Discriminant Analysis PCA-LDA Assisted Surface-Enhanced Raman Spectroscopy for Direct Identification of Malaria-Infected Red Blood Cells

Gunganist Kongklad, Ratchapak Chitaree , Tana Taechalertpaisarn , Nathinee Panvisavas and Noppadon Nuntawong

Objectives and overview

Thailand and other tropical countries are always plagued with malaria. Numerous strategies have been created to meet the requirement for quick and accurate malaria diagnostic tools. This study aims to develop a label-free, nondestructive alternative method for detecting malaria in blood samples using Raman spectroscopy that does not necessitate a laborious sample preparation procedure. To enhance Raman scattering, a silver nano substrate was used. After infection, the infected red blood cell produces the malaria pigment known as hemozoin. Although, the majority of hemoglobin and hemozoin is composed of heme. However, there was a distinction in the Raman spectra and images between normal and infected-red blood cells. Additionally, the spectra of normal and malaria-infected red blood cells were utilized as the training data set. PCA-LDA algorithm applied for classification coordinate conduction which can be achieved up to 80% of prediction accuracy in testing data set collected from the blind test.