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Structured Abstracts: The Time Has Come for the *Journal of Biomedical Optics*!

For decades many medical journals have required authors to structure their abstracts in a standard way, presenting the key components of the paper in a manner that makes it clear and easy to read. There are slight variations in the design of a structured abstract, but generally most involve outlining five categories, which include (i) the motivations for the work relative to background materials, (ii) the aims or hypotheses of the work, (iii) the approach, materials, and/or methods used, (iv) a summary of key results, and (v) the final conclusions of the study described in an interpretive way.

Only a sentence or two can be included in each section, and so they are easy to read, comprehensive of the study, and perhaps most importantly they enable readers to determine relatively quickly if the paper is relevant to their interests. It also benefits authors by providing them with a logical flow for the abstract, ensuring that each of these five core areas is addressed.

The data is clear that papers with structured abstracts get accessed more; the use in Medline-listed journals has grown continuously for decades with more than 20% of all listed using this format.[1] Nonmedical scientific journals have been slowly promoting the use of this style, although perhaps many years behind medical journals.[2] Since the *Journal of Biomedical Optics* (JBO) presents a bridge between the scientific and medical worlds, it is critical to adopt the best practices of both worlds.

The design of the structured abstract for JBO will be as follows.

Significance: This section in particular is the rationale for the work, incorporating possible background material and what makes the work relevant reading for those in the field of study.

Aim: This outlines specifics of what exactly was studied. While the significance speaks to the broader impact, the aim is more specific to the study, tools, or systems used.

Approach: This describes the materials and methods used, in a brief manner.

Results: The core summary of study numbers, analyses, discoveries, or data descriptions goes here. Very often this takes the most space; several sentences may be needed if many studies were completed.

Conclusions: An interpretive statement that summarizes the approach and results of the work is important to round out the end of the abstract.

Succinct Design for Higher Impact

Perhaps one of the most important things to think about in this choice is *how do people find which papers they want to read*?

The electronic access to most journals is now seemingly unlimited at most research-intensive universities. While this is critically important for advancing the highest impact research, it also leaves active researchers with the constant problem of trying to determine what is worth spending their time to read. In almost every select field of study, there are multiple papers being published every day, and so science has long passed the tipping point where reading every single publication within a research field is feasible anymore. Most active researchers utilize search engines and electronic filtering tools to find the papers most relevant to their research topics. No matter which search tools are used, the details of the paper title, abstract, and keywords likely have the most important impact on whether the paper gets found. As such, the completeness and accuracy of the authored abstract is a core component of having that paper found and read by others.

The published data shows that structured abstracts in clinical journals have more access points than nonstructured abstract papers[3] and for many years it has been known that objective measures of abstract quality are higher in structured versions.[4] These all point to the fact that higher quality and more access will accompany the change to structured abstracts.

At JBO we firmly believe in the quality of the science published and need to take steps to ensure that search engines find these papers and present them to relevant readers. Having authors structure their abstracts will have this effect.

Example

To give a concrete example of the design, an example abstract is given here.

Significance: Surgical oncology procedures can fail if there is not complete resection of the lesion. Imaging of the margin on the specimen could be used to detect any residual cancer tissue present. Detection of cancer in these tissues might be enhanced by a structured light imaging that enhances the pathology-specific contrast.

Aim: High spatial frequency optical imaging (HSFI) was used on the margins of resected breast tumors with the goal of quantifying the value for detection of diseased regions.

Approach: HSFI was integrated into a commercial x-ray tomography system allowing for simultaneous volumetric

x-ray and surface HSFI of 76 resected tumor specimens. Image data was compared to pathology classification, and the dominant predictive measures of spectral and spatial patterns were identified for each pathologic subtype.

Results: Discrimination of the 5 malignant subtypes from 4 normal tissue subtypes was possible based upon 405-nm light and with fractal dimension analysis (p-value <0.05). Identification of intralobular breast lesions, based upon prior knowledge of the pathology subtype, was possible with higher confidence (p-value <0.001), while identification of invasive ductal carcinoma varied considerably with grade.

Conclusions: Detection of cancer on margins of surgically resected breast tissues appears feasible with HSFI in this *ex vivo* survey study.

Timeline—Changeover for 2020

The initial idea of structured abstracts was discussed at meetings of the SPIE Board of Editors and the JBO Editorial Board with general support for the move. Other SPIE journals have already moved to or are considering the structured abstract format, including *Neurophotonics,* the *Journal of Micro/Nanolithography, MEMS, and MOEMS*,[5] and *Optical Engineering*.[6] This fall we are encouraging participation in this style of abstract in JBO through the end of 2019, and as of January 2020 all JBO submissions will be required to format their abstract in this way. This should be an easy transition and we look forward to helping each author and reader with this positive step for JBO.

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Editor-in-Chief

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