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About the cover: Fluorescence microscopy image from the carotid artery of a mouse injected with 1 mg/kg TT1-HSA NP after 30 minutes, 2 hours, and 24 hours. Original magnification 100×. In the micrograph taken at 30 minutes, the vessel wall is indicated by a white line while the lumen of the vessel is indicated by a pink line. The area between the two lines presents an atherosclerotic plaque obstructing the vessel. The magnification of the image at 30 minutes shows a low fluorescence signal of the TT1 observable only with maximum gain (inset).

EDITORIAL
Prec. Nanomed. 2019 Apr;2(2):270-277
Building the European Nanomedicine Research and Innovation Area

EuroNanoMed
10 years of funding innovative research projects

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Abstract
It has been 10 years since the establishment of EuroNanoMed (ENM), presently in its third phase. For those 10 years, research and innovation funding organisations in Europe and beyond have been joining forces to fund excellent innovative research projects in three main topics defined by the European Technology Platform on Nanomedicine: targeted drug delivery, diagnostics, and regenerative medicine. Ten joint transnational calls have been launched (the 10th call is ongoing). So far, 90 transnational projects have been funded, including 460 research groups from over 20 countries. In the Joint Transnational Call 2017—co-funded by national and regional funding organizations and the European Commission (EC) —16 projects were funded with a total investment of 14 million euros, including 3.3 million euros from the EC. In addition to ENM’s main activity of funding transnational innovative research projects, it collaborates with sister initiatives in nanomedicine and translational research. ENM has organised review seminars as well as safety, ethics, and regulatory affairs training workshops. The
The purpose of this article is to introduce the ENM initiatives to the scientific community, that together with its collaborators shape the map of nanomedicine in Europe.

FEATURE ARTICLE
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Human serum albumin nanoparticles loaded with phthalocyanine dyes for potential use in photodynamic therapy for atherosclerotic plaques

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From the Clinical Editor: POTENTIAL CLINICAL SIGNIFICANCE

Photodynamic therapy (PDT) can be used for a variety of diseases such as cancer, psoriasis, macular degeneration etc. with the aim being minimally invasive and toxic. The authors describe the development and characterization of Near-Infrared (NIR) photosensitizer (silicon and zinc based) human serum albumin nanoparticles and their potential applicability in PDT including in vivo studies for treatment of atherosclerotic plaques. They could show the successful concentration of the nanoparticles in the plaques and after illumination a good cell-killing activity including visualization of the respective areas offering the potential to be a candidate to treat cardiovascular diseases in the future.

Abstract

Diseases caused by obstruction or rupture of vulnerable plaques in the arterial walls such as cardiovascular infarction or stroke are the leading cause of death in the world. In the present work, we developed human serum albumin nanoparticles loaded by physisorption with zinc phthalocyanine, TT1, mainly used for industrial application as near-infrared photosensitizer (silicon and zinc based) human serum albumin nanoparticles and their potential applicability in PDT including in vivo studies for treatment of atherosclerotic plaques. They could show the successful concentration of the nanoparticles in the plaques and after illumination a good cell-killing activity including visualization of the respective areas offering the potential to be a candidate to treat cardiovascular diseases in the future.
lungs with a fast clearance of the nanoparticles. Zinc phthalocyanine loaded human serum albumin nanoparticles present an interesting candidate for the visualization and potentially photodynamic treatment of macrophages in atherosclerotic plaques.

**RESEARCH ARTICLE**

*Prec. Nanomed. 2019 Apr;2(2):256-269*

**Critical evaluation of the interaction of special proteins with human stratum corneum via terahertz scanning reflectometry and spectrometry**

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From the Clinical Editor:

**POTENTIAL CLINICAL SIGNIFICANCE**

Transdermal drug delivery is a very attractive option in clinical practice. Nonetheless, the exact interactions between various drugs and the skin are not fully understood. In this study, the authors investigated this aspect using terahertz scanning reflectometry (TSR) and terahertz spectrometry (TS) to study the surface-mediated FXII activation, as well as penetration of the FXII and an in-house compound, UM8190. The findings would open the door to studying other compounds and could potentially lead to better drug design and optimal dose delivery in the clinic.

**Abstract**

Many patients with chronic skin disease develop hemostatic abnormalities. The blood coagulation factor XII is a multifunctional protease, which is involved in thrombosis, fibrinolysis, and inflammatory processes. The aim of this investigation was to assess the autoactivation of FXII that leads to the generation of FXII fragments and their subsequent cell penetration compared to UM8190, a lipophilic selective prolyl carboxypeptidase inhibitor compound. Terahertz scanning reflectometry (TSR) and terahertz spectrometry (TS) were used to study the surface-mediated FXII activation, as well as penetration of the FXII and UM8190, their retardant property, diffusion kinetics and fragmentation profiles into human stratum corneum (SC). From the diffusion kinetics and profiling experiments it was found that FXII does not penetrate the SC but remains mostly on the surface. Compound UM8190 indicates penetration into the SC, as indicated by the increased reflected intensity of T-ray. The terahertz spectral analysis via absorbance spectra indicates that at a low frequency of 0.56 THz a prominent peak occurs due to water or moisture for the SC alone. This peak, however, exhibits a shift for post-diffusion samples of both FXII saturated SC and UM8190-saturated SC. This is indicative of adhesion of these proteins onto the SC. Though this process corroborates the binding of FXII to the cell membrane surface as reported in the in vitro findings, it does not appear to be activated and degraded. It was also found that there are a number of absorbance peaks characteristic for each molecule and these peaks are uniquely shifted relative to each other when compared with the SC alone. Thus, these absorbance peaks may be utilized for assigning identifying features of the protein and peptides in this present study. Further investigation will be conducted for assigning the absorbance peaks to the specific proteins and their resonances.