

In vitro detection of porphyrin-producing wound bacteria using optical sensor

Background

Wound care constitutes a significant clinical challenge and imposes a substantial burden on healthcare systems globally. The presence of bacteria in both acute and chronic wounds can result in infections that delay or prevent wound healing. In addition, the formation of bacterial biofilms may pose a challenge for treatment.

The rising demand for non-invasive, rapid, and cost-efficient techniques for early infection detection reflects the urgent need for improved diagnostic and therapeutic approaches tailored to the complex and persistent nature of chronic wounds. Among emerging strategies, bacterial autofluorescence—particularly that arising from endogenous porphyrins—presents a promising avenue for advancing both diagnostic precision and therapeutic efficacy. Porphyrins are cyclic tetrapyrrole compounds involved in essential bacterial metabolic pathways, notably heme biosynthesis.

At Odinwell, we are developing a sensor technology that quantifies bacterial load in wounds.

Project Objectives

The aim is to investigate the auto-fluorescence properties of wound-associated bacteria and the fluorescence detected from bacteria in biofilm using Odinwell's optical sensors.

The experimental work can consist of the following components:

- **Microbiology work:** Bacteria culturing and plating, cell viability, cell metabolism, Imaging-based viability analysis, biofilm culture, biochemistry assays
- **Optical Detection and Validation:** The Odinwell sensor will be used to detect bacterial fluorescence from bacterial culture and biofilm culture to determine detection thresholds, reproducibility, and diagnostic accuracy.

The thesis will combine literature review, lab-based work, data collection, data analysis, writing, and revision. The outcome should be both academic and application-oriented, contributing to the scientific understanding of bacterial porphyrin fluorescence in chronic wounds while also supporting the development and validation of Odinwell's sensor technology for real-world clinical use.

Do you fit the profile?

- A background in Biotechnology, Biomedical Engineering
- Strong interest in microbiology, lab-based work, medical technology
- A curious mindset and a passion for integrating diverse analytical techniques to uncover meaningful insights is essential
- Experience from courses and lab experiments in microbiology or cell biology
- Motivation to contribute to real-world clinical innovation, particularly in the context of chronic wound monitoring and infection detection

You will work closely with Odinwell's R&D team, gaining insight into real-world medical device development and contributing to next-generation wound care diagnostics.

Credits: 30 hp (can be extended as 60 hp project) or 2 students working in pair

Location: The thesis can be carried out remotely, at your university, and partially at Odinwell's office in Mölnlycke, depending on your preferences and project needs.

Start: January 2026

Duration: 20 weeks

About Odinwell

Odinwell is a start-up based in Mölnlycke driven by a small multi-disciplinary team. We focus on developing innovative solutions for wound care, using fibre optics and fluorescent light.

Contact

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