinus Syndrome (SSS) — also called Sinus Node Dysfunction — is when the sinus node fires too slowly, pauses, or fails to restart after a fast rhythm.
- Tachy-brady syndrome is a type of SSS. Atrial fibrillation (fast) and slow rates alternate. The heart 'resets' with a long pause that can cause near-fainting.
- Drugs that slow the fast rate also slow the already-slow rate. A dual-chamber pacemaker is usually placed first to make drug therapy safe.
- AFib episodes in tachy-brady raise stroke risk. Ask Dr. Ali if a blood thinner is right for you.
- SSS mainly affects older adults but can occur at any age. Thyroid disease, amyloid, and sarcoid are reversible or treatable causes.



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Mobitz I vs Mobitz II — The Critical Difference

- MOBILZ I (Wenckebach): the PR interval grows longer with each beat until one beat is dropped. Then the cycle starts over. This is usually benign — caused by high vagal tone or inferior heart attack.
- MOBILZ II: the PR stays the same, but beats drop without warning. This happens below the AV node, in the bundle branches. It is UNPREDICTABLE — it can turn into complete block at any time.
- Key rule: any new Mobitz II on an ECG is almost always referred for a pacemaker. The risk of sudden complete block (and cardiac arrest) is too high to wait.
- How to tell them apart: look at the PR before the dropped beat. Lengthening PR = Wenckebach. Fixed PR = Mobitz II.
- High-degree block (2 or more beats dropped in a row) is treated like Mobitz II. Urgent pacemaker evaluation is needed.



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Complete (3rd-Degree) Heart Block

- In complete heart block, the upper and lower heart chambers beat on their own. The sinus node fires (you see P waves on the ECG), but no signal reaches the ventricles.
- The ventricles fall back on a slow backup rhythm at 20–40 bpm. This is not enough to support normal activity.
- Common causes: age-related fibrosis (Lenegre–Lev), inferior or anterior heart attack, TAVR procedure, heart surgery, and infiltrative diseases like amyloid or sarcoid.
- Symptoms include severe fatigue, near-fainting, fainting (Stokes-Adams attacks), confusion, and shortness of breath. Some patients feel fine at rest but collapse with activity.
- Treatment: a permanent dual-chamber pacemaker (Class I — 2018 ACC/AHA/HRS Guideline). Temporary pacing on external pads or a small wire in the heart is used as a bridge.
- Inferior MI block often resolves in a few days. Anterior MI block usually needs a permanent pacemaker.



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Why It Matters

- A heart at 30 bpm cannot pump enough blood to the brain. This causes fatigue, dizziness, and fainting. Falls can lead to serious injury.
- Complete heart block is life-threatening. Without a pacemaker, up to 30% of new cases lead to cardiac arrest within weeks.
- Mobitz II is unpredictable. It can become complete block during exercise, under anesthesia, or during sleep — with no warning at all.
- Some causes are REVERSIBLE. Stopping a drug, treating thyroid disease, or treating Lyme can restore a normal rate. Knowing the cause changes the treatment.
- When a pacemaker is needed, it is safe and effective. Most patients feel much better within days of implant — symptoms they thought were just aging often disappear.



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Risk Factors

Some patients are more likely to develop this condition. Knowing your risk helps your care team take extra precautions.

Risk Factor	Why It Increases Risk
Older age	Fibrosis of the conduction system (Lenegre–Lev disease) builds up with age. It is the top cause of complete AV block.
Heart attack (MI)	Inferior MI can damage the AV node. Anterior MI can damage the bundle branches. Both can cause heart block.
Medications	Beta-blockers, diltiazem, verapamil, digoxin, and amiodarone all slow conduction. Always tell your doctor every drug you take.
TAVR / heart surgery	TAVR causes new bundle branch block in 10–30% and complete AV block in 5–10% of cases. Some patients need a pacemaker after the procedure.
Hypothyroidism	Low thyroid hormone slows the heart rate and impairs signals. Fully reverses with thyroid hormone treatment.
High potassium (hyperkalemia)	High potassium, common in kidney disease, disrupts the heart's electrical system. Correcting it often restores a normal rate.
Lyme disease	Lyme carditis causes AV block in 1–10% of untreated cases. It usually resolves with antibiotics. Ask about Lyme exposure if you live in the Northeast or upper Midwest.
Infiltrative disease	Amyloid or sarcoid can build up in the heart muscle and block conduction pathways. This type can be hard to treat without a pacemaker.
Athletic conditioning	Fit athletes often have slow resting rates (40–55 bpm) from high vagal tone. This is benign — the rate rises normally with exercise and no symptoms are present.



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What Causes Bradycardia & Heart Block?

Heart Attack (MI) Inferior MI → AV node block Anterior MI → bundle branch block or complete block (higher risk)	Systemic & Reversible Hypothyroidism Hyperkalemia / low O ₂ Lyme carditis Amyloid · sarcoid	High Vagal Tone Athletes at rest (normal) Vasovagal episodes Sleep / breath-holding Not usually dangerous
Age & Fibrosis Lenegre-Lev disease: fibrosis of conduction system with age (most common cause of complete AV block)	Medications Beta-blockers Diltiazem / verapamil Digoxin Amiodarone · sotalol	Post-Procedure TAVR: 5–25% new block Valve surgery Ablation procedures Cardiac surgery

Five columns organize the causes of bradycardia by mechanism: age-related fibrosis (Lenegre–Lev), cardiac ischemia, medications, systemic/reversible conditions, and post-procedure causes including TAVR.



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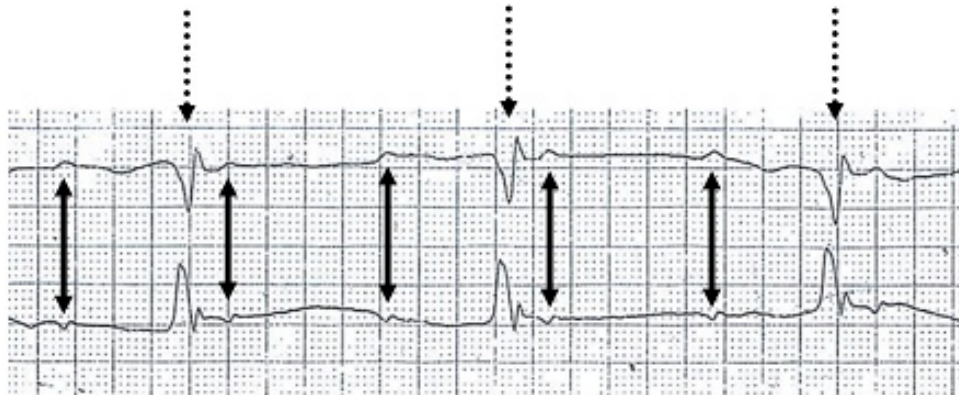
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Treatment Options

- **FIRST:** find and fix the cause. Stop the drug causing the slow rate. Fix electrolytes. Treat thyroid disease or Lyme. If the cause is reversible, no pacemaker may be needed.
- **EMERGENCY:** atropine (IV) is the first drug given for acute symptomatic bradycardia. If it does not help, temporary pacing pads on the chest keep the heart beating until a more stable option can be placed.
- **PERMANENT PACEMAKER** is the main treatment for: symptomatic bradycardia, Mobitz II, complete AV block, and symptomatic Sick Sinus Syndrome. This is a Class I guideline recommendation (ACC/AHA/HRS 2018).
- The pacemaker guide explains the device, the procedure, recovery, and follow-up. Visit: go.riasalimd.com/pacer-icd-guide
- **AMBULATORY MONITORING** (Holter or event monitor) records the heart rhythm over days to weeks. It catches block or pauses that cause fainting when symptoms are not constant.
- Monitoring guide: go.riasalimd.com/holter-guide
- **EXERCISE TEST:** used when bradycardia only happens with activity. It checks if the heart rate rises as it should during exertion (chronotropic competence).
- **EP STUDY:** used for unexplained fainting when other tests are normal. It measures how fast signals travel through the AV node and bundle branches.



A real EKG from a patient in complete (3rd-degree) heart block — two simultaneous strips of the same heartbeat. Dotted arrows mark P waves firing on schedule from the sinus node; double arrows mark the QRS complexes beating on their own, slower rhythm. The top and bottom chambers have lost their electrical connection — this pattern is a Class I indication for a permanent pacemaker. Image: Gregory Marcus, MD, MAS, FACC, Wikimedia Commons (CC BY 3.0).



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When Is a Pacemaker Needed?

- ALWAYS needed (Class I): symptomatic bradycardia from any cause not fixed by treating the underlying problem; complete AV block; Mobitz II; symptomatic SSS.
- ALWAYS needed even without symptoms: complete AV block with escape rate < 40 bpm or pauses of 3 seconds or longer; complete block after TAVR or heart surgery that does not resolve.
- USUALLY reasonable (Class IIa): symptomatic Mobitz I; bifascicular block with unexplained fainting; Mobitz II confirmed at the bundle-branch level on EP study.
- NOT needed for: 1st-degree block alone; asymptomatic Wenckebach; athletic bradycardia without symptoms; drug-induced bradycardia when the drug can be safely stopped.
- Pacemaker guide: go.riasalimd.com/pacer-icd-guide — explains the implant, recovery, leadless devices, MRI safety, and driving restrictions.

Cross-links to companion guides:

Pacemakers & ICDs: go.riasalimd.com/pacer-icd-guide

Holter & Event Monitors: go.riasalimd.com/holter-guide

Syncope (Fainting): go.riasalimd.com/syncope-guide



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Comfort Measures at Home (No Medication Needed)

These simple steps support healing and ease symptoms. Use them alongside any medication your doctor prescribes.

- Stay hydrated — dehydration can worsen bradycardia from any cause.
- Avoid prolonged Valsalva maneuvers (straining, heavy lifting) if bradycardia is symptomatic — these increase vagal tone and can worsen the slow rate.
- If you have a pacemaker, carry your device ID card at all times; especially important when traveling or before any medical procedure.
- Wear a medical alert bracelet if you have a high-degree AV block or a pacemaker dependency.
- Track your pulse daily (wrist or neck) and bring a log to every follow-up visit — rate trends help your cardiologist assess whether pacing is needed.



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Risks, Benefits, and Alternatives

Every choice has trade-offs. Use this table to start the shared decision conversation.

Option	Risks	Benefits	Alternatives
Permanent pacemaker implant	1–2% procedure risk: bleeding under skin, infection (< 1% at 1 year), lead shift (1–3% in first weeks), rare lung nick (< 1%). Lifetime infection risk: 1–2%.	Stops symptomatic bradycardia. Life-saving in complete block. Most patients feel much better within days. Energy and activity return to normal.	Watchful waiting if cause is reversible and block is low-grade. Leadless pacemaker (Micra) — no chest cut, no leads.
Acute atropine (IV)	Side effects: fast rate, dry mouth, urine trouble in older men, confusion. Very small doses (< 0.3 mg) can paradoxically worsen the slow rate. Effect lasts minutes to hours — not a long-term fix.	Works fast. Given in hospital within minutes. Buys time for a more stable treatment while pacing is arranged.	Pacing pads on chest (temporary). Isoproterenol drip (second-line). Permanent pacemaker (definitive).
Watchful waiting (no symptoms, low-grade block)	Risk of missing progression to higher-degree block. Mobitz II can turn into complete block without warning. Needs close follow-up.	Avoids a procedure if the cause is benign (athlete, drug, high vagal tone). Right for 1st-degree block and asymptomatic Mobitz I.	Ambulatory monitoring to track the pattern. Stop or reduce the offending drug. Pacemaker if symptoms appear or block worsens.
Reversing the cause (stop drug / treat thyroid / antibiotics for Lyme)	Drug withdrawal may worsen rate control in AFib or raise blood pressure. Thyroid treatment takes weeks to months. Lyme drugs can cause allergy.	No procedure needed if it works. Lyme carditis resolves in > 90% of cases. Drug-induced bradycardia often reverses within days of stopping the drug.	Pacemaker if bradycardia persists after the cause is treated. Dose reduction instead of full drug stop (sometimes works).



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Common Misconceptions

Myth	Reality
A slow pulse is always a sign of fitness.	A slow rate in a fit, asymptomatic athlete is healthy. But dizziness, fainting, or extreme fatigue with a slow rate is a medical problem — not a badge of honor. Rate alone does not separate athletic from pathologic bradycardia.
Heart block means the heart has stopped.	Heart block means the electrical signal is delayed or blocked — not that the heart stopped. The heart still beats, but slower or with dropped beats. Only complete block with no escape rhythm causes cardiac arrest.
1st-degree block always leads to complete block.	Usually not. 1st-degree block is a simple delay — most people with it never progress. Mobitz II is the dangerous type that can progress without warning.
My pacemaker will stop when the battery runs out.	Devices warn months ahead of end-of-service. A 'generator change' replaces the battery box in a short outpatient visit. The leads usually stay in place. It is not an emergency.
I cannot exercise or travel with a pacemaker.	Most pacemaker patients can exercise, fly, and live normally. Cell phones, microwaves, and airport scanners are safe. Avoid prolonged contact with strong magnets or arc welders.
Taking a beta-blocker means I need a pacemaker.	Beta-blockers slow the heart on purpose for many conditions. This is usually safe. A pacemaker is needed only if the slow rate causes symptoms or the dose cannot be reduced.
Complete heart block is the same as heart failure.	They are different. Heart failure means the heart cannot pump well. Complete heart block means the electrical signals between chambers are disconnected. Both can occur together, but each has its own treatment.



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Possible Complications

Knowing what can go wrong helps you spot problems early. Most complications are uncommon, especially with treatment.

Where / What	What Can Happen
Syncope / Injury from falls	Sudden blackouts from a cardiac pause (Stokes-Adams attacks) can cause head trauma, fractures, and car crashes. This is one of the strongest reasons to act fast.
Cardiac arrest	Untreated complete block or Mobitz II can cause cardiac arrest if the backup rhythm fails. Risk is highest in the first days after new complete block from a heart attack.
Worsening heart failure	A rate of 30–40 bpm cannot pump enough blood. This leads to fluid buildup, shortness of breath, and organ damage — especially in patients with other heart problems.
Pacemaker syndrome	Occurs with single-chamber pacing when the upper and lower chambers beat out of sync. Causes neck pulsing, fatigue, and low blood pressure. Fixed by switching to dual-chamber pacing.
Progression of conduction disease	Patients with bundle branch block or 1st-degree block should have regular ECGs. Progression is unpredictable but more common with fibrosis, amyloid, or prior heart attack.
Stroke risk in tachy-brady syndrome	AFib episodes in tachy-brady raise stroke risk. Ask your cardiologist if a blood thinner is needed alongside the pacemaker.



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Points to Know

If you remember nothing else, remember these key points.

- Not all bradycardia is dangerous — a slow rate in a fit, asymptomatic person is often normal. The symptoms matter as much as the rate.
- Mobitz II and complete heart block are always concerning and usually require a pacemaker — do NOT wait for symptoms to worsen before acting.
- Many cases are reversible: stop the offending drug, treat thyroid or Lyme, correct potassium — and the heart rate may return to normal without a pacemaker.
- If you faint or black out unexpectedly, tell your doctor the same day — this may be a Stokes-Adams attack from heart block, which can be life-threatening without treatment.
- Pacemakers are highly reliable, minimally invasive, and transformative. Battery life is 8–12 years; replacement is a simple outpatient procedure.
- Ask your cardiologist about ambulatory monitoring if your symptoms are intermittent:
go.riasalimd.com/holter-guide
- Wear a medical alert bracelet and carry your pacemaker ID card if you have a device or a high-degree block — especially when traveling or having surgery.



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When to Call Us - and When to Call 911

If you are not sure, call. We would rather hear from you twice than miss a real problem.

- CALL 911 — FAINTING, losing consciousness, or not waking up normally: this may be a Stokes-Adams attack (cardiac pause from heart block) — a medical emergency.
- CALL 911 — Chest pain, severe shortness of breath, or no pulse: do not drive yourself to the ER.
- CALL US TODAY — Pulse consistently below 40–45 bpm AND you feel dizzy or very tired.
- CALL US TODAY — A pacemaker patient who feels their pulse is very slow or irregular, or who has near-fainting — the device may need to be checked.
- CALL US TODAY — Any new episode of lightheadedness, near-fainting (almost blacking out), or sudden extreme fatigue.
- CALL US THIS WEEK — New or worsening ankle swelling, shortness of breath at rest, or inability to do daily activities that were easy before.
- CALL US BEFORE — Any planned surgery (the anesthesia team needs to know about your heart block or pacemaker; device management may be needed).
- CALL US BEFORE — Any MRI scan (most modern pacemakers are MRI-conditional but require coordination with the device clinic).

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Trusted Resources

The links below are the trusted resources Dr. Ali used to write this guide and that he recommends you visit for more information. Each is a clickable link in the digital version and a Short.io tracked URL on the printed version.

- [American Heart Association — Bradycardia](#) - Patient-friendly AHA page explaining slow heart rate, causes, and when to seek care.
- [Cleveland Clinic — Bradycardia](#) - Overview of bradycardia types, symptoms, diagnosis, and pacemaker treatment.
- [Mayo Clinic — Heart Block](#) - Plain-language explanation of 1st-, 2nd-, and 3rd-degree AV block.
- [Heart Rhythm Society — Patient Resources](#) - HRS hub for patients on arrhythmias, pacing guidelines, and device information.
- [MedlinePlus — Sick Sinus Syndrome](#) - Government resource on sinus node dysfunction; when a pacemaker is needed.
- [Pacemakers & ICDs Guide — go.riasalimd.com/pacer-icd-guide](#) - Dr. Ali's detailed guide on pacemakers, ICDs, and what to expect from device therapy.
- [Holter & Event Monitors Guide — go.riasalimd.com/holter-guide](#) - How ambulatory monitoring works and why it is key for diagnosing intermittent bradycardia.
- [Syncope \(Fainting\) Guide — go.riasalimd.com/syncope-guide](#) - Comprehensive guide to the causes of fainting — bradycardia is one of the most common.



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Sources Used to Build This Guide

Every recommendation in this guide is grounded in one or more of the studies, guidelines, or trusted resources below. Short links are tracked so Dr. Ali can see which references patients are reading; nothing personally identifying is captured.

- [2018 ACC/AHA/HRS Guideline on the Evaluation and Management of Patients With Bradycardia and Cardiac Conduction Delay](#) [Guideline]
Primary ACC/AHA/HRS guideline: indications for pacing in sinus node dysfunction, AV block, and conduction disorders.
- [Cleveland Clinic — Bradycardia \(Slow Heart Rate\)](#) [Patient Education]
Patient-friendly overview of bradycardia causes, symptoms, and treatment; used for plain-language framing.
- [Mayo Clinic — Heart Block](#) [Patient Education]
Clear explanations of 1st-, 2nd-, and 3rd-degree AV block for the general public.
- [American Heart Association — Bradycardia](#) [Patient Education]
AHA patient page on bradycardia; used for when-to-call and trusted resources framing.
- [Heart Rhythm Society — Patient Resources on Bradycardia](#) [Professional Society]
HRS patient-facing bradycardia and pacing resource; guideline-aligned clinical context.
- [Lev M & Lenegre J — Idiopathic bilateral bundle branch fibrosis \(Lev's/Lenegre's disease\) \(NCBI review\)](#) [Pubmed]
Age-related conduction system fibrosis — the #1 cause of complete AV block; pathophysiology framing.
- [Epstein AE et al. — ACC/AHA/HRS 2008 Device-Based Therapy Guideline Update](#) [Guideline]
Device-therapy indications (Class I/IIa) for bradycardia syndromes; pacing criteria.
- [Hayes DL et al. — Permanent Cardiac Pacing Overview \(UpToDate public summary\)](#) [Clinical Reference]
Pacing indications, device types, and acute management of high-grade AV block.
- [McAnulty JH et al. — Natural history of high-risk bundle-branch block \(New Engl J Med 1982\)](#) [Pubmed]
Landmark data on Mobitz II and complete heart block natural history and sudden death risk.
- [Lyme Carditis — Wormser GP et al. IDSA Lyme Disease Guidelines \(CID 2006\)](#) [Guideline]
Lyme carditis as a reversible cause of AV block; treatment framing.
- [TAVR and Conduction Abnormalities — Urena M et al. \(JACC 2020\)](#) [Pubmed]
TAVR-associated new LBBB and complete AV block requiring pacemaker — cited in causes section.
- [MedlinePlus — Sick Sinus Syndrome](#) [Patient Education]
Government health resource explaining sinus node dysfunction for patients; plain-language.



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About This Guide

Rias KS Ali, MD FACC | Board Certified in Interventional Cardiology & Cardiovascular Disease

4740 Mile Stretch Drive, Holiday FL 34690 | Office: (727) 943-5200 | Fax: (727) 943-5201 | RiasAliMD.com

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Reviewer note: Reviewed against Cleveland Clinic, Mayo Clinic, AHA, Heart Rhythm Society, and 2018 ACC/AHA/HRS Bradycardia Guideline. Ours adds: a 5-strip ECG cover diagram comparing all block types at a glance; a mechanistic causes chart grouping by fibrosis / ischemia / drugs / systemic / post-procedure; an AV block grade table color-coded by danger; and explicit named-mechanism coverage of Lenegre–Lev disease, Lyme carditis, TAVR-related block, and tachy-brady syndrome.

Disclaimer

This guide is for educational purposes only and does not replace medical advice from your physician. Recommendations may not apply to every patient. Always follow the specific instructions of Dr. Ali and your care team. In an emergency call 911 or go to the nearest emergency department.



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