

## Microemulsions as Potent Drug Delivery Systems

Nirmala MJ\* and Nagarajan R\*

Department of Chemical Engineering, Indian Institute of Technology Madras, Chennai 600 036, India

### Editorial

The term “microemulsion” was first coined by Schulman et al. Microemulsions have attained significance in various sectors such as biotechnology, pharmaceuticals, analytical applications, food industries, cosmetics, agrochemicals, textiles, fuels, lubricants, enhanced oil recovery, environmental remediation and detoxification, and others. This could be explicated by their unique properties such as low interfacial tension, large surface area, thermodynamic stability and enhanced solubilization capacity [1].

Though microemulsions play a vital role in various fields, their importance in the field of pharmaceuticals has significantly increased in recent years. This could be due to their ease of preparation at cost effective methods, high stability and optical transparency. Microemulsions act as potent drug delivery systems and they could be administered through various routes such as oral, parenteral, topical, ophthalmic and nasal routes. They also enable drug targeting, tumor targeting, brain targeting and cellular targeting [2]. Microemulsions act as an excellent antibacterial, antifungal, antiviral and antitumor agent as well. A self-microemulsifying drug delivery system of curcumin showed improved aqueous solubility, oral bioavailability and high loading efficiency. The droplets were produced spontaneously in the nano range with minimum polydispersity. They demonstrated good cytostatic action against HeLa cells and also exhibited antibacterial activity against *E. coli* and *S. aureus* respectively [3]. A clotrimazole-loaded *H. suaveolens* oil microemulsion gel demonstrated significant antifungal activity against *T. mentagrophyte*, *T. rubrum*, *M. gypseum* and *C. albicans* as well. This carboxy methyl mungbean gel based formulation showed sustained release with improved penetration and antifungal property as compared to other available commercial forms [4]. A recent study demonstrated that etoposide loaded coix

seed oil microemulsion system with a droplet size of 35 nm induced apoptosis in A549 human lung carcinoma cells [5]. Another study of olive oil-in-water emulsions preserved the viability of mycobacteria and showed positive response in bladder cancer treatment [6].

There are several other existing reports that demonstrate microemulsions as effective drug delivery agents. Microemulsions owing to their potent activity and high efficacy are effectively used in the field of modern medicine.

### Acknowledgement

The authors thank DST-SERB, Government for providing us the research support.

### References

1. Paul BK, Moulik SP (2001) Uses and applications of microemulsions. *Curr Sci* 80: 990-1001.
2. Muzaffar F, Singh UK, Chauhan L (2013) Review on microemulsion as futuristic drug delivery. *Int J Pharm Pharm Sci* 5: 39-53.
3. Dhumal DM, Kothari PR, Kalhapure RS, Akamanchi KG (2015) Self-microemulsifying drug delivery system of curcumin with enhanced solubility and bioavailability using a new semi-synthetic bicephalous heterolipid: in vitro and in vivo evaluation. *RSC Adv* 5: 90295-90306.
4. Khonkam R, Okonogi S, Kittipongpatana OS, Boasoung V (2015) Antifungal effect of Hyptis Suaveolens oil microemulsion based carboxymethyl mungbean gel for topical delivery. *Int J Pharm Pharm Sci* 7: 22-267.
5. Qu D, Ma Y, Sun W, Chen Y, Zhou J, et al. (2015) Microemulsion-based synergistic dual-drug codelivery system for enhanced apoptosis of tumor cells. *J Nanomedicine* 10: 1173-1187.
6. Noguera-Ortega E, Blanco-Cabra N, Rabanal RM, Sánchez-Chardi A, Roldán M, et al. (2016) Mycobacteria emulsified in olive oil-in-water trigger a robust immune response in bladder cancer treatment. *Sci Rep*.

\*Corresponding authors: Nirmala MJ and Nagarajan R, Department of Chemical Engineering, Indian Institute of Technology Madras, Chennai, India, Tel: 9677174200; E-mail: joycegitz@gmail.com

Received June 09, 2016; Accepted June 09, 2016; Published June 12, 2016

Citation: Nirmala MJ, Nagarajan R (2016) Microemulsions as Potent Drug Delivery Systems. *J Nanomed Nanotechnol* 7: e139. doi:10.4172/2157-7439.1000e139

Copyright: © 2016 Nirmala MJ, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.