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Candidate Name: Komal Attri

Supervisor's Signature.....

Supervisor's Name:

Dr. Diptiman Choudhury,

Dr. Bhupender Chudasama,

Dr. Roop L. Mahajan

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Metadata Information

Author	**Komal Attri**
Supervisor(s)	Dr. Diptiman Choudhury, Dr. Bhupender Chudasama, Dr. Roop L. Mahajan
Title of the Thesis	Iron-oxide Nanoparticles Coated on *Helicobacter pylori* for Gastric Cancer Treatment *via* Magnetic Hyperthermia
Language	English
Subject Keywords (at least five)	Cancer, Magnetic hyperthermia, *Helicobacter pylori*, Gastric cancer, Immunology, Iron oxide nanoparticles, Lactoferrin Nanotechnology, Surface functionalization, Immune activation.

Abstract
(If required attached a separate sheet)

Nearly one million cases of gastric cancer are diagnosed annually, making it the fourth most common cancer worldwide. It is also the second leading cause of cancer-related deaths, with approximately 700,000 fatalities each year. There is lack of early symptoms leading to delays diagnosis of gastric cancer, resulting in a five-year survival rate of just 15%.

Since 1994, *Helicobacter pylori* (*H. pylori*) has been perceived as a type I carcinogen for gastric cancer and is now observed as the most prominent etiologic source for cancer linked with infection, contributing to 5.5% of the cancer burden globally and 25% of all infection-associated cancers. *H. pylori* is responsible for 70-85% of gastric ulcers and 90-95% of duodenal ulcers. Nearly half of the world's population is having *H. pylori* infection, and while most infected individuals develop chronic inflammation, many do not exhibit any symptoms.

This work aimed towards developing a technology using a non-pathogenic strain of *H. pylori* coated with Iron-Oxide Nanoparticles (IONPs) to specifically target gastric cancer. The approach leverages hyperthermia-induced activation of the body's natural immune system. Given that *H. pylori* naturally infect the human stomach and duodenum, it can effectively deliver treatment to these tissues. IONPs serve as MRI sensitizers, allowing for the visualization of infected tissues, and they are responsive to Magnetic hyperthermia. After applying external high-frequency magnetic field, IONPs generate heat on the surface of the bacteria. This ruptures the bacterial membrane and in turn, spillage occurs in the tumor microenvironment, thereby activating the natural

	immunity. Further, this leads to the infiltration of immune cells like macrophages in the tumor microenvironment. These activated macrophages then cleanse the spillage along with the tumor cells. This proposed cancer treatment does not involve chemotherapeutic drugs, thereby avoiding the unsolicited aftereffects linked with chemotherapy.
Name of the Department	DCBC
Name of the Degree/Program	Ph.D
Date of Final Viva-Voce	6/03/2025