MSI AUTOMATION, Inc. *MAY 28, 2026*
by Dave Brinckerhoff Dr. Deepa Ghosh

Amputation of Foot and Limb

A Breakthrough for Treating Diabetic Foot Infections to Prevent Amputation

Once the foot infection establishes itself on the bone, the foot bone becomes ***necrotic*** and will die: ***osteomyelitis.*** Treatment then becomes very difficult. Amputation will be required. After amputation, long term antimicrobial therapy begins and can continue for many years to control any resurgent infections.

Several pathophysiological and clinical factors prevent antibiotic drug and wound treatments from succeeding. This leads to ***osteomyelitis*** and ***amputation.***

1. ***Antimicrobial Therapy*** struggles to penetrate into infected bone and tissue that has restricted blood flow, a result of ***peripheral vascular disease*** common with diabetics.
2. ***Neuropathy*** causes infections and diabetic foot ulcers **(DFU).**
3. ***Bacteria Biofilm*** is a dominant form of bacteria. It is far more resistant to antibiotics and fights the body's own immune system. It appears on the foot bone's surface as a slime and surrounds the bone to protect the infection and to kill the bone.
4. **Incorrect biopsy** of sample cultures of the pathogen of the infection can result in negative treatment outcome.
5. **Wrong antibiotic** may actually stimulate a new round of antimicrobial resistance **(AMR)** that did not exist beforehand.
6. The use of **Magnetic Hyperthermia** has been stalled until recently by the unclear level of heating power allowed by the **NIH** to safely kill bacterial infections.

2026 Breakthrough: There is an alternative treatment, a result of the significant innovation and research by **Dr. Deepa Ghosh** or the ***Institute of NanoScience and Technology*** in Mohali, India.*

2026 Medical Innovation: It is common knowledge that bacteria absorb iron for its own biological needs. This fact represents an opportunity that medical innovation can exploit. The bacteria ***biosynthesizes*** this iron oxide to form it into ***iron nanoparticles.*** Iron nanoparticles are ***paramagnetic. Paramagnetic*** nanoparticles will easily self-heat inside the bacteria cell membrane when exposed to **Magnetic Hyperthermia (AMF).***

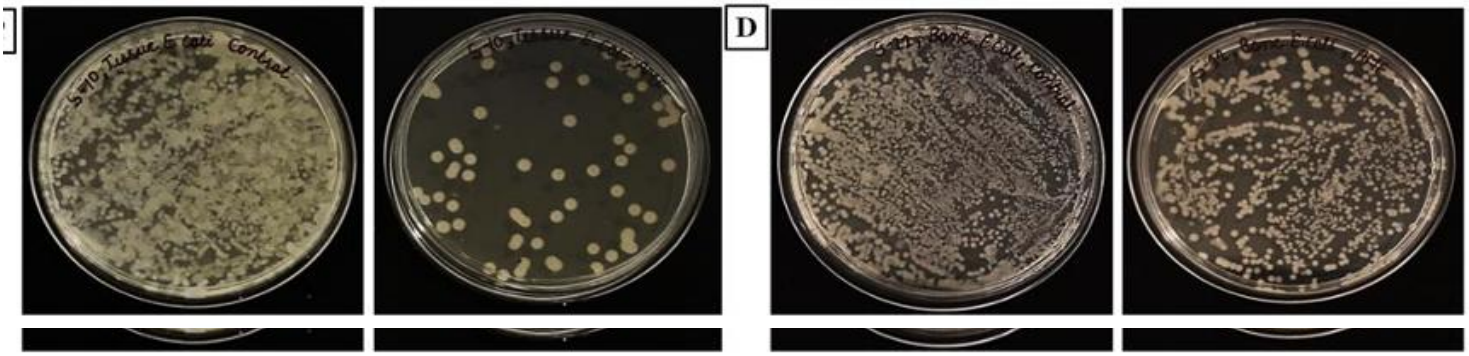
MSI AUTOMATION, INC.
8537 Greenbriar St., Wichita, Kansas USA
www.msiautomation.com
email: research@msiautomation.com

Magnetic Hyperthermia Can Prevent Osteomyetitis

1) Magnetic Heating is a ***Quasi Drug*** treatment that uses the bacteria's own iron to over-heat the cell membrane from the inside, resulting in cell death.
2) The Magnetic Field can penetrate both deep tissue and dense bone mass.
3) The Magnetic Heating easily penetrates past the biofilm layering on the bone's surface.
4) Regardless of diabetic patient's peripheral vascular disease that restricts blood flow and blocks antibiotics from reaching the infected tissue, the magnetic field ignores these blood flow issues and heats and kills the bacteria directly.
5) Once the bacteria are subjected to this type of internal heating, the cell membrane denatures and can no longer function. The bacteria cannot continue to grow and spread the infection into the surrounding tissue and bone.
6) Magnetic Heating is not a conventional drug and does not inadvertently cause the bacteria to develop a new resistance or more lethal pathogen.
7) Until recently the **NIH** had not established a magnetic heating limit. Now the Atkinson-Brevovich Limit of (H x f = 9.46 (10)9 can be used as a guide.
8) Computer software by the MSI Automation Magnetic Hyperthermia System controls the heating power at the **A-B Limit of 9.46 (10)9.**

LIVE HUMAN TISSUE **LIVE HUMAN BONE**

E-Coli Infection **E-Coli Infection**



BEFORE **AMF** **BEFORE** **AMF**

Tissue samples taken from live patients whose infections spread despite antibiotic treatment. (C) E. Coli infected muscle sample. (D) E.Coli infected bone sample. Both treatments were exposed to magnetic hyperthermia heating (**AMF**) for 5-15 minutes. Longer exposure results in higher death rate for the bacteria. Scanning electron microscope images revealed the destruction of the bacterial cell wall. **AMF** treatment also resulted in excess reactive oxygen species formation, which might contribute to bacteria cell death. As required by the **FDA**: A lengthy safety study of 25 female rats showed an overall lack of significant edematous response to **AMF**. (**Journal of the Royal Society of Chemistry 2022: *NanoScale*,14. 1713…)**

Upon exposure of the bacteria for 5-15 minutes with **AMF** (360 kHz / 400 Oe), we observed a hyperthermia response with 3-5 log reduction in live bacterial load. The hyperthermia anti-bacterial treatment was confirmed using multiple patient specimens with different pathogens.

"*This validates the clear potential of the drug-free strategy to address the infection."* (Dr. Deepa Ghosh)

Dr. Deepa Ghosh** of **The *Institute of Nano Science and Technology / (Mohali, India). Aug 7, 2022-2024 **Nanoscale DOI: 10.1039/d1nr07435k (pp 1713-1722)**

MSI Automation, Inc.
www.msiautomation.com

Worldwide Announcement: 2025-2026

In 2024 Dr. Deepa Ghosh of the Institute of NanoScience and Technology (Mohali, India) used the MSI Automation Magnetic Hyperthermia Instrument to conduct research to kill bacteria.

The findings were that Magnetic Heating bypasses the fundamental problems of antibiotic treatments. Magnetic Heating can penetrate easily into deep tissue to kill the bacteria. It is the only treatment that can enter through deep tissue and reach the infection of the bone, eliminating the single biggest cause of amputations: *osteomyelitis.* The dead bacteria are consumed by the body's own macrophages. Recovery starts with the help of the body's own immune system.

Magnetic Heating can now provide a needed synergy to assist antibiotics in the treatment of most infections.

MSI AUTOMATION, INC.
8537 Greenbriar St., Wichita, Kansas 67226 USA
www.msiautomation.com
email: research@msiautomation.com