Development of galactosamine decorated andrographolide loaded nanocochleates for liver cancer targeting

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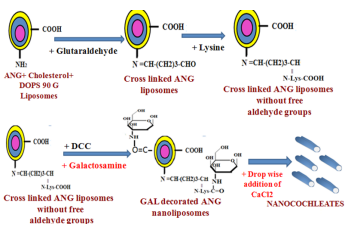
Statement of the Problem: Andrographolide (ANG), an anticancer chemotherapeutic phytoconstituent has been used in the treatment of various tumours and produced 39% inhibition cancer cell due to lack of specific affinity for site of action or to its limited biopharmaceutical properties. This juncture demands an effective, controlled release and safe formulation of AND would be a significant advance for the treatment of cancer. Nanocochleates are unique lipid-based supramolecular assemblies composed of a negatively charged phospholipid and a divalent cation. Aim of the study was to develop galactosamine (GA) decorated andrographolide (ANG) loaded Nano-Cochleates (NC) for liver targeting.

Methodology: GA was attached to ANG-loaded 1,2-dioleoyl-sn-glycero-3-phospho-L-serine (DOPS) nanoliposomes (GA-ANG-NL) by aldehyde chemistry. GA-ANG-NL was converted into nanocochleates (GA-ANG-NC) by addition of Ca2+ ions and evaluated in terms of in-vitro and in-vivo and compared with ANG and ANG-NC.

Findings: ANG-NC and GA-ANG-NC showed particle size of 149 and 835 nm and zeta potential of -0.308 and -2.08 mV, respectively. ANG-NC and GA-ANG-NC showed higher release in pH 5.3 as compared to pH 7.4. GA-ANG-NC demonstrated higher in-vitro anticancer activity in Human hepatoma cell line Hep-G2. The targeting effect for the GA-ANG-NC was also demonstrated in which fourfold improved GI50 as compared ANG. Moreover, bioavailability of AGN from GA-ANG-NC increased by 3-fold with long circulation time and slower plasma elimination. Furthermore, GA-ANG-NC showed 2.1-fold increases in liver drug concentration ANG.

Conclusion & Significance: The proposed strategy is advantageous in terms of targeted drug delivery and has high potential to address the current challenges in drug delivery. Thus, the prepared nanocarrier offers a novel formulation that combines the unique properties of a biodegradable material, galactosamine and nanocochleates for biomedical applications.

Acknowledgement: The authors sincerely acknowledge Lipoid GmbH, Ludwigshafen, Germany for providing gift sample of1,2-dioleoyl-sn-glycero-3-phospho-L-serine (DOPS).



Biography

Bothiraja has expertise in the field of novel and targeted drug delivery systems. His rigorous research work has been dedicated in various research projects like nanoparticulate systems drug delivery, tumor targeting, solid dispersion and crystal engineering. He has 50 research papers published in various international and national journals depict quality, innovativeness and expertise achieved by him in mentioned research fields. He would also like to use his enthusiasm for science to involve students and help them to become successful and contributing members of the scientific community.

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