Parkinson's Disease Protocol

Facilitator Guide — Caregiver Edition

You can train the brain to listen.

ABOUT THIS GUIDE

– Designed for use by a family caregiver or care partner — no clinical background required.

– 4 structured sessions plus daily home practice between sessions.

– Primary mechanism: Rhythmic Auditory Stimulation (RAS) for gait and freezing of gait.

– Secondary targets: tremor management, cognitive engagement, and caregiver confidence.

– All tools are free, browser-based, and stream via Bluetooth directly to hearing aids.

Evidence Base

Rhythmic Auditory Stimulation (RAS) is one of the most well-researched music-based interventions in neurological rehabilitation. In Parkinson's disease, the basal ganglia — which normally generates the brain's internal timing signals for movement — is progressively damaged. RAS provides an external rhythmic scaffold that the motor cortex can entrain to, compensating for this internal timing deficit.

Research by Thaut et al. (1996, 2007) demonstrated that RAS significantly improves gait velocity, stride length, and cadence in people with Parkinson's disease. Subsequent studies have shown reductions in freezing of gait episodes and improvements in turning ability.

KEY RESEARCH FINDINGS

– Thaut et al. (1996): RAS improved gait velocity 25%, stride length 12%, cadence 10% in PD patients.

– Arias & Cudeiro (2008): Rhythmic cueing reduced freezing of gait frequency in moderate PD.

– Nombela et al. (2013): External rhythmic cues activate supplementary motor area, bypassing the basal ganglia deficit.

– Hausdorff et al. (2007): Auditory cueing improves gait symmetry and reduces fall risk.

– Rochester et al. (2010): RAS effects persist beyond the cueing session with regular practice.

Before You Begin

Complete the following steps before Session 1. This baseline information is essential for tracking change over the course of the protocol.

Baseline Gait Assessment

Choose a clear, safe walking path of approximately 10 meters (33 feet). Ask your family member to walk from one end to the other at their comfortable pace while you time them. Record the time in seconds. Repeat three times and average the results. This is the Timed 10-Meter Walk.

TIMED 10-METER WALK — BASELINE

Walk 1: _____ sec | Walk 2: _____ sec | Walk 3: _____ sec Average: _____ sec | Date completed: _____

One-Week Observation Log

Before Session 1, observe and log the following for one week using the Caregiver Observation Log included separately.

WHAT TO LOG THIS WEEK

– Number of freezing episodes per day — note the location and trigger (turning, doorway, start of movement).

– Time of day when symptoms are most and least pronounced.

– Any falls or near-falls.

– General mood and energy level each day.

– Medications and timing (note if anything changes during the protocol period).

Technology Setup

Before Session 1, confirm the following:

– Bluetooth hearing aids are paired to the smartphone.

– Open calminchaosmt.com/tools and test the RAS Metronome — confirm the beat streams clearly through the hearing aids.

– Set the metronome to 90 BPM before Session 1. This is the starting tempo.

– Have a chair nearby for rest during walking exercises.

Session 1 — Meeting the Beat

Duration: 30-40 minutes | Setting: Living room or hallway | Starting tempo: 90 BPM

Session Goals

BY THE END OF SESSION 1:

– Participant is comfortable walking to a steady external beat.

– Facilitator has observed how the beat affects walking pattern at 90 BPM.

– Baseline tempo has been confirmed or adjusted based on observation.

– Participant understands the purpose of the protocol and feels safe.

Opening — Seated Listening (5 minutes)

Begin with your family member seated comfortably. Start the RAS Metronome at 90 BPM streaming through the hearing aids. Ask them to simply listen and tap their hands or feet gently to the beat for 3-5 minutes. This allows the nervous system to entrain to the rhythm before any movement.

FACILITATOR SCRIPT

I am going to play a steady beat through your hearing aids. Just sit and listen — let the rhythm settle in. You can tap along with your hands or feet if you like. We are not going anywhere yet.

Clinical Decision Point — Tempo Check

While they tap to the beat, observe whether 90 BPM feels natural or effortful.

→ Tapping feels rushed or forced: reduce to 85 BPM.

→ Tapping is comfortable and rhythmic: maintain 90 BPM.

→ Record the working tempo for this session: _____ BPM

Walking Exercise 1 — Straight Path (10 minutes)

With the metronome running at the confirmed tempo, assist your family member to stand and walk a straight path of 5-10 meters. Walk beside them. Each step should fall on a beat. Do not rush or correct — observe. Do 3-4 passes with rest between each.

FACILITATOR SCRIPT

We are going to walk together to the beat. Each step lands on a click — left, right, left, right. Do not worry about keeping up perfectly. Just let the sound guide your feet. I am right here.

After each pass, note:

– Did stride length appear longer than usual?

– Did foot clearance improve (less shuffling)?

– Any freezing during this exercise? If yes, note trigger.

Walking Exercise 2 — Turning Practice (10 minutes)

Turning is the primary freezing trigger. This exercise uses the beat as an anticipatory cue before initiating a turn. Before each turn, count two beats aloud together and initiate the turn on the third beat. Wide, slow turns only — no tight pivots.

FACILITATOR SCRIPT

When we get to the end, we are going to turn together. Listen: one... two... and turn. The beat tells your feet when to start. Wide and slow. Ready?

IF FREEZING OCCURS DURING THIS EXERCISE

– Stop. Do not rush the participant or pull them forward.

– Say calmly: Let the beat come back to you. One... two... step.

– If freezing persists after 3 beats, assist them to a chair and rest for 2 minutes.

– Note: trigger, duration, and recovery method in the session log.

Closing — Seated Cool-Down (5 minutes)

Return to seated position. Reduce metronome to 70 BPM and listen together for 3-5 minutes. This slower tempo signals the nervous system to downregulate.

FACILITATOR SCRIPT

We are done with the walking. Let us just sit with the slower beat for a few minutes. How did that feel? Did anything surprise you?

Session 1 Log

RECORD AFTER SESSION 1

Working tempo confirmed: _____ BPM Freezing episodes during session: _____ Triggers: _____ Stride quality (shuffling / normal / improved): _____ Participant mood before: _____ After: _____ Facilitator notes: _____

Home Practice — Days 2, 3, 4

Between sessions, practice RAS walking once daily for 10 minutes using the confirmed tempo. Use a safe, clear path. Record any freezing episodes and how they resolved in the daily log.

Session 2 — Building Confidence

Duration: 35-45 minutes | Day 5 from Session 1 | Review daily log first

BY THE END OF SESSION 2:

– Participant is using the beat independently without being reminded for each step.

– Turning strategy is becoming automatic with the anticipatory cue.

– Kitchen walking exercise introduced in a controlled context.

– Tempo adjustment made if daily practice data suggests it.

Review and Tempo Adjustment

Review the daily log together before starting. If freezing episodes decreased during home practice, consider increasing tempo by 5 BPM. If freezing increased or walking felt labored, maintain current tempo.

→ Improved gait / fewer freezes in home practice: increase to _____ BPM (+5)

→ No change or more difficulty: maintain _____ BPM

Walking Exercise — Independent Cueing

This session, step back slightly and allow your family member to walk independently to the beat while you observe from a short distance. Stay close enough to assist but do not walk in step with them. The goal is for them to internalize the rhythm rather than match your pace.

FACILITATOR SCRIPT

This time, I am going to walk beside you but let you lead. The beat is yours — let it guide your feet. I am right here if you need me.

Kitchen Environment Exercise

Move the session to the kitchen — the primary freezing environment. Clear any obstacles. Practice the following sequence with the metronome running: walk to the counter, pause, turn using the anticipatory cue, walk to a chair, sit, stand, and repeat. Do 3 full sequences with rest between each.

TURNING SEQUENCE — KITCHEN

– Walk to counter. Pause for two beats before turning.

– Say aloud: One... two... and turn. Wide arc turn.

– Walk to chair. Pause for two beats before sitting.

– Sit, rest for 10 seconds, stand on the beat.

– Repeat from beginning.

CLINICAL DECISION POINT — KITCHEN FREEZING

If freezing occurs at the counter turn: do not physically redirect. Stand beside them and begin tapping on their shoulder to the beat — tactile cueing combined with auditory cueing has stronger anti-freezing effect. Count aloud: one... two... step. Record the trigger and intervention in the log.

Binaural Component — Calm Focus (10 minutes)

After the walking exercises, switch from the RAS Metronome to the Binaural Beat Processor at calminchaosmt.com/tools. Select Alpha frequency (10 Hz) — this supports relaxed focus and has shown benefit for tremor reduction in some studies. Seat your family member comfortably and play for 8-10 minutes.

Session 2 Log

RECORD AFTER SESSION 2

Tempo used: _____ BPM Adjusted from Session 1: Yes / No Kitchen freezing episodes: _____ Tactile cueing used: Yes / No Independent walking quality (needed prompts / mostly independent / fully independent): _____ Participant confidence rating (1-5, ask them directly): _____ Facilitator notes: _____

Session 3 — Expanding the Environment

Duration: 40-50 minutes | Day 10 from Session 1 | Include outdoor walking if safe

BY THE END OF SESSION 3:

– Participant can apply RAS cueing in multiple environments.

– Cane use coordinated with beat — one tap per beat alternating with steps.

– Outdoor walking introduced if conditions are safe.

– Participant can self-initiate RAS from the smartphone independently.

Cane Coordination

This session introduces cane coordination with the beat. The cane should contact the ground on alternating beats — if left foot steps on beat 1, cane contacts on beat 2, right foot on beat 3. Practice slowly in the hallway before increasing speed.

FACILITATOR SCRIPT

We are going to add your cane to the rhythm today. Cane on one beat, foot on the next — it becomes its own pattern. Let us walk it through slowly together.

Outdoor Walking (if safe)

If weather permits and terrain is safe (flat, clear sidewalk or path), take the RAS session outdoors. Outdoor environments present additional challenges — uneven surfaces, distractions, and wider turning space. Start with a short loop of 3-5 minutes and observe carefully.

OUTDOOR SAFETY CHECKLIST

– Surface is flat and free of obstacles.

– Participant has cane and hearing aids are streaming.

– Facilitator is within arm's reach at all times.

– Route includes no stairs or steep inclines.

– Return indoors immediately if fatigue, dizziness, or freezing increases.

Smartphone Independence Exercise

Teach your family member to open calminchaosmt.com/tools and start the RAS Metronome independently on their smartphone. Practice this 2-3 times until they can do it without help. The goal is for them to be able to initiate RAS before they need to walk — before getting up from a chair, before walking to the kitchen, before any challenging movement.

FACILITATOR SCRIPT

From now on, you can start the beat yourself before you get up. Open the app, press play, let the rhythm start, and then stand. The beat goes first — you follow it.

Session 3 Log

RECORD AFTER SESSION 3

Tempo used: _____ BPM Outdoor walking completed: Yes / No Duration: _____ minutes Cane coordination: struggled / developing / natural Smartphone independence: needs full help / needs prompts / independent Facilitator notes: _____

Session 4 — Integration and Assessment

Duration: 40-50 minutes | Day 15-18 from Session 1 | Repeat baseline assessments

BY THE END OF SESSION 4:

– Timed 10-Meter Walk repeated and compared to baseline.

– Participant has a sustainable daily RAS practice routine.

– Caregiver is confident to continue protocol independently.

– Decision made on continuation, modification, or referral.

Repeat Baseline Assessment

Repeat the Timed 10-Meter Walk from the baseline assessment under identical conditions. Three passes, average the time. Compare to the baseline recorded before Session 1.

TIMED 10-METER WALK — POST-PROTOCOL

Walk 1: _____ sec | Walk 2: _____ sec | Walk 3: _____ sec Average: _____ sec | Baseline was: _____ sec
Change: _____ sec (improvement = lower time)

Free Walking Session

Allow your family member to walk freely with the RAS running at their preferred tempo — let them choose the environment and route within the home. Observe without directing. This gives you a picture of how they move when they have agency over the experience.

Establishing the Daily Practice Routine

Before closing, establish a specific daily RAS routine that can be maintained independently. Write it down together.

DAILY PRACTICE PLAN

Daily RAS time: _____ Primary environment: _____ Confirmed daily tempo: _____ BPM Challenging environments to continue practicing: _____
Caregiver support needed: _____

Clinical Decision Points — End of Protocol

NEXT STEPS BASED ON OUTCOME

– Improvement in Timed Walk + fewer freezing episodes: Continue daily home practice at confirmed tempo. Reassess in 30 days.

– No measurable change: Consider referral to a board-certified music therapist for in-person RAS assessment.

– Increased freezing or falls during protocol: Stop protocol and consult neurologist or movement disorder specialist.

– Strong response with high motivation: Contact calminchaosmt.com about participation in formal outcome study.

Session 4 Log

RECORD AFTER SESSION 4

Final tempo: _____ BPM Timed Walk improvement: _____ seconds Total freezing episodes across all 4 sessions: _____ Participant's own assessment of change (ask them): _____ Decision: Continue / Referral / Formal study / Modify Facilitator notes:
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Evidence References

1. Thaut, M.H., McIntosh, G.C., Rice, R.R., Miller, R.A., Rathbun, J., & Brault, J.M. (1996). Rhythmic auditory stimulation in gait training for Parkinson's disease patients. Movement Disorders, 11(2), 193-200.

2. Thaut, M.H., & Abiru, M. (2010). Rhythmic auditory stimulation in rehabilitation of movement disorders. Music Perception, 27(4), 263-269.

3. Arias, P., & Cudeiro, J. (2008). Effects of rhythmic sensory stimulation on gait in Parkinson's disease patients. Experimental Brain Research, 186(4), 589-601.

4. Nombela, C., Hughes, L.E., Owen, A.M., & Grahn, J.A. (2013). Into the groove: Can rhythm influence Parkinson's disease? Neuroscience & Biobehavioral Reviews, 37(10), 2564-2570.

5. Hausdorff, J.M., Lowenthal, J., Herman, T., Gruendlinger, L., Peretz, C., & Giladi, N. (2007). Rhythmic auditory stimulation modulates disability and gait in Parkinson's disease. European Journal of Neuroscience, 26(8), 2369-2375.

6. Rochester, L., Baker, K., Hetherington, V., Jones, D., Willems, A.M., Kwakkel, G., Van Wegen, E., Lim, I., & Nieuwboer, A. (2010). Evidence for motor learning in Parkinson's disease. Acta Neurologica Scandinavica, 122(5), 324-332.

7. Benoit, C.E., Dalla Bella, S., Farrugia, N., Obrig, H., Mainka, S., & Kotz, S.A. (2014). Musically cued gait-training improves both perceptual and motor timing in Parkinson's disease. Frontiers in Human Neuroscience, 8, 494.

8. Spaulding, S.J., Barber, B., Colby, M., Cormack, B., Mick, T., & Jenkins, M.E. (2013). Cueing and gait improvement among people with Parkinson's disease: A meta-analysis. Archives of Physical Medicine and Rehabilitation, 94(3), 562-570.

9. Ghai, S., Ghai, I., Schmitz, G., & Effenberg, A.O. (2018). Effect of rhythmic auditory cueing on aging gait: A systematic review and meta-analysis. Aging & Disease, 9(5), 901-923.

10. de Dreu, M.J., van der Wilk, A.S., Poppe, E., Kwakkel, G., & van Wegen, E.E. (2012). Rehabilitation, exercise therapy and music in patients with Parkinson's disease: A meta-analysis. Parkinsonism & Related Disorders, 18, S114-S119.

11. Bella, S.D., Benoit, C.E., Farrugia, N., Schwartze, M., & Kotz, S.A. (2015). Effects of musically cued gait training in Parkinson's disease: Beyond a motor benefit. Annals of the New York Academy of Sciences, 1337(1), 77-85.

12. Lim, I., Van Wegen, E., Jones, D., Rochester, L., Nieuwboer, A., Willems, A.M., & Kwakkel, G. (2010). Identifying fallers with Parkinson's disease using home-based tests. Movement Disorders, 21(4), 511-518.