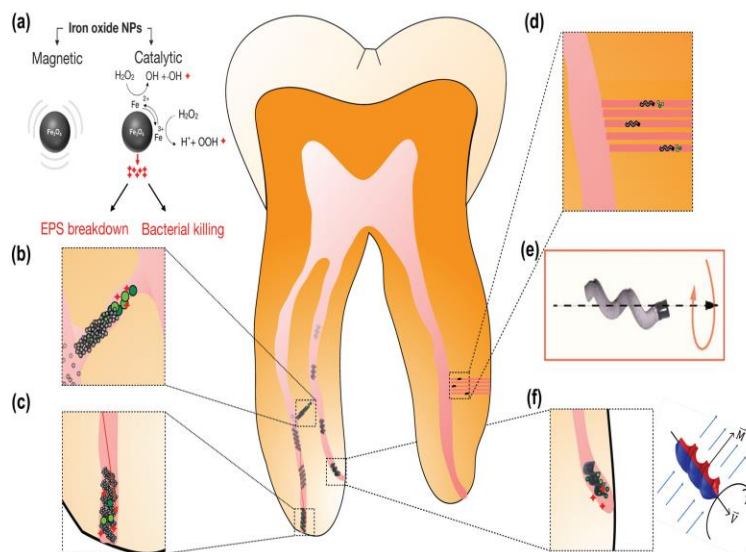


MICROSCALE MARVELS: THE RISE OF ENDODONTIC MICROROBOTS

INTRODUCTION – Advances in micro-scale robotics and nanotechnology are providing previously unimagined opportunities for new diagnostic and therapeutic approaches with high precision, control, and efficiency. Concurrently, multifunctional magnetic microrobots have been developed to overcome the disinfection challenges of current approaches to disrupt, kill, and retrieve biofilms with the goal of enhancing the efficacy and precision of endodontic therapy

AGGREGATED MICROSWARMS –

1. use iron oxide nanoparticles (IONPs) as building blocks
2. can be magnetically moved and directed inside the root canal to reach the apical region

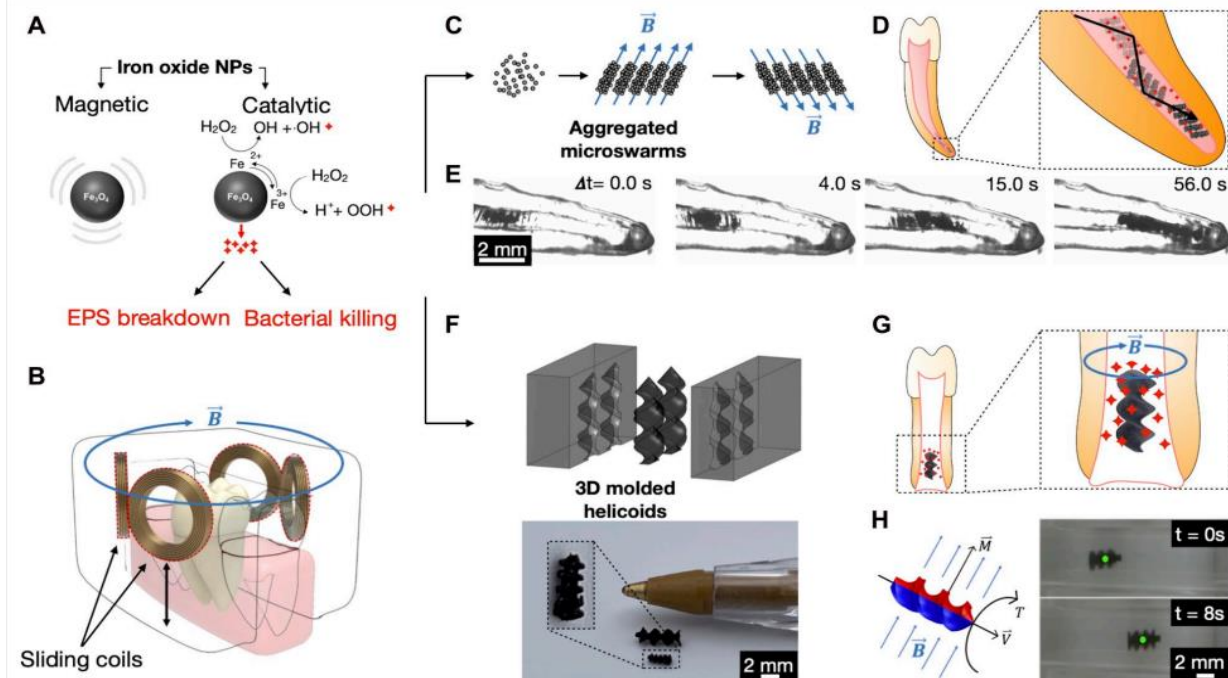


3D-MOULDED ROBOTS

- fabricated by embedding iron oxide nanoparticles within a biocompatible hydrogel.
- the chiral geometry of the helicoid results in forming shear forces capable of biofilm disruption.

HELICAL SILICA NANOROBOTS-

application of high oscillating magnetic fields leads to heat generation that was capable of successfully killing *E. faecalis*



CONCLUSION – as conventional biomechanical instrumentation fails to predictably clean anatomical complexities, Multifunctional microrobotics systems show great promise in overcoming the limitations of current disinfection methods by effectively disrupting and eliminating biofilms.