Challenging common research practice for a brAlght clinical future.

Intelligent medical systems capable of capturing and interpreting sensor data and providing context-aware assistance are promising to revolutionize interventional healthcare. One of the key components of such systems is perception. While the current state of the art in interventional healthcare largely relies on conventional imaging modalities, we challenge common practice by proposing intelligent medical systems based on novel biophotonics-based techniques that go beyond human perception with modern machine learning methods. Promising as they may appear, however, these systems can only be as ‘intelligent’ as the validation that was conducted on the algorithms used. Although validation is the basis for measuring all scientific progress as well as a key prerequisite for successful clinical translation, current common practice in the entire field of medical image analysis is heavily flawed, with strategies and metrics used frequently not reflecting the underlying medical problem. We challenge these shortcomings and propose solutions compiled by an international consortium of medical and machine learning experts from over 60 institutions worldwide.