Contribution ID : **74**   Type : **Poster**

Synchrotron-infrared microspectroscopy of live Leishmania major infected macrophages and isolated promastigotes and amastigotes

Leishmaniasis is a vector-borne Neglected tropical diseases (NTD) associated with a spectrum of clinical manifestations and now endemic in over 90 tropical and subtropical low socioeconomic countries. Current diagnosis for this disease involves serological assessment of infected tissue by either light microscopy, antibody tests or culturing via in vitro inoculation or in vivo animal inoculation. Furthermore, co-infection by other pathogens can make it difficult to accurately determine Leishmania infection with light microscopy. Herein, for the first time, we demonstrate the potential of combining synchrotron FTIR microspectroscopy with powerful discrimination tools such as partial least squares – discriminant analysis (PLS-DA), support vector machine – discriminant analysis (SVM-DA), and k-nearest neighbors (KNN), to characterize the parasitic forms of Leishmania major both isolated and within infected macrophages. To date no spectroscopic studies investigating biochemical fingerprints of the intra and extra cellular leishmania parasitic forms have been performed. Nor have any studies investigated Leishmania infected macrophages paving the way for a spectroscopic based approach to diagnosing leishmania infection. For measurements performed on functional infected and uninfected macrophages in physiological solutions the sensitivity from PLS-DA, SVM-DA, KNN classification methods was found to be 0.923, 0.981, and 0.989, while the specificity was 0.897, 1.00, and 0.975, respectively. Cross-validated PLS-DA models on live amastigotes and promastigotes showed a sensitivity and specificity of 0.98 in the lipid region, whilst a specificity and sensitivity of 1.00 was achieved in the fingerprint region. The study demonstrates the potential of the FTIR technique to identify unique diagnostic bands and utilize them to generate machine learning models to predict leishmania infection.

Level of Expertise

Student

Presenter Gender

Woman

Pronouns

She/Her

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