Meet&Match.Dx 2022 Challenge #2

Title of the challenge: Accurate, real-time visualization of tumors during oncology resection surgeries

Name of the Pharma/Medtech company: Medtronic (MDT)

Disease area (optional): MDT Operating unit: Surgical Innovations**;** GYN, general/digestive, & thoracic surgeries

Description of the challenge

1. Short introduction about the disease or the problem.
Oncology surgeries with resection of tumors are very common and should still be more and more prevalent in the years to come. According to WHO, cancer accounted for nearly 10 million deaths in 2020, of which 1.8 million were lung cancer deaths, followed by cancer of the colon and rectum (935,000 deaths); liver cancer (830,000 deaths); stomach cancer (769,000 deaths); and breast cancer (685,000 deaths).
Technologies such as fusion imaging, artificial intelligence (AI), robotics and augmented reality should become even more essential tools to facilitate real-time and more accurate visualization of tumors with their margins and then, to effectively remove the tumors to prevent re-do surgeries and to guarantee optimal quality of life of patients by reducing / eliminating as far as possible the complications associated with the surgery. Fusion imaging is a technique that fuses two different imaging modalities such as endoscopic imaging with other real-time intraoperative such as ultrasound imaging, fluorescence imaging or with pre-operative imaging (eg. MRI, CT-Scan, PET-Scan).
Image guided or interventional oncology surgeries are already done for a number of organs, such as lung, kidney, liver, prostate, and breast. But they should benefit other surgeries, like colorectal and uterine surgeries.

2. Describe the current treatment/solution and its limitations.
Despite major advances, re-do surgeries occur because of inaccurate of tumor margins. For example, for breast oncology surgeries, current techniques to diagnose / image tumors (eg. frozen section, imprint cytology, intraoperative ultrasound, near-infrared fluorescence with indocyanine green) are still leading to unacceptably high positive margin rate following breast-conserving surgery. To guarantee also less errors from oncology surgeries, image-enabled intraoperative assistance are now more and more expected to facilitate the training of surgeons and to make easier, safer and faster the resection of tumors.

3.1. Describe which kind of solution you are looking for:
Fusion imaging and/or AR (augmented reality) for intraoperative assistance and/or possibly surgery planning, for GYN (eg. uterine), Colorectal and Lung oncology surgeries

Desirable solutions:

- Imaging clearly and accurately the tumors and their margins to be resected by surgery
- Giving real-time fusion imaging / AR with as much as possible automated registration and accurate image segmentation
- AI-enabled solutions powered by the right hardware for local and/or cloud processing
- Additionally, new or improved imaging approaches should be considered to deliver the fusion imaging / AR solutions with the requested accuracy and robustness level (eg. endoluminal Ultrasound catheter, more specific probes for tumor imaging by NIR fluorescence)
- Solution to be implemented within the next 5 years max
- The solution will be deployed at the Operating Room and/or be used for the planning of surgeries. It is intended to give information on tumor location to facilitate the oncology resections (Class IIa medical device solution in Europe)
- To be adopted, the solution should be robust enough to avoid/reduce post-operative positive tumor margins

4. Target group:

End users are primarily surgeons at the OR and/or for the planning of surgeries