Journal of Nanomedicine & Biotherapeutic Discovery

OPEN ACCESS Freely available online

Short Communication

Nanoemulsion Formulation for Improved Drug Delivery

Erwin Gelfand*

Department of Pharmaceutics, University of Assiut, El Fateh, Assiut Governorate, Egypt

ABOUT THE STUDY

Nanoemulsions are a type of emulsion with droplet sizes in the range of 20-200 nm. These small droplets have unique physicochemical properties, such as increased surface area and stability, which make them attractive for a wide range of applications in various fields, including food, pharmaceuticals, cosmetics, and materials science. One of the main advantages of nanoemulsions is their high stability. Traditional emulsions tend to separate over time due to droplet coalescence and creaming, but nanoemulsions are stabilized by the presence of surfactants or other stabilizing agents, which prevent droplet aggregation and maintain the uniformity of the emulsion [1]. This stability also allows for extended shelf-life and ease of transport, making nanoemulsions ideal for commercial use.

Another advantage of nanoemulsions is their increased bioavailability. The small droplet size of nanoemulsions facilitates their absorption through biological barriers, such as cell membranes or the gastrointestinal tract, leading to improved efficacy and therapeutic outcomes. This property makes nanoemulsions particularly attractive for drug delivery applications, as they can enhance the delivery of poorly soluble drugs or target specific tissues or cells. In the food industry, nanoemulsions are used to improve the sensory properties of food products, such as flavour, texture, and appearance. For example, nanoemulsions can be used to create clear beverages, enhance the flavour of oils and sauces, or improve the texture of ice cream [2]. The small droplet size of nanoemulsions also allows for the creation of low-fat or fat-free products, as the emulsified droplets can replace the fat globules in traditional emulsions, while maintaining the same sensory attributes.

In the cosmetics industry, nanoemulsions are used to enhance the stability and efficacy of personal care products, such as lotions, creams, and sunscreens. Nanoemulsions can improve the penetration of active ingredients into the skin, leading to enhanced moisturization, anti-aging, or UV protection effects. Nanoemulsions can also improve the texture and appearance of cosmetic products, such as creating a more uniform and smooth skin feels [3]. Despite the advantages of nanoemulsions, there are also some challenges associated with their production and application,

One of the main challenges is the high energy input required to create small droplets in the emulsion. This energy input can come from mechanical or ultrasonic methods, but it can also lead to degradation of sensitive components, such as drugs or bioactive compounds. Therefore, it is important to optimize the production process to minimize the energy input and preserve the functional properties of the emulsion [4].

Another challenge is the potential toxicity of some surfactants or stabilizing agents used in nanoemulsions. Some surfactants, such as Tween and Span, have been shown to cause cytotoxicity or oxidative stress *in vitro*, raising concerns about their safety for human use. Therefore, it is important to carefully select the surfactants and stabilizing agents based on their biocompatibility and toxicity profile [5].

CONCLUSION

Nanoemulsions are a promising technology with a wide range of applications in various fields. Their small droplet size, high stability, and increased bioavailability make them attractive for drug delivery, food, and cosmetic applications. However, the production and application of nanoemulsions require careful consideration of the energy input, surfactant selection, and toxicity profile. With further optimization and research, nanoemulsions have the potential to revolutionize many industries and improve human health and well-being.

REFERENCES

1. Elzayat A, Adam-Cervera I, Álvarez-Bermúdez O, Muñoz-Espí R. Nanoemulsions for synthesis of biomedical nanocarriers. Colloids Surf B. 2021;203:111764.
2. Ashaolu TJ. Nanoemulsions for health, food, and cosmetics: a review. Environ Chem Lett. 2021;19(4):3381-3395.
3. Gawin-Mikołajewicz A, Nartowski KP, Dyba AJ, Gołkowska AM, Malec K, Karolewicz B. Ophthalmic nanoemulsions: From composition to technological processes and quality control. Mol Pharm. 2021;18(10):3719-3740.
4. Nirale P, Paul A, Yadav KS. Nanoemulsions for targeting the neurodegenerative diseases: Alzheimer's, Parkinson's and Prion's. Life Sci. 2020;245:117394.

Correspondence to: Erwin Gelfand, Department of Pharmaceutics, University of Assiut, El Fateh, Assiut Governorate, Egypt, E-mail: Gelfand@imc.cas

Received: 01-Mar-2023, Manuscript No. JNBD-23-23299; **Editor assigned:** 03-Mar-2023, PreQC No. JNBD-23-23299 (PQ); **Reviewed:** 23-Mar-2023, QC No. JNBD-23-23299; **Revised:** 03-Apr-2023, Manuscript No. JNBD-23-23299 (R); **Published:** 12-Apr-2023, DOI: 10.4172/2155-983X.23.13.188

Citation: Gelfand E (2023) Nanoemulsion Formulation for Improved Drug Delivery. J Nanomedicine Biotherapeutic Discov. 13:188.

5. Franklyne JS, Gopinath PM, Mukherjee A, Chandrasekaran N. Nanoemulsions: The rising star of antiviral therapeutics and nanodelivery system–Current status and prospects. Curr Opin Colloid Interface Sci. 2021;54:101458.