



### **Anca Hermenean**

Prof. Dr. Habil. Anca Hermenean is Professor of Histology at “Vasile Goldiș” Western University of Arad, Romania, and Associate Professor at the University of Bucharest and the National University of Science and Technology POLITEHNICA Bucharest. She is a PhD supervisor in Biology and has extensive experience in coordinating multidisciplinary research teams and national and international research projects.

Her research focuses on nanobiotechnology and biomaterials, regenerative medicine and tissue engineering, drug-delivery systems, experimental pharmacology and toxicology, and the molecular mechanisms of tissue injury, repair and fibrosis. A major direction of her work is the biological and preclinical evaluation of biomaterials and nanostructured systems for medical applications, with particular emphasis on biocompatibility, biomaterial-tissue interactions, inflammatory responses, safety, and regenerative efficacy. These directions are also explicitly reflected in her research profile, particularly in *in vivo* biocompatibility and toxicological assessment of nanomaterials and materials designed for bone and cartilage regeneration.

Her research on chitosan-based biomaterials spans more than a decade. She has contributed to the biological evaluation of chitosan-graphene oxide three-dimensional scaffolds for bone tissue engineering, from *in vitro* cytocompatibility studies to *in vivo* evaluation in critical-size bone defects and assessment of their regenerative potential. More recent research has expanded toward chitosan-coated scaffolds for biomedical applications.

Her research combines cellular and molecular approaches, biochemical analyses, biocompatibility and toxicological testing, and preclinical *in vivo* models to investigate the biological performance and safety of advanced materials.

### ***Talk: Biological evaluation of chitosan-based biomaterials for medical applications***

Chitosan is a versatile natural polymer with considerable potential for biomedical applications due to its biocompatibility, biodegradability, functional versatility, and ability to be combined with a wide range of bioactive compounds and nanomaterials. Its use in tissue engineering, regenerative medicine, drug delivery, wound healing, and other medical applications requires, however, a comprehensive biological evaluation adapted to the composition, structure, route and duration of exposure, and intended clinical use of the final biomaterial.

This lecture will provide an overview of the main strategies for the biological and preclinical evaluation of chitosan-based biomaterials, following the progression from material characterization and *in vitro* testing to *in vivo* experimental models. The evaluation framework will be discussed in relation to international standards for the biological evaluation of medical





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devices, particularly the ISO 10993 series, highlighting how biological endpoints and testing strategies are selected according to the nature and intended medical application of the material.

Particular attention will be given to cytocompatibility and cell-material interactions, including cell viability, adhesion, proliferation, morphology, oxidative stress, inflammatory responses, and functional cellular behavior.

The transition to *in vivo* evaluation will address local and systemic biocompatibility, toxicity, inflammatory and foreign-body responses, tissue integration, biodegradation, vascularization, and regenerative performance. The selection of appropriate experimental models, endpoints, and analytical methods will be discussed as an essential component of a scientifically robust biological evaluation strategy.

Examples from our research on chitosan-based scaffolds and nanostructured systems will illustrate the integration of *in vitro* and *in vivo* approaches, with particular emphasis on chitosan–graphene oxide 3D scaffolds for bone tissue engineering and regeneration and on more recent chitosan-based biomedical systems.

Overall, the lecture will emphasize an integrated, risk-based and stepwise approach to biological evaluation, connecting international standards, experimental testing, and preclinical evidence required for the translation of chitosan-based biomaterials toward safe and effective medical applications.

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