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Novel Raman-based insights into spermatozoal biology: From bench to bedside

Spermatozoa were among the first cells observed microscopically. Today light microscopes are still primary instruments for clinical sperm diagnostics. However, bio-optic inventions and bio-imaging breakthroughs have revolutionized insights into the structure and function of the male gamete. This talk will provide an overview on the history of spermatozoal research, provide insights into current technology used in clinical and research settings. We have reviewed the potential of Raman spectroscopy for functional sperm analysis and selection strategies [1]. We have explored the Raman spectra of various sperm components in a number of species [2] and the potential to detect changes in DNA integrity by readouts of the DNA backbone in the sperm nucleus [3, 4]. We are facing challenges in transforming the highly promising strategies for functional sperm detection by Raman to living sperm since the state of hydration seems to effect the Raman readout of damaged sperm [5]. We are proposing to further develop the strategies enabling non-destructive analysis and selection of intact sperm for fertilization in human and veterinary medicine.

References

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Figure

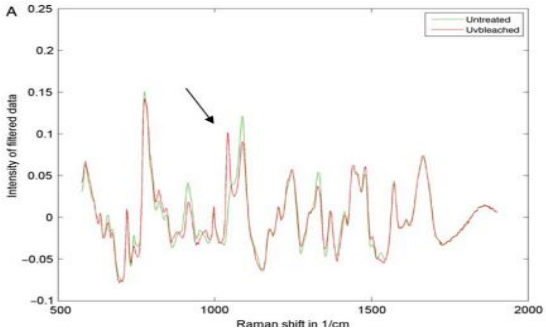

Fig. 1 Averaged spectra showing the distinct shift at 1042 cm21 (arrow) in spectra of irradiated (red) compared with that of untreated human sperm (green). [reprinted from Reference 1)