

Light Fantastic: Rapid Diagnosis of Gliomas via Serum Spectroscopy

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Gliomas are the most frequent primary brain tumours in adults, with these intracranial neoplasms accounting for 70% of adult malignant brain tumours [1]. Confirmatory diagnosis occurs by staining tumour sections and identifying microscopic features characteristic of a disease state. The current methodology is subjective, and may require the patient to undergo unnecessary surgery.

Spectroscopy is the study of the absorption and emission of light. Raman and ATR-FTIR (Attenuated Total Reflectance Fourier Transform Infrared) spectroscopy are rapid, cost-effective and analytical techniques and require little or no sample preparation or use of chemicals. A recent study has shown the potential of ATR-FTIR spectroscopy for the analysis of serum to discriminate between myocardial infarction and other chest pain, thus providing a rapid and effective screening tool [2].

We report the use ATR-FTIR spectroscopy combined with a Radial Based Function Support Vector Machine (RBF-SVM) as a rapid screening tool for the diagnosis of gliomas using high-grade (e.g. Glioblastoma multiforme), low-grade (e.g. oligoendroglioma) and non-cancerous control serum samples and filtrate aliquots of these serum samples to remove components above a specific molecular weight (100 kDa, 10 kDa and 3 kDa).

Results obtained from the use of whole serum ATR-FTIR combined with RBF-SVM produced sensitivities and specificities of 93.75 and 96.53 % respectively. As yet, whole serum ATR-FTIR data achieved greater sensitivities and specificities compared to their filtrate aliquot samples.

This research will assess the use of ATR-FTIR spectroscopy as a rapid screening tool for the diagnosis of gliomas using serum samples to provide a rapid, cost-effective and simple diagnosis with high specificity and sensitivity.

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[2] W. Petrich, K. B. Lewandrowski, J. B. Muhlestein, M. E. H. Hammond, J. L. Januzzi, E. L. Lewandrowski, R. R. Pearson, B. Dolenko, J. Früh, M. Haass, M. M. Hirschl, W. Köhler, R. Mischler, J. Möcks, J. Ordóñez-Llanos, O. Quarder, R. Somorjai, A. Staib, C. Sylvén, G. Werner, R. Zerback. *Analyst.* 134, 1092-1098 (2009).