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# Micro-CT journey - from bones to personalized medicine

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X-ray microtomography (micro-CT) is a well establised nondestructive 3D method for small sample internal structure imaging. For over 20 years, micro-CT is known as a golden standard in bone microarchitecture analysis, as an alternative to histological sectioning method for preclinical research [1, 2]. Micro-CT surpasses histological analysis because it provides 3D information with several micron sampling.

In recent years, micro-CT has been succesfully used in micro-angiography research. For this purpose it needs addition of contrast agents either by staining the sample for ex-vivo scanning or using perfusion in small animal in-vivo micro-CT [3, 4]. Staining methods enhance imaging contrast globally by diffusion process in examined tissue, particullary in areas with high affinity to a specific contrasting solutions. Recent research proofs the potential of this metod in imaging of 3D cell cultures called spheroids [5]. The injected contrast agent works more locally. It can enhance image contrast of blood vessels, heart, kidneys and urinary bladder.

From the other hand micro-CT is an indispensable tool in material science including drug design for a personalized medicine. This work shows how micro-CT can help in design and quality control of individualy 3D printed tablets [6, 7].

References

[1] Leszczyński, et al. (2014). Three dimensional visualisation and morphometry of bone samples studied in microcomputed tomography (micro-CT). Folia morphologica, 73(4), 422–428. https://doi.org/10.5603/FM.2014.0064
[2]Pilutin, A., et al. (2021). Morphology and serum and bone tissue calcium and magnesium concentrations in the bones of male rats chronically treated with letrozole, a nonsteroidal cytochrome P450 aromatase inhibitor. Connective tissue research, 62(4), 454–463. https://doi.org/10.1080/03008207.2020.1771329
[3]Leszczyński, et al.(2018). Visualization and Quantitative 3D Analysis of Intraocular Melanoma and Its Vascularization in a Hamster Eye. International journal of molecular sciences, 19(2), 332. https://doi.org/10.3390/ijms19020332
[4] Tielemans, B., et al. (2020). From Mouse to Man and Back: Closing the Correlation Gap between Imaging and Histopathology for Lung Diseases. Diagnostics, 10(9), 636. https://doi.org/10.3390/diagnostics10090636
[5] Karimi, H., et al.(2020). X-ray microtomography as a new approach for imaging and analysis of tumor spheroids. Micron, 137, 102917. https://doi.org/10.1016/j.micron.2020.102917
[6] Jamróz, W., et al. (2020). Speed it up, slow it down…An issue of bicalutamide release from 3D printed tablets. European journal of pharmaceutical sciences : official journal of the European Federation for Pharmaceutical Sciences, 143, 105169. https://doi.org/10.1016/j.ejps.2019.105169
[7] Jamróz W., et al.(2020). Multivariate Design of 3D Printed Immediate-Release Tablets with Liquid Crystal-Forming Drug-Itraconazole. Materials, 13(21), 4961. https://doi.org/10.3390/ma13214961

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