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Formulation of inhaled phytochemicals

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Fisetin or 3, 3', 4', 7-tetrahydroxyflavone is a natural flavonoid which can be found in different fruits and vegetables. Apart from its antioxidant, anti-inflammatory and neuroprotective activities, several studies have shown its anticancer effect in several cancer cell lines (e.g., lung, colon and prostate). This study explores the incorporation of fisetin into the cavity of different cyclodextrins to improve its poor aqueous solubility (<1 mg/ml), that hinders its delivery. The complex was further engineered into an inhalable dry powder formulation that will potentially be useful to target the lung for therapeutic applications. The highest complexation was found between fisetin and sulfobutylether- β -Cyclodextrin (SBE- β -CD), and addition of 20% v/v ethanol increased the complexation by 5.9-fold. The spray-dried complex from the ethanolic solution showed an improved aerosolization performance, indicated by two-fold increase in the fine particle fraction, compared to the spray-dried complex from aqueous solution. This may be caused by the lighter and less dense properties of the particles, showed by the pitted morphological surfaces, suggesting a hollow internal structure. Further incorporation of 20% w/w leucine improved the physical and aerosolization properties of the spray-dried complex. The preparation also showed an unchanged cytotoxic activity of fisetin against the human lung adenocarcinoma cell line (A549). In conclusion, the inhalable dry powder of fisetin-SBE- β -CD complex was able to increase aqueous solubility of fisetin and may be useful to deliver fisetin to the deep lung region.

Biography

Satyanarayana Somavarapu completed his PhD at University of Aston in Birmingham and received the award of a Commonwealth Fellowship from Association of Commonwealth Universities. In 2005, he was appointed as Academic Fellow at School of Pharmacy and became a Lecturer in 2010. He has more than 100 publications, including 50 journal articles, over 50 peer-reviewed abstracts and several international conference presentations. He also has six patents on Vaccine Formulations. His research focus is on "Designing, understanding & developing technologies for novel nanocarrier systems in overcoming biological barriers for the targeted delivery of small therapeutic molecules and macromolecules (proteins, peptides, siRNA and miRNA) via the pulmonary route in the treatment of lung diseases (lung cancer, asthma, COPD) and ocular conditions".

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