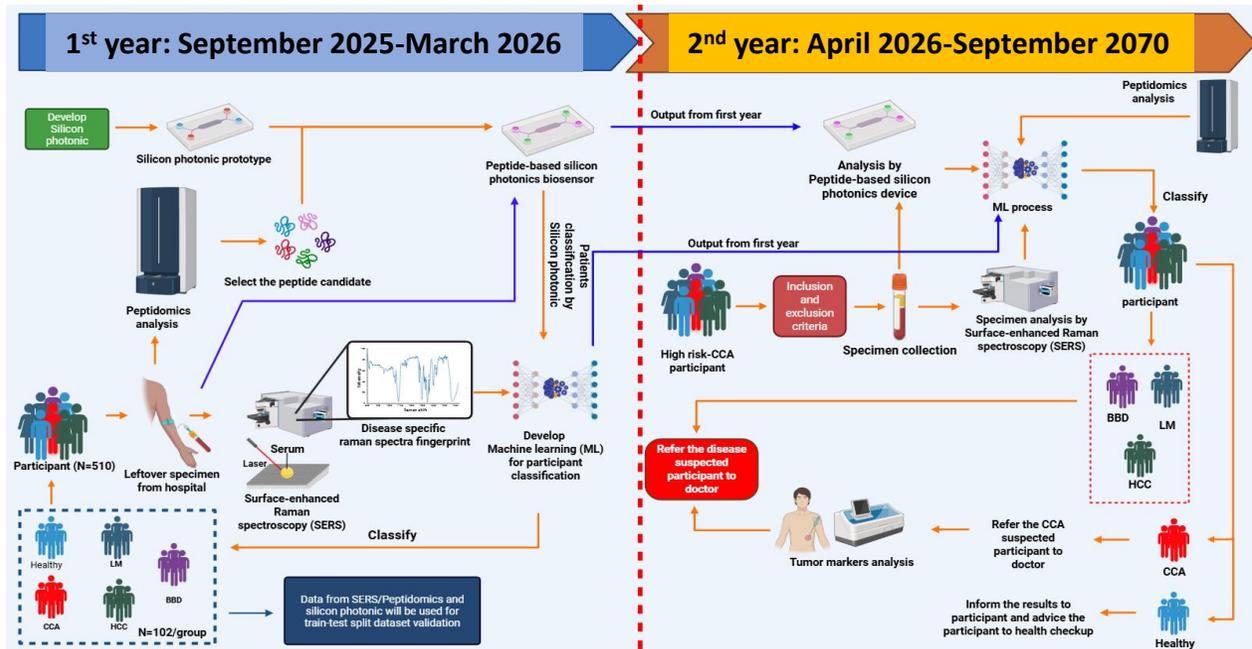


Developing photonics and specific peptides platform towards point-of-care screening for cholangiocarcinoma diagnosis in Lao PDR



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Liver cancer, particularly Cholangiocarcinoma (CCA), represents a significant global health burden with exceptionally high incidence and mortality in the Greater Mekong Subregion, driven largely by the *Opisthorchis viverrini* liver fluke infection. CCA's subtle early symptoms lead to late-stage diagnosis, resulting in poor survival rates and imposing high economic costs, while current diagnostics like imaging and biomarkers like CA 19-9 lack the necessary sensitivity for early detection. To address the critical need for accurate, accessible, and stage-specific screening tools, this research proposes an innovative, cost-effective diagnostic platform that integrates three advanced technologies: **Surface-enhanced Raman Spectroscopy (SERS)**, which uses amplified signals coupled with machine learning to identify minute biochemical changes and multiple biomarkers; **Peptidomics**, which discovers novel, disease-specific peptide signatures in biofluids; and **Silicon Photonic Sensors (BiPhoS)**, a highly sensitive, scalable, and IoT-compatible nanoscale platform for real-time, point-of-care detection. Supported by a robust collaborative network including institutions in Thailand (CMU, TMEC, BIOTEC, NECTEC), Lao PDR, the Philippines (ADMU), and Japan (NICT, Suzuka University). **This study aims** to establish a new platform for minimally invasive early CCA diagnosis, initially benefiting Lao PDR and eventually contributing to the reduction of CCA incidence, mortality, and healthcare costs across the GMS and globally. **The outcome of this study** could deliver innovative, minimally invasive platforms for early CCA diagnosis, starting in Laos, and then for application globally. Future development will focus on a point-of-care CCA screening platform, which will significantly reduce CCA incidence, mortality, and related healthcare expenses.