

Isabelle Fournier Artificial Intelligence for Laser in vivo Mass Spectrometry Guided Surgery (Ai-LIVE)

Evaluateur 1

The proposal's objectives are relevant to the development of an automated system to improve precision of cancer surgeries and diagnostics of heterogeneous cancers. The competences and experience of the coordinator and the participants in the techniques proposed is satisfactory. There is significant potential to advance in-vivo MS field in intraoperative surgical analysis.

The state-of-the-art regarding the biological/medical application being addressed in the proposal is not described adequately. Details on how a database of reference MS spectra is created in Task 2 is lacking. In Task 3, the number of patients is statistically low to create a bank of reference MS spectra for an acceptable tissue typing, subtyping and grading.

Strong points: The proposed methodology is state-of-the-art. The technology proposed here constitute an advance that could revolutionize the care of surgical oncology patients. Possible improvements: Rigorous validation studies on a large sample sets and on in-vivo tissues are necessary to evaluate the performance of the in vivo mass spectrometry guided surgery method.

Evaluateur 2

The project is innovative with respect to analogous approaches: it is based on laser induced vaporization of ionic species from biological substrates and their analysis by mass spectrometry. By this it will be possible to obtain a molecular map of part of tissues of oncological interest supported by a bioinformatic platform. The development of a 2D/3D platform by a simple automated robot would lead to well reproducible and accurate experiments.

Scientific approach is surely valid, being supported by previous researches on the same topic, but introducing new methodologies able to overcome their negative aspects.

Optimization of the fiber laser source, the transfer line and the interface with the mass spectrometer together with the bioinformatic platform and the robotic management would lead to a powerful system, of high interest for surgery applications. Both the timeframe and the budget required are adequate.

I find this project really interesting, having the aim to give to physician working in oncological surgery new instruments to confirm diagnosis and to suggest morphological information on the tissue under examination from the molecular point of view. The proposing researcher has already a valid experience in the field and the project would allow to increase the sensitivity and specificity of the method.