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The approaches in visualization and quantification of collagen fibers

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The extracellular matrix (ECM) is as a very dynamic meshwork of proteins and sugars, dominantly fibrous proteins like collagen, elastin and fibronectin and various specific proteoglycans. ECM has important and multiple roles both in healthy tissues and in the disease. ECM is now recognized as a crucial component of complex cancer microenvironment, and remodeling of ECM follow every step of cancer development, progression and response to treatment [1].

Collagen is the most abundant component of ECM. More than 25 subtypes of collagen have been identified. Among them, collagen type I is the main fibrillar collagen, present in most tissues, forming collagen fibers, responsible for biomechanical properties of tissues [2].

The emerging understanding of collagen organization, remodelling and functions in multiple diseases including cancer could provide new strategies for early cancer detection and cancer therapy.

Methods for visualization and quantification of collagen fibers are expanding.

They vary starting with traditional light microscopy and different histochemical staining including Masson trichrome and picrosirius, immunohistochemistry for different epitopes on collagen fibers, confocal microscopy with fluorescent labelling of collagen and electron microscopy. Other methods such as Raman spectroscopy and atomic force microscopy are being used to examine composition, structure and biomechanical properties of collagen [3, 4]. We will provide a comprehensive review of traditional and novel methods of collagen visualization and quantification with a special reference to nonlinear laser scanning microscopy with second harmonic generation imaging, which is still considered a golden standard in this filed [5, 6, 7].

References

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