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Compressed fluids for the production of lipid-based nanovesicles with application in nanomedicine

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Molecular self-assembly has enabled the fabrication of biologically inspired, advanced nanostructures as lipid-based nanovesicles (L-NVs) [1]. The oldest L-NVs, liposomes, have been widely proposed as potential candidates for drug delivery, diagnostic and/or theranostic applications and some liposome-based drug products have already stepped from the lab-bench to the market. This success is attributed to their ability to encapsulate both hydrophobic and/or hydrophilic molecules, efficiently carry and protect them within the body and finally deliver them at the target site. These positive features are also coupled with high biocompatibility. However, liposomes still present some unsolved drawbacks, such as poor colloidal stability, short shelf-life, restricted and expensive conditions of preparation because of the inherent nature of their fundamental constituents (phospholipids). The new tools available in the controlled self-assembly of molecules have significantly advanced in the field of L-NV design and synthesis, and nonliposomal L-NVs have been recently developed; such as quatsomes [2]. This new generation of nanovesicles can represent a paradigm shift in nanomedicine: they may complement liposomes, showing their advantages and overcoming most of their drawbacks. Clearly, being still young, their rocky way to the clinic first and then to the market has just started and it is still long, but they have all the potentialities to reach their objective target.

The arrival of a nanomaterial to the market is strongly dependent on the availability of technological-scale preparation methods, in this communication will be reviewed the most cutting-edge approaches based on compressed fluids technologies for the production of liposomal and non-liposomal L-NVs [1]. These green technologies show the potential to represent a game-change in the production of L-NVs, favouring the step of L-NVs from the bench to the clinical use.

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