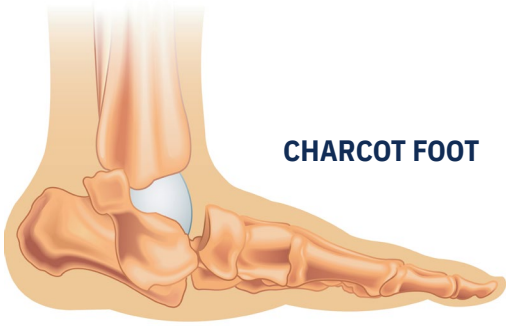
Charcot Foot: Understanding the Risks and How Remote Temperature Monitoring Can Change the Game

INTRODUCTION

Charcot neuroarthropathy (CN) was first described in the 19th century by Jean-Martin Charcot, who noted characteristic joint destruction in syphilitic patients with sensory neuropathy. Theories explaining CN's etiology include the neurovascular theory (autonomic neuropathy leads to bone resorption) and the neurotraumatic theory (repetitive trauma in insensate joints causes progressive damage). Today, diabetes is the leading cause of Charcot neuroarthropathy worldwide.[1,2]



THE BURDEN OF CHARCOT FOOT

The most notable complications from CN include the rocker-bottom deformity caused by the collapse of the arch as well as recurrent skin breakdown, ulceration, and superimposed infections such as osteomyelitis. These markedly increase the risk for lower limb amputation, especially when ulceration is present. Additional issues include acute and chronic pain, instability, the potential for bilateral involvement, and difficulties with both mobility and activities of daily living. Timely recognition and intervention are critical to reduce the risk for hospitalizations and systemic complications such as sepsis.[3]

EVOLUTION OF FOOT TEMPERATURE MONITORING

Temperature monitoring as a metric for inflammation in Charcot foot developed as clinicians recognized asymmetrical warmth as an early and persistent sign of active disease. Modern approaches to gauge temperature differences between corresponding anatomic sites on each foot include Remote Temperature Monitoring (RTM) Programs like the SmartMat™. Active CN is most commonly defined by a temperature difference of more than 2°C, with a sustained drop below this threshold used as a marker for remission or transition to quiescence.[4,5]

PATIENT AND PROVIDER BENEFITS OF TEMPERATURE MONITORING IN CHARCOT PATIENTS

Patient Benefits:

- **Enables earlier detection of acute Charcot activity, potentially preventing severe deformity or ulceration.**
- **Home temperature monitoring empowers patient self-management and supports adherence to offloading and treatment.**
- **Objective, non-invasive data may reduce patient anxiety by providing concrete metrics of improvement.**

Provider Benefits:

- **Offers an evidence-based, reproducible clinical parameter to monitor disease progression and guide immobilization.**
- **Facilitates timely and safer transition from active treatment (e.g., total contact cast) to normal footwear, reducing risk of relapse.**
- **Longitudinal data support communication among multidisciplinary team members and can be documented for quality audits or registries.**
- **Correlates with radiographic and laboratory findings, providing cross-validation for diagnosis and management.**

LONGITUDINAL TEMPERATURE DATA FOR PHASE TRANSITION

Longitudinal monitoring (regularly recording foot temperatures over weeks to months) yields actionable insights into the transition from the acute (active) to the quiescent phase of Charcot. Guidelines recommend temperature assessments every 2-6 weeks, typically after the patient rests their feet, with immobilization considered only when the temperature differential falls below 1-2°C for at least 2-3 consecutive visits. This strategy reduces unnecessary immobilization while minimizing the risk of premature return to normal weightbearing and recurrence. Technology-enabled home monitoring and diary-keeping can further enhance accuracy and engagement.[4-6]

EVIDENCE BASE AND RECOMMENDATIONS

Systematic reviews and guidelines consistently affirm the value of temperature monitoring as a reliable adjunct for both Charcot diagnosis and remission assessment. Contralateral temperature differences of 1.6–8°C (mean ~2–4°C) are typical in acute disease and decrease with resolution. Home-based and remote monitoring approaches are gaining acceptance and demonstrate similar validity to in-clinic methods.[5,6]

PODIMETRICS EXPERIENCE WITH CHARCOT FOOT MONITORING

Current trends in monitoring patients with self-reported diagnosis of Charcot neuroarthropathy:[9]

2023 — ***2.8% PUM*** PATIENTS UNDER MANAGEMENT

2024 — ***4.4% PUM***

2025 — ***5.5% PUM***

When risk stratifying people with diabetes and CN, generally, patients fall into the highest risk categories. According to the International Working Group on the Diabetic Foot, patients with Charcot may either fall into risk category 2 or 3 based on history of prior ulceration or amputation. In the VA Prevention of Amputation for Veterans Everywhere risk stratification system, CN is explicitly listed among the high-risk conditions of Category 3. For these high-risk patients, foot temperature monitoring is recommended.[7,8]

Scan the QR Code to read a Case Study on early CNO detection.

CONCLUSION

By integrating historical tradition with modern evidence and a patient-centered perspective, clinicians can use longitudinal temperature monitoring to optimize outcomes in CN, guiding safe transitions between disease phases and empowering both patients and providers with actionable, objective data.

For more information on remote temperature monitoring, visit podimetrics.com or contact us at providers@podimetrics.com.

References: 1. Sanders LJ. The Charcot foot: historical perspective 1827-2003. Diabetes Metab Res Rev. 2004 May-Jun;20 Suppl 1:S4-8. doi: 10.1002/dmrr.451. PMID: 15150805. **2.** Dardari D. An overview of Charcot's neuroarthropathy. J Clin Transl Endocrinol. 2020 Oct 28;22:100239. doi: 10.1016/j.jcte.2020.100239. PMID: 33251117; PMCID: PMC7677697. **3.** Marmolejo VS, Arnold JF, Ponticello M, Anderson CA. Charcot Foot: Clinical Clues, Diagnostic Strategies, and Treatment Principles. Am Fam Physician. 2018 May 1;97(9):594-599. **4.** Jones PJ, Davies MJ, Webb D, Berrington R, Frykberg RG. Contralateral foot temperature monitoring during Charcot immobilisation: A systematic review. Diabetes Metab Res Rev. 2023 May;39(4):e3619. doi: 10.1002/dmrr.3619. Epub 2023 Feb 20. PMID: 36728905. **5.** Dallimore SM, Puli N, Kim D, Kaminski MR. Infrared dermal thermometry is highly reliable in the assessment of patients with Charcot neuroarthropathy. J Foot Ankle Res. 2020 Sep 14;13(1):56. doi: 10.1186/s13047-020-00421-z. PMID: 32928270; PMCID: PMC7489208. **6.** Dubský M, Bém R, Sojáková D, Fejfarová V, Hughes M, Jude EB. Charcot foot disease: A new approach. Drugs Aging. 2025 Sep;42(9):837-851. doi:10.1007/s40266-025-01234-0. Epub 2025 Aug 11. PMID: 40789985; PMCID: PMC12436485. **7.** Schaper NC, van Netten JJ, Apelqvist J, Bus SA, Hinchliffe RJ, Lipsky BA. Practical guidelines on the prevention and management of diabetes-related foot disease (IWGDF 2023 update). Diabetes Metab Res Rev. 2024;40(3):e3657. **8.** https://www.navao.org/wp-content/uploads/2017/04/VHA-Directive-1410-Prevention-of-Amputation-in-Veterans-Everywhere-PAVE-Program-3-31-17.pdf **9.** Podimetrics, internal data on file

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