

Optical biopsy and artificial intelligence as a diagnostic tool of smokers: a pilot study

Maria Clara de Moura Santos Coelho Ferreira¹, Pedro Arthur Augusto de Castro², Felipe da Silva Peralta³, Darcio Kitakawa⁴, Denise Maria Zezell², Luis Felipe das Chagas e Silva de Carvalho^{1,4}

¹ University of Taubaté, Taubaté, SP, Brazil (e-mail: mariacclaracoelho36@gmail.com)

² Center for Lasers and Applications, Energy and Nuclear Research Institute (IPEN-CNEN/SP), São Paulo, SP, Brazil

³ Santa Catarina Educational Society University, Blumenau, SC, Brazil

⁴ University Center of Bras Cubas, Mogi das Cruzes, SP, Brazil

Background: FT-IR spectroscopy can investigate and detect tissue changes at biochemical levels, it is a safe technique, the result is obtained quickly, it needs a small sample amount, which can be biofluids.

Objective: Compare saliva between smoking and non-smoking patients by FT-IR spectroscopy, as an optical biopsy technique and associate with data processing methods based on artificial intelligence. It will be possible to investigate biochemical changes at the molecular level, and in the future use it as an early diagnosis of oral cancer.

Methodology

This study was approved by the Research Ethics Committee, and was conducted using a FT-IR spectroscopy coupled with and attenuated total reflection accessory. Volunteers were divided into three groups, however just 10 patients were analyzed as pilot study. In control group were collected saliva of volunteers who had never tried tobacco (15 spectra from 5 samples). In smoking group patients over 40 years old who smoke more than one pack of cigarettes a day (3 spectra from 1 sample); In sporadic smoking group, patients who smoke sporadically and/or socially (12 spectra from 4 samples).

Results: In all groups, the structural components were DNA, RNA, lipids, proteins and Amide. The spectra showed different intensities in the respective structural components mentioned above, so that subtle differences could prove that the saliva of smoking patients has differences with normal patients.

Conclusion: Optical biopsy and artificial intelligence could be used in the medical field, it is a safe and label technique, more patients should be analyzed for solid results.

