UNIVERSIDADE DE SÃO PAULO

FACULDADE DE CIÊNCIAS FARMACÊUTICAS DE RIBEIRÃO PRETO

Formação, caracterização e atividade biológica de sistemas lipídicos contendo óleo essencial

Iara Baldim

Ribeirão Preto
2022

IARA BALDIM

Formação, caracterização e atividade biológica de sistemas lipídicos contendo óleo essencial

Tese de Doutorado apresentada ao Programa de Pós-Graduação em Ciências Farmacêuticas da Faculdade de Ciências Farmacêuticas de Ribeirão Preto/USP para obtenção do Título de Doutor em Ciências

Área de Concentração: Medicamentos e Cosméticos.

Orientador: Prof. Dr. Wanderley Pereira Oliveira

Coorientadora: Profa. Dra. Eliana B. Souto

Versão corrigida da Tese de Doutorado apresentada ao Programa de Pós-Graduação em Ciências Farmacêuticas em 01/04/2022. A versão original encontra-se disponível na Faculdade de Ciências Farmacêuticas de Ribeirão Preto/USP.

Ribeirão Preto
2022

BALDIM, I.	**Formação, caracterização e atividade biológica de sistemas lipídicos contendo óleo essencial**	Espaço de **2,5 cm** reservado para etiqueta de localização da biblioteca	DOUTORADO FCFRPUSP 2022

Baldim, Iara

Formação, caracterização e atividade biológica de sistemas lipídicos contendo óleo essencial. Ribeirão Preto, 2022.

261 p. : il. ; 30 cm

Tese de Doutorado, apresentada à Faculdade de Ciências Farmacêuticas de Ribeirão Preto/USP. Área de concentração: Medicamentos e Cosméticos.

Orientador: Oliveira, Wanderley Pereira.

Coorientadora: Souto, Eliana

11. Encapsulation 2. Essential oil 3. Liposome 4. NLC 5. *Lippia sidoides* 6. Antifungal activity 7. Multidrug resistant pathogen

FOLHA DE APROVAÇÃO

Iara Baldim
Formação, caracterização e atividade biológica de sistemas lipídicos contendo óleo essencial

Tese de Doutorado apresentada ao Programa de Pós-Graduação em Ciências Farmacêuticas da Faculdade de Ciências Farmacêuticas de Ribeirão Preto/USP para obtenção do Título de Doutor em Ciências

Área de Concentração: Medicamentos e Cosméticos.

Aprovado em:

Banca Examinadora

Prof. Dr. _____
Instituição: _____ Assinatura:_____

Prof. Dr. _____

Instituição: _____ Assinatura:_____

Prof. Dr. _____

Instituição: _____ Assinatura:_____

Prof. Dr. _____

Instituição: _____ Assinatura:_____

Dedico esse trabalho aos meus pais Ana e Robertinho
que desde cedo me ensinaram a sonhar
e me mostraram com maestria como lutar
para que cada sonho se realize.
Obrigada por lutarem comigo ontem, hoje e sempre.

Agradecimentos

Assim como as nanopartículas formam as formulações, somos todos feitos por pequenos fragmentos de matéria, que se unem para formar o todo. Essa tese, carrega inúmeros experimentos, modelos matemáticos, teorias, discussões e dias a fio de dedicação. Mas também carrega cada centímetro de doação de pessoas que me apoiaram, me inspiraram e puderam me ajudar a crescer, e ainda assim ver que não perderam a importância. Vocês são partes do que eu sou hoje.

Agradeço primeiramente aos meus pais por todo amor, apoio e carinho. À minha mãe Ana Lucia, por ser meu maior exemplo de força e me ensinar a ter coragem e perseverança para enfrentar cada desafio que a vida nos traz. Ao meu pai Robertinho, por ser meu maior exemplo de disciplina, e por me ensinar tanto com sua bondade e companheirismo. Vocês são minha base e meu porto seguro.

Ao meu companheiro e grande amor da minha, Tomaz. Seu apoio e companhia me fortalecem a cada dia. Obrigada por encarar tantos desafios e viver comigo meus maiores sonhos.

Aos meus queridos irmãos e companheiros Iuri e Isabela, que tanto me ensinam e apoiam. À minha amada avó Verinha, que nos auge de seus quase 92 anos é um exemplo de força, coragem e uma inspiração para mim. Você é minha fortaleza.

À minha querida pequena Wendy, por seu amor incondicional e por tornar leve e especial cada momento ao seu lado.

À minha bibliotecária preferida e querida prima Cintia pela valiosa ajuda valiosa com as formatações da tese.

Aos meus amigos queridos que a linda e doce Ribeirão Preto me deu e que me acompanharam, me inspiraram e me motivaram durante toda a minha jornada. Especialmente à Flavia, Marília, Camila e Lívia, mulheres inspiradoras que eu tenho a sorte e a honra de ter como amigas há muitos anos.

À minha terapeuta Iana, por me apoiar e me mostrar novos horizonte a cada dia.

À toda equipe do LAPROFAR, que foram grandes companheiros nessa aventura. Em especial ao Marcelo, por iluminar meus dias com sua companhia no laboratório e por me ajudar tantas vezes, até mesmo quando eu nem sabia que precisaria de ajuda. Obrigada pela companhia dentro e fora do laboratório.

A todos os coautores pela parceria maravilhosa nos experimentos e publicações. Em especial à professora Márcia Kress pela valiosa colaboração e parceria nos experimentos e ao meu querido amigo Mario, pelos valiosos momentos de discussão e descontração, parcerias de trabalho, ajuda e amizade.

A todos os funcionários da pós-graduação, em especial à Eleni e ao Henrique por todo apoio, doçura e prontidão. A todos os professores da FCFRP que fizeram parte dessa trajetória desde 2008, com quem tive o privilégio de aprender tanto.

À Faculdade de Ciências Farmacêuticas de Ribeirão Preto junto à Universidade de São Paulo pela preciosa formação e por ter sido esse lugar que eu orgulhosamente chamo de casa, desde 2008.

Aos meus queridos amigos Patrícia e Fernando, por me acolherem com tanto carinho e amor em Portugal, e à minha "família" de Portugal, Fábio, Ana, Clarinha e Thalita: obrigada por tornarem meus dias em Braga ainda mais especiais.

Aos queridos amigos do LTEB por me acolherem tão bem no laboratório, desde os momentos de descontração nos cafés até as valiosas trocas de experiências. Ao professor Miguel Gama, por toda ajuda e por me receber em seu laboratório de braços abertos. À Universidade do Minho e INL por poder contar com toda a estrutura, e à Biblioteca Lúcio Craveiro da Silva, por me abrigar com minhas incontáveis horas de estudo.

À professora Eliana Souto pela grande oportunidade de me receber para desenvolver parte desse projeto e por me coorientar. Muito obrigada pelo carinho desde sempre e pelas valiosas orientações, colaborações e oportunidades.

Ao professor Wanderley Pereira Oliveira, por tornar possível toda minha formação durante a pós-graduação. Obrigada pela valiosa orientação e supervisão nesses anos todos e por confiar no meu trabalho.

O presente trabalho foi realizado com apoio da Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – Brasil (CAPES) – Código de Financiamento 001. E com apoio financeiro contínuo da FAPESP pelo (Bolsas 2011/10333-1, 2012/03427-2, 2014/25934-9; 2014/15905-1 e 2018/26069-0 e 2019/25981-0).

Os meus mais sinceros agradecimentos!

“tudo é ousado para quem a nada se atreve”

Fernando Pessoa

RESUMO

BALDIM, I. **Formação, caracterização e atividade biológica de sistemas lipídicos contendo óleo essencial**. 2022. 260f. Tese (Doutorado). Faculdade de Ciências Farmacêuticas de Ribeirão Preto – Universidade de São Paulo, Ribeirão Preto, 2022.

Óleos essenciais (OEs) têm despertado grande interesse nos últimos anos, principalmente devido a sua ampla gama de atividades biológicas, como antifúngicos, antibacterianos, inseticidas, antivirais, antioxidantes, entre outras. Seu uso como ingrediente ativo traz uma série de benefícios, e talvez a principal vantagem esteja relacionada à sua capacidade de combater a resistência muitas vezes apresentada pelos microrganismos contra os antibióticos e antifúngicos disponíveis no mercado. Contudo, sua alta volatilidade e sensibilidade restringem seu uso e limitam sua incorporação a produtos mais elaborados. A microencapsulação e nanoencapsulação dos OEs surgem como estratégias viáveis e eficientes à proteção e modulação da liberação de seus compostos bioativos, promovendo o aumento da estabilidade físico-química, proteção contra fatores ambientais, redução da volatilidade, aumento da solubilidade, biodisponibilidade e atividade biológica, redução da toxicidade, entre outros benefícios. Os sistemas lipídicos são uma estratégia especialmente promissora para incorporação de OEs, pois são biocompatíveis, apresentam alta capacidade de carga, baixo custo, baixa toxicidade e são capazes de encapsular tanto substâncias lipofílicas quanto hidrofílicas. Dentre esses sistemas, temos os lipossomas, que são vesículas biocompatíveis, biodegradáveis e com potencial aplicação farmacêutica, e os carreadores lipídicos nanoestruturados (NLC), nanopartículas capazes de carregar moléculas quimicamente diferentes e fornecer um perfil de liberação ajustável, podendo ser produzidas em larga escala e sem a necessidade de solventes orgânicos. A influência do sistema de encapsulação, componentes lipídicos, tipo de emulsificante e outros excipientes deve ser avaliada para otimizar a estabilidade do sistema, a retenção de compostos bioativos e melhorar sua atividade biológica. Nesta tese se investigou várias rotas tecnológicas envolvidas na obtenção de sistemas lipídicos micro ou nanoestruturados para estabilizar e modular a liberação dos óleos essenciais alecrim-pimenta (*Lippia sidoides*) e cravo (*Syzygium aromaticum*), enfatizando-se processos de preparação, propriedades físico-químicas, estabilidade e atividade biológica frente a microrganismos multirresistentes de importância clínica. As principais variáveis de formulação e de processo foram analisadas, sendo definidas condições ótimas de processamento para sistemas a base de lipossomas encapsulando óleo essencial complexado em β-ciclodextrina e para os NLCs. Ensaios de atividade antifúngica frente a diferentes microrganismos foram realizados para os NLCs, que se mostraram eficientes no combate do fungo multirresistente *Candida auris*, que tem se disseminado globalmente principalmente em ambientes hospitalares, para o qual as opções de tratamento são muito reduzidas ou inexistentes.

Palavras-chave: óleos essenciais, encapsulação, carreadores lipídicos nanoestruturados, lipossomas, *Lippia sidoides*, microrganismos multirresistentes

ABSTRACT

BALDIM, I. **Formation, characterization, and biological activity of lipid systems loaded by essential oil**. 2022. 260f. Thesis (Doctoral). Faculdade de Ciências Farmacêuticas de Ribeirão Preto – Universidade de São Paulo, Ribeirão Preto, 2022.

Essential oils (EOs) have aroused great interest in recent years, mainly due to their wide range of biological activities, such as antifungal, antibacterial, insecticide, antiviral, antioxidant, among others. Its use as an active ingredient brings countless benefits, and maybe the main advantage is related to its ability to fight the resistance often presented by microorganisms against antibiotics and antifungals available on the market. However, the high volatility and sensitivity of these compounds restrict their use, limiting the incorporation into more elaborate products. Microencapsulation and nanoencapsulation of EOs emerge as viable and efficient strategies to protect and modulate the release of their bioactive compounds, promoting increased physical-chemical stability, protection against environmental factors, reduced volatility, increased solubility, bioavailability and biological activity, reduction of toxicity, among other benefits. Lipid systems are an especially promising strategy for EO incorporation, as they are biocompatible, present high loading capacity, low cost, low toxicity, and can encapsulate both lipophilic and hydrophilic substances. Among these systems, the liposomes are biocompatible, biodegradable vesicles with a potential pharmaceutical application; and nanostructured lipid carriers (NLC) are nanoparticles able to carry chemically different molecules, providing an adjustable release profile, which can be produced on a large scale, without the need for organic solvents. The influence of the encapsulation system, lipid components, type of emulsifier, and other excipients must be evaluated to optimize system stability, retention of bioactive compounds, and improve their biological activity. This thesis aimed to investigate the technological routes involved in obtaining micro or nanostructured lipid systems to stabilize and modulate the release of rosemary-pepper (*Lippia sidoides*) and clove (*Syzygium aromaticum*) essential oils were investigated, emphasizing the preparation processes, physicochemical properties, stability, and biological activity against multidrug-resistant microorganisms of clinical importance. The main formulation and process variables were analyzed, defining optimal processing conditions for liposome-based systems encapsulating essential oil complexed in β-cyclodextrin and for NLCs. Assays of antifungal activity against different microorganisms were performed for NLCs, which proved to be efficient in combating the multidrug-resistant fungus Candida auris, which has spread globally, mainly in hospital environments, with very limited or non-existent treatment options.

Keywords: essential oils, encapsulation, NLC, liposomes, *Lippia sidoides*, multidrug-resistant microorganisms

CHAPTER 1. INTRODUCTION

The growing consumer demand for more natural, sustainable, and environmentally friendly products has changed the way of consuming in the world. The industry has responded to this demand by trying to identify natural alternatives to functional synthetic ingredients in products from the most varied fields, including pharmaceuticals, food, cosmetics, and personal care products (CARVALHO, ESTEVINHO e SANTOS, 2016; MCCLEMENTS e GUMUS, 2016; OZTURK e MCCLEMENTS, 2016).

In a prominent position in the list of natural functional actives are essential oils (EOs). These natural substances also have countless biological activities and an indisputable potential for applicability in products that support a more natural claim. Among the biological activities stands out the ability to combat microorganisms resistant to antibiotics present in the market (BALDIM *et al.*, 2022; FEYAERTS *et al.*, 2018; RAI *et al.*, 2017). Nevertheless, it can be taken in account that these compounds have limitations, such as: chemical complexity, high volatility, susceptibility to degradation/oxidation, insolubility in aqueous systems, and low bioavailability, limiting their use in more elaborate products (BALDIM *et al.*, 2020).

The micro and nanoencapsulation of EOs have received significant attention in the pharmaceutical and food sectors, being a promising strategy to overcome the limitations of using these substances *in natura* form. This approach allows for example to modify physicochemical properties, promote reduced volatility, increased solubility, stability, protection against environmental factors, bioavailability, and biological activity. This technique consists of the inclusion of the active agent in carrier systems, which may consist of carbohydrates, gums, proteins, lipids or other natural or synthetic polymeric materials. These systems are able to release their content under specific conditions through a controlled release, which results in greater effectiveness of the actives, allowing the use of an optimal dosage, which improves the cost-efficiency of the product (BALDIM, SOUZA e OLIVEIRA, 2021).

In the last two decades, encapsulation in lipid systems has been highlighted, due to several advantages, such as low toxicity, ease of scalability, low production cost and the possibility of encapsulating hydrophilic and lipophilic compounds. The dehydration of these systems can generate dry dispersions with high encapsulation efficiency, solubility, and greater stability against liquid forms, which can be redispersed when necessary or used in the development of topical and/or oral products (BOUREZG *et al.*, 2012; VARSHOSAZ, ESKANDARI e TABBAKHIAN, 2012).

Recent publications show the use of micro and nanoencapsulation for protection and release of various compounds of plant origin such as quercetin (VIJAYAKUMAR *et al.*, 2017), lutein (LIU *et al.*, 2014), β-carotene (SALMINEN *et al.*, 2016), essential oils (BALDIM *et al.*, 2019), among others. Factors such as composition of the EO used, type of lipid, type and concentration of surfactants, emulsification process (high or low energy), and dehydration/cooling conditions influence the characteristics of the particles obtained, however this information are scarce in the literature. Therefore, conducting systematic studies to determine the mechanisms involved on particle formation that influence the achievement of a product with desired properties (stability, high encapsulation efficiency, solubility, and biological activity) is essential for the development of new strategies to encapsulate these bioactives.

Lippia sidoides, popularly known as pepper rosemary, is a small tree native to northeastern Brazil. It is an important medicinal plant due to its wide range of biological applications described over time not only in folk medicine, but also in several scientific works published in the literature. Its main biological activities include insecticidal, fungicidal, bactericidal, antileishmanial, larvicidal, acaricidal and anti-inflammatory activities (BALDIM *et al.*, 2019). Its EO is extracted from the leaves and is rich in thymol, the compound usually related to its biological activity. This species is also listed in the list of medicinal plants with the potential to generate products of interest to the Brazilian Public Health System – RENISUS (BRASIL, 2009).

Given the above, the present study presents as a contribution the development of nanostructured lipid systems loaded with essential oil as an innovative strategy to protect and modulate their release profile, aiming to improve their antimicrobial potential against multidrug-resistant microorganisms.

I adopted a structure based on the journal papers written for this thesis, to provide a clear understanding of all stages of this work. Consequently, chapters can be read independently, and some overlap may be found between them. Thus, in addition to the Introduction Chapter (Chapter 1) described here, this thesis is structured in 11 chapters. Chapter 2 presents a summary of the main objectives of this thesis. Chapter 3 presents a comprehensive review on encapsulation of essential oils in lipid nanosystems. Chapter 4 provides an overview of preformulation studies to obtain proliposomes loaded by essential oil. Chapter 5 describes an innovative system to encapsulate essential oils, making it possible to encapsulate them both in the hydrophilic and lipophilic portions: the drug-in-cyclodextrin-in-liposomes system. Chapter 6 provide a comprehensive review on lipid nanoparticles (SLN and NLC) for skin

administration. Chapter 7 provide an experimental design for the development of NLC loaded by *L. sidoides* EO, ranging from pre-formulation studies, through characterization and antimicrobial activity. Chapter 8 evaluates the toxicity and antifungal potential of NLC containing *L. sidoides* EO against a multidrug-resistant fungus of clinical interest: *Candida auris*. Chapter 9 brings an experimental design to describe the parameters involved in the drying of NLC loaded by *L. sidoides* EO, and how they influence the characteristics of the final product. Finally, Chapter 10 describes the final considerations of this thesis and Chapter 11 the conclusions.

CHAPTER 11. CONCLUSION

This thesis covered the entire process involved in developing novel lipid-based release systems loaded with essential oils, aiming to be used as a microbial agent effective against resistant microorganisms. We brought the combination between the formulation studies with the technologies and processes involved in producing these nanosystems.

EOs, especially *Lippia sidoides* EO, were successfully encapsulated in both types of nanoparticles studied: EO-in-cyclodextrins-in-liposomes and NLC. Stable systems with good retention of actives were developed, demonstrating good systems to encapsulate essential oils. In particular, NLC has proven to be a simpler technique to encapsulate essential oil.

Data confirm that NLC presents various beneficial properties in a relatively simple formulation. The inherent advantages of NLC, i.e., increased stability for labile compounds, as EOs, ease of manufacture, low toxicity, and high loading capacity, when compared to liposomes, were confirmed in this study. Furthermore, the results demonstrate that the developed systems can maintain the antimicrobial activity of the essential oil and, in some cases, even enhance it. This result is highly promising, especially for the combat of multidrug-resistant microorganisms. Relatively low doses of NLC were sufficient to show fungicidal activity against the emerging superbug multidrug-resistant Candida auris, with relatively low toxicity.

The lyophilization of the NLCs in the presence of cryoprotectants generate a powder with good retention of actives and good physicochemical properties, evidencing a product with high stability against biochemical/chemical degradation. The properties of the product obtained can be engineered through the correct selection of the formulation components.

Results obtained in this thesis provides strong evidence and a relevant scientific basis for using the innovative lipid nanoparticles loaded with essential oils as antimicrobial agents and a toll to combat multidrug-resistant pathogens, with high potential of application in pharmaceutical or personal care products, as well as in other sectors such as in food and agricultural.

BIBLIOGRAPHY

Abdel-Salam FS, Mahmoud AA, Ammar HO, et al. Nanostructured lipid carriers as semisolid topical delivery formulations for diflucortolone valerate. J Liposome Res. 2017 Mar;27(1):41-55.

Abdelwahed W, Degobert G, Stainmesse S, Fessi H. Freeze-drying of nanoparticles: Formulation, process and storage considerations. Adv Drug Deliv Rev. 2006;58(15):1688–713.

Aburahma MH, Badr-Eldin SM. Compritol 888 ATO: A multifunctional lipid excipient in drug delivery systems and nanopharmaceuticals. Expert Opin Drug Deliv. 2014 Dec;11(12):1865-83.

Acid, L. 3: Final Report on the Safety Assessment of Oleic Acid, Lauric Acid, Palmitic Acid, Myristic Acid, and Stearic Acid. *J. Am. Coll. Toxicol.* **1987**, *6*, 321–401, doi:10.3109/10915818709098563.

Adams RP. Identification of essential oil components by gas chromatography/mass spectroscopy. 4th ed. Allured Publishing Corporation. Carol Stream, Illinois; 2007.

Adelakun, O. E.; Oyelade, O. J.; Olanipekun, B. F. Use of Essential Oils in Food Preservation. In *Essential Oils in Food Preservation, Flavor and Safety*; Preedy, V. R., Ed.; Elsevier: London, 2016; pp 71–84. https://doi.org/10.1016/B978-0-12-416641-7.00007-9.

Aggarwal N, Goindi S. Preparation and in vivo evaluation of solid lipid nanoparticles of griseofulvin for dermal use. J Biomed Nanotechnol. 2013 Apr;9(4):564-76.

Agrawal Y, Petkar KC, Sawant KK. Development, evaluation and clinical studies of Acitretin loaded nanostructured lipid carriers for topical treatment of psoriasis. Int J Pharm. 2010 Nov 30;401(1-2):93-102.

Akbari J, Saeedi M, Morteza-Semnani K, et al. The design of naproxen solid lipid nanoparticles to target skin layers. Colloids and Surfaces B: Biointerfaces. 2016 2016/09/01/;145:626-633.

Alam S, Aslam M, Khan A, et al. Nanostructured lipid carriers of pioglitazone for transdermal application: from experimental design to bioactivity detail. Drug Deliv. 2016;23(2):601-9.

Alamgir, A. N. M. *Therapeutic Use of Medicinal Plants and Their Extracts*; 2017; Vol. 73.

Alipour, S.; Dehshahri, S.; Afsari, A. Preparation and Evaluation of a Herbal Mouthwash Containing Oak: Husk of Quercus Brantii and Zataria Multiflora. *Jundishapur J. Nat. Pharm. Prod.*, **2018**, *13* (3). https://doi.org/10.5812/jjnpp.13420.

Aljuffali IA, Sung CT, Shen FM, et al. Squarticles as a lipid nanocarrier for delivering diphencyprone and minoxidil to hair follicles and human dermal papilla cells. AAPS J. 2014 Jan;16(1):140-50.

Almeida AJ, Souto E. Solid lipid nanoparticles as a drug delivery system for peptides and proteins. Advanced drug delivery reviews. 2007 Jul 10;59(6):478-90.

Almeida, M.C.S.; Alves, L.A.; Souza, L.G.S.; Machado, L.L.; Matos, M.C.; Oliveira, M.C.F.; Lemos, T.L.G.; Braz-Filho, R. Flavonoides e outras substâncias de *Lippia sidoides* e suas atividades antioxidantes. *Quim. Nova* **2010**, *33*, 1877–1881, doi:10.1590/S0100-40422010000900011.

Andrade LM, de Fatima Reis C, Maione-Silva L, et al. Impact of lipid dynamic behavior on physical stability, in vitro release and skin permeation of genistein-loaded lipid nanoparticles. Eur J Pharm Biopharm. 2014 Sep;88(1):40-7.

Andrade LN, Oliveira DML, Chaud MV, et al. Praziquantel-Solid Lipid Nanoparticles Produced by Supercritical Carbon Dioxide Extraction: Physicochemical Characterization, Release Profile, and Cytotoxicity. Molecules. 2019 Oct 28;24(21).

Anton, N.; Gayet, P.; Benoit, J.P.; Saulnier, P. Nano-emulsions and nanocapsules by the PIT method: An investigation on the role of the temperature cycling on the emulsion phase inversion. *Int. J. Pharm.* **2007**, *344*, 44–52, doi:10.1016/j.ijpharm.2007.04.027.

Antonio Teixeira, J.; Pinheiro, A. C.; Acevedo-Fani, A.; Rai Vittal, R.; Bai Aswathanarayan, J. Nanoemulsions and Their Potential Applications in Food Industry. **2019**, *3*, 95. https://doi.org/10.3389/fsufs.2019.00095.

Araujo J, Garcia ML, Mallandrich M, et al. Release profile and transscleral permeation of triamcinolone acetonide loaded nanostructured lipid carriers (TA-NLC): in vitro and ex vivo studies. Nanomedicine. 2012 Aug;8(6):1034-41.

Araujo J, Nikolic S, Egea MA, et al. Nanostructured lipid carriers for triamcinolone acetonide delivery to the posterior segment of the eye. Colloids Surf B Biointerfaces. 2011 Nov 1;88(1):150-7.

Arruda, L. M.; Teixeira, M.; Ribeiro, A. I.; Souto, A. P.; Cionek, C. A. Copaíba Essential Oil Microencapsulation: Production and Evaluation. In *Textiles, Identity and Innovation: In Touch*; 2020. https://doi.org/10.1201/9780429286872-60.

Asbahani, A. El; Miladi, K.; Badri, W.; Sala, M.; Addi, E. H. A.; Casabianca, H.; Mousadik, A. El; Hartmann, D.; Jilale, A.; Renaud, F. N. R.; et al. Essential Oils: From Extraction to Encapsulation. *Int. J. Pharm.*, **2015**. https://doi.org/10.1016/j.ijpharm.2014.12.069.

Asif, M.; Saleem, M.; Saadullah, M.; Yaseen, H. S.; Al Zarzour, R. COVID-19 and Therapy with Essential Oils Having Antiviral, Anti-Inflammatory, and Immunomodulatory Properties. *Inflammopharmacology*, **2020**, *28* (5), 1153–1161. https://doi.org/10.1007/s10787-020-00744-0.

Attama, A. A.; Momoh, M. A.; Builders, P. F. Lipid Nanoparticulate Drug Delivery Systems: A Revolution in Dosage Form Design and Development. In *Recent Advances in Novel Drug Carrier Systems*; Sezer, A. D., Ed.; InTech, 2012; pp 107–140. https://doi.org/10.5772/50486.

Aulton ME, Staniforth J. Pharmaceutics: The science of dosage form design. by Aulton ME, Churchill Livingstone, Edinbrough. London: Churchill Livingstone; 2002. 197–210 p.

Averina ES, Seewald G, Muller RH, et al. Nanostructured lipid carriers (NLC) on the basis of Siberian pine (Pinus sibirica) seed oil. Pharmazie. 2010 Jan;65(1):25-31.

Bajpai, V. K.; Sharma, A.; Baek, K.-H. Antibacterial Mode of Action of Cudrania Tricuspidata Fruit Essential Oil, Affecting Membrane Permeability and Surface Characteristics of Food-Borne Pathogens. *Food Control*, **2013**, *32* (2), 582–590. https://doi.org/10.1016/j.foodcont.2013.01.032.

Baldim I, Tonani L, von Zeska Kress MR, Pereira Oliveira W. *Lippia sidoides* essential oil encapsulated in lipid nanosystem as an anti-Candida agent. Ind Crops Prod [Internet]. 2019 Jan;127(October 2018):73–81. Available from: https://doi.org/10.1016/j.indcrop.2018.10.064

Baldim I. Desenvolvimento tecnológico e secagem de sistemas lipídicos incorporando óleo essencial de *Lippia sidoides*. Universidade de São Paulo; 2017.

Baldim, I.; Rosa, D. M.; Souza, C. R. F.; Da Ana, R.; Durazzo, A.; Lucarini, M.; Santini, A.; Souto, E. B.; Oliveira, W. P. Factors Affecting the Retention Efficiency and Physicochemical Properties of Spray Dried Lipid Nanoparticles Loaded with *Lippia Sidoides* Essential Oil. *Biomolecules*, **2020**, *10* (5), 693. https://doi.org/10.3390/biom10050693.

Baldim, I.; Souza, C. R. F.; Durazzo, A.; Lucarini, M.; Santini, A.; Souto, E. B.; Oliveira, W. P. Spray-Dried Structured Lipid Carriers for the Loading of Rosmarinus Officinalis: New Nutraceutical and Food Preservative. *Foods*, **2020**, *9* (8), 1110. https://doi.org/10.3390/foods9081110.

Baldim, I.; Tonani, L.; von Zeska Kress, M. R.; Pereira Oliveira, W. *Lippia Sidoides* Essential Oil Encapsulated in Lipid Nanosystem as an Anti-Candida Agent. *Ind. Crops Prod.*, **2019**, *127*. https://doi.org/10.1016/j.indcrop.2018.10.064.

Ballabeni, V.; Tognolini, M.; Bertoni, S.; Bruni, R.; Guerrini, A.; Rueda, G. M.; Barocelli, E. Antiplatelet and Antithrombotic Activities of Essential Oil from Wild Ocotea Quixos (Lam.) Kosterm. (Lauraceae) Calices from Amazonian Ecuador. *Pharmacol. Res.*, **2007**, *55* (1), 23–30. https://doi.org/10.1016/j.phrs.2006.09.009.

Bankole, V. O.; Osungunna, M. O.; Souza, C. R. F.; Salvador, S. L.; Oliveira, W. P. Spray-Dried Proliposomes: An Innovative Method for Encapsulation of Rosmarinus Officinalis L. Polyphenols. *AAPS PharmSciTech*, **2020**, *21* (5), 143. https://doi.org/10.1208/s12249-020-01668-2.

Baranauskiene, R.; Venskutonis, P. R.; Dewettinck, K.; Verhé, R. Properties of Oregano (Origanum Vulgare L.), Citronella (Cymbopogon Nardus G.) and Marjoram (Majorana Hortensis L.) Flavors Encapsulated into Milk Protein-Based Matrices. *Food Res. Int.*, **2006**, *39* (4), 413–425. https://doi.org/10.1016/j.foodres.2005.09.005.

Barbosa TC, Nascimento LED, Bani C, et al. Development, Cytotoxicity and Eye Irritation Profile of a New Sunscreen Formulation Based on Benzophenone-3-poly(epsilon-caprolactone) Nanocapsules. Toxics. 2019 Sep 22;7(4).

Barreto, J.O.; do Nascimento, F.B.S.A.; Fonseca, S.G. da C.; Serpa Sampaio, L.; da Silva, C.R.; de Andrade Neto, J.B.; Júnior, H.V.N.; Regis, R.R. Microbiological evaluation of an experimental denture cleanser containing essential oil of *Lippia sidoides*. *Biofouling* **2021**, *37*, 117–130, doi:10.1080/08927014.2021.1885649.

Baser, K. H. C.; Buchbauer, G. *Handbook of Essential Oils: Science, Technology, and Applications*, 2nd ed.; Baser, K. H. C., Buchbauer, G., Eds.; CRC Press: Boca Raton, 2016.

Battaglia L, Gallarate M. Lipid nanoparticles: state of the art, new preparation methods and challenges in drug delivery. Expert opinion on drug delivery. 2012 May;9(5):497-508.

Beloqui A, Solinis MA, Rodriguez-Gascon A, et al. Nanostructured lipid carriers: Promising drug delivery systems for future clinics. Nanomedicine : nanotechnology, biology, and medicine. 2016 Jan;12(1):143-61.

Benelli L, Souza CRF, Oliveira WP. Quality changes during spouted bed drying of pepper-rosmarin extract. Can J Chem Eng [Internet]. 2013 Sep;91(11):1837–46. Available from: http://doi.wiley.com/10.1002/cjce.21907

Beristain, C. I.; García, H. S.; Vernon-Carter, E. J. Spray-Dried Encapsulation of Cardamom (Elettaria Cardamomum) Essential Oil with Mesquite (Prosopis Juliflora) Gum. *LWT - Food Sci. Technol.*, **2001**, *34* (6). https://doi.org/10.1006/fstl.2001.0779.

Bertoni, S.; Dolci, L. S.; Albertini, B.; Passerini, N. Spray Congealing: A Versatile Technology for Advanced Drug-Delivery Systems. *Ther. Deliv.*, **2018**, *9* (11), 833–845. https://doi.org/10.4155/tde-2018-0049.

Bhagurkar AM, Repka MA, Murthy SN. A Novel Approach for the Development of a Nanostructured Lipid Carrier Formulation by Hot-Melt Extrusion Technology. J Pharm Sci. 2017 Apr;106(4):1085-1091.

Bhalla, Y.; Gupta, V. K.; Jaitak, V. Anticancer Activity of Essential Oils: A Review. *J. Sci. Food Agric.*, **2013**, *93* (15), 3643–3653. https://doi.org/10.1002/jsfa.6267.

Bikkad ML, Nathani AH, Mandlik SK, et al. Halobetasol propionate-loaded solid lipid nanoparticles (SLN) for skin targeting by topical delivery. Journal of Liposome Research. 2014 2014/06/01;24(2):113-123.

Bilia, A. R.; Guccione, C.; Isacchi, B.; Righeschi, C.; Firenzuoli, F.; Bergonzi, M. C. Essential Oils Loaded in Nanosystems : A Developing Strategy for a Successful Therapeutic Approach. *Evid. Based. Complement. Alternat. Med.*, **2014**, *2014*, 1–14. https://doi.org/10.1155/2014/651593.

Billamboz, M.; Fatima, Z.; Hameed, S.; Jawhara, S. microorganisms Promising Drug Candidates and New Strategies for Fighting against the Emerging Superbug Candida auris. **2021**, doi:10.3390/microorganisms9030634.

Borges, R. S.; Ortiz, B. L. S.; Pereira, A. C. M.; Keita, H.; Carvalho, J. C. T. Rosmarinus Officinalis Essential Oil: A Review of Its Phytochemistry, Anti-Inflammatory Activity, and Mechanisms of Action Involved. *J. Ethnopharmacol.*, **2019**, *229*, 29–45. https://doi.org/10.1016/j.jep.2018.09.038.

Borman, A.M.; Szekely, A.; Johnson, E.M. Comparative pathogenicity of United Kingdom isolates of the emerging pathogen Candida auris and other key pathogenic Candida species. *mSphere* **2016**, *1*, doi:10.1128/mSphere.00189-16.

Botrel, D. A.; Fernandes, R. V. de B.; Borges, S. V. Microencapsulation of Essential Oils Using Spray Drying Technology. In *Microencapsulation and Microspheres for Food Applications*; Elsevier, 2015; pp 235–251. https://doi.org/10.1016/B978-0-12-800350-3.00013-3.

Buckle, J. Basic Plant Taxonomy, Basic Essential Oil Chemistry, Extraction, Biosynthesis, and Analysis. In *Clinical Aromatherapy*; Elsevier, 2015; pp 37–72. https://doi.org/10.1016/B978-0-7020-5440-2.00003-6.

Bunjes H, Steiniger F, Richter W. Visualizing the structure of triglyceride nanoparticles in different crystal modifications. Langmuir. 2007 Mar 27;23(7):4005-11.

Bunjes H, Unruh T. Characterization of lipid nanoparticles by differential scanning calorimetry, X-ray and neutron scattering. Adv Drug Deliv Rev. 2007 Jul 10;59(6):379-402.

Butani D, Yewale C, Misra A. Topical Amphotericin B solid lipid nanoparticles: Design and development. Colloids Surf B Biointerfaces. 2016 Mar 1;139:17-24.

Calcabrini, A.; Stringaro, A.; Toccacieli, L.; Meschini, S.; Marra, M.; Colone, M.; Arancia, G.; Molinari, A.; Salvatore, G.; Mondello, F. Terpinen-4-Ol, the Main Component of Melaleuca Alternifolia (Tea Tree) Oil Inhibits the in Vitro Growth of Human Melanoma Cells. *J. Invest. Dermatol.*, **2004**, *122* (2), 349–360. https://doi.org/10.1046/j.0022-202X.2004.22236.x.

Campos JR, Fernandes AR, Sousa R, et al. Optimization of nimesulide-loaded solid lipid nanoparticles (SLN) by factorial design, release profile and cytotoxicity in human Colon adenocarcinoma cell line. Pharm Dev Technol. 2019 Jun;24(5):616-622.

Campos, D. A.; Madureira, A. R.; Sarmento, B.; Pintado, M. M.; Gomes, A. M. Technological Stability of Solid Lipid Nanoparticles Loaded with Phenolic Compounds: Drying Process and Stability along Storage. *J. Food Eng.*, **2017**, *196*, 1–10. https://doi.org/10.1016/j.jfoodeng.2016.10.009.

Carbone C, Martins-Gomes C, Caddeo C, et al. Mediterranean essential oils as precious matrix components and active ingredients of lipid nanoparticles. International journal of pharmaceutics. 2018 Sep 5;548(1):217-226.

Carbone C, Teixeira MDC, Sousa MDC, et al. Clotrimazole-Loaded Mediterranean Essential Oils NLC: A Synergic Treatment of Candida Skin Infections. Pharmaceutics. 2019 May 13;11(5).

Carbone, C.; Martins-Gomes, C.; Caddeo, C.; Silva, A. M.; Musumeci, T.; Pignatello, R.; Puglisi, G.; Souto, E. B. Mediterranean Essential Oils as Precious Matrix Components and Active Ingredients of Lipid Nanoparticles. *Int. J. Pharm.*, **2018**, *548* (1), 217–226. https://doi.org/10.1016/j.ijpharm.2018.06.064.

Carson, C. F.; Hammer, K. A.; Thormar, H. *Lipids and Essential Oils as Antimicrobial Agents*; 2011. https://doi.org/10.1002/9780470976623.

Carvalho, I. T.; Estevinho, B. N.; Santos, L. Application of Microencapsulated Essential Oils in Cosmetic and Personal Healthcare Products - a Review. *Int. J. Cosmet. Sci.*, **2016**, *38* (2), 109–119. https://doi.org/10.1111/ics.12232.

Castro GA, Oliveira CA, Mahecha GA, et al. Comedolytic effect and reduced skin irritation of a new formulation of all-trans retinoic acid-loaded solid lipid nanoparticles for topical treatment of acne. Arch Dermatol Res. 2011 Sep;303(7):513-20.

Chaabane, F.; Graf, A.; Jequier, L.; Coste, A.T. Review on Antifungal Resistance Mechanisms in the Emerging Pathogen Candida auris. *Front. Microbiol.* **2019**, *10*, 2788, doi:10.3389/fmicb.2019.02788.

Challa R, Ahuja A, Ali J, Khar RK. Cyclodextrins in drug delivery: An updated review. AAPS PharmSciTech [Internet]. 2005 Jun;6(2):E329–57. Available from: http://www.springerlink.com/index/10.1208/pt060243

Chandrasekhar S. Stochastic problems in physics and astronomy. Rev Mod Phys [Internet]. 1943 Jan 1;15(1):1–89. Available from: http://link.aps.org/doi/10.1103/RevModPhys.15.1

Chantaburanan T, Teeranachaideekul V, Chantasart D, et al. Effect of binary solid lipid matrix of wax and triglyceride on lipid crystallinity, drug-lipid interaction and drug release of ibuprofen-loaded solid lipid nanoparticles (SLN) for dermal delivery. Journal of Colloid and Interface Science. 2017 Oct 15;504:247-256.

Chauhan MK, Sharma PK. Optimization and characterization of rivastigmine nanolipid carrier loaded transdermal patches for the treatment of dementia. Chemistry and Physics of Lipids. 2019 2019/11/01/;224:104794.

Chen H, Chang X, Du D, et al. Podophyllotoxin-loaded solid lipid nanoparticles for epidermal targeting. J Control Release. 2006 Jan 10;110(2):296-306.

Chen H, Wang Y, Zhai Y, et al. Development of a ropivacaine-loaded nanostructured lipid carrier formulation for transdermal delivery. Colloids and Surfaces A: Physicochemical and Engineering Aspects. 2015;465:130-136.

Chen J, Lu W-LL, Gu W, Lu S-SS, Chen Z-PP, Cai B-CC, et al. Drug-in-cyclodextrin-in-liposomes: a promising delivery system for hydrophobic drugs. Intergovernmental Panel on Climate Change, editor. Expert Opin Drug Deliv [Internet]. 2014 Apr 4;11(4):565–77. Available from: https://www.cambridge.org/core/product/identifier/CBO9781107415324A009/type/book_part

Chen L, Okuda T, Lu X-Y, Chan H-K. Amorphous powders for inhalation drug delivery. Adv Drug Deliv Rev [Internet]. 2016 May;100:102–15. Available from: http://dx.doi.org/10.1016/j.addr.2016.01.002

Chen S, Liu W, Wan J, et al. Preparation of Coenzyme Q10 nanostructured lipid carriers for epidermal targeting with high-pressure microfluidics technique. Drug Development and Industrial Pharmacy. 2013 2013/01/01;39(1):20-28.

Chen Y, Zhou L, Yuan L, et al. Formulation, characterization, and evaluation of in vitro skin permeation and in vivo pharmacodynamics of surface-charged tripterine-loaded nanostructured lipid carriers. Int J Nanomedicine. 2012;7:3023-32.

Chen YC, Liu DZ, Liu JJ, et al. Development of terbinafine solid lipid nanoparticles as a topical delivery system. Int J Nanomedicine. 2012;7:4409-18.

Chen-yu G, Chun-fen Y, Qi-lu L, et al. Development of a quercetin-loaded nanostructured lipid carrier formulation for topical delivery. International journal of pharmaceutics. 2012 Jul 1;430(1-2):292-8.

Chowdhary, A.; Sharma, A. The lurking scourge of multidrug resistant Candida auris in times of COVID-19 pandemic. *J. Glob. Antimicrob. Resist.* **2020**, *22*, 175–176, doi:10.1016/j.jgar.2020.06.003.

Cirri M, Bragagni M, Mennini N, et al. Development of a new delivery system consisting in "drug--in cyclodextrin--in nanostructured lipid carriers" for ketoprofen topical delivery. Eur J Pharm Biopharm. 2012 Jan;80(1):46-53.

Claffey, N. Essential Oil Mouthwashes: A Key Component in Oral Health Management. *J. Clin. Periodontol.*, **2003**, *30* (SUPPL. 5), 22–24. https://doi.org/10.1034/j.1600-051X.30.s5.8.x.

CLSI. Clinical and Laboratory Standards Institute, Reference Method for Broth Dilution Antifungal Susceptibility Testing of Filamentous Fungi. Second. Vol. 28, Clinical and Laboratory Standards Institute. Wayne, Pa: Clinical and Laboratory Standards Institute; 2008.

CLSI. Reference Method for Broth Dilution Antifungal Susceptibility Testing of Yeasts [Internet]. 4th ed. Clinical and Laboratory Standards Institute, editor. Wayne: CLSI; 2017. Available from: http://shop.clsi.org/site/Sample_pdf/M27A3_sample.pdf

Collins, A. R. Antioxidant Intervention as a Route to Cancer Prevention. *Eur. J. Cancer*, **2005**, *41* (13), 1923–1930. https://doi.org/10.1016/j.ejca.2005.06.004.

Conegundes, J. L. M.; Silva, J. M. da; Mendes, R. de F.; Fernandes, M. F.; Pinto, N. de C. C.; Almeida, M. A. de; Dib, P. R. B.; Andrade, R. de O.; Rodrigues, M. N.; Castañon, M. C. M. N.; et al. Anti-Inflammatory and Antinociceptive Activity of Siparuna Guianensis Aublet, an Amazonian Plant Traditionally Used by Indigenous Communities. *J. Ethnopharmacol.*, **2021**, *265*, 113344. https://doi.org/10.1016/j.jep.2020.113344.

Cook, S.M.; McArthur, J.D. Developing Galleria mellonella as a model host for human pathogens. *Virulence* **2013**, *4*, 350–353, doi:10.4161/viru.25240.

Copsey, A.C.; Barsottini, M.R.O.; May, B.; Xu, F.; Albury, M.S.; Young, L.; Moore, A.L. Kinetic characterisation and inhibitor sensitivity of Candida albicans and Candida auris recombinant AOX expressed in a self-assembled proteoliposome system. *Sci. Rep.* **2021**, *11*, 14748, doi:10.1038/s41598-021-94320-3.

Cordeiro, P.; Temtem, M.; Winters, C. Spray Congealing: Applications in the Pharmaceutical Industry. *Chim. Oggi/Chemistry Today*, **2013**, *31* (5).

Cortés-Rojas, D. F.; Souza, C. R. F.; Oliveira, W. P. Encapsulation of Eugenol Rich Clove Extract in Solid Lipid Carriers. *J. Food Eng.*, **2014**, *127*, 34–42. https://doi.org/10.1016/j.jfoodeng.2013.11.027.

Cserhati, T.; Forgacs, E.; Oros, G.; Cserháti, T.; Forgács, E.; Oros, G. Biological activity and environmental impact of anionic surfactants. *Environ. Int.* **2002**, *28*, 337–348, doi:10.1016/S0160-4120(02)00032-6.

Das S, Ng WK, Tan RB. Are nanostructured lipid carriers (NLCs) better than solid lipid nanoparticles (SLNs): development, characterizations and comparative evaluations of clotrimazole-loaded SLNs and NLCs? European journal of pharmaceutical sciences : official journal of the European Federation for Pharmaceutical Sciences. 2012 Aug 30;47(1):139-51.

Day, A.M.; McNiff, M.M.; da Silva Dantas, A.; Gow, N.A.R.; Quinn, J. Hog1 Regulates stress tolerance and virulence in the emerging fungal pathogen Candida auris. *mSphere* **2018**, *3*, doi:10.1128/mSphere.00506-18.

de Matos, S. P.; Lucca, L. G.; Koester, L. S. Essential Oils in Nanostructured Systems: Challenges in Preparation and Analytical Methods. *Talanta*. Elsevier B.V. April 1, 2019, pp 204–214. https://doi.org/10.1016/j.talanta.2018.11.029.

de Oliveira, J. L.; Campos, E. V. R.; Bakshi, M.; Abhilash, P. C.; Fraceto, L. F. Application of Nanotechnology for the Encapsulation of Botanical Insecticides for Sustainable Agriculture: Prospects and Promises. *Biotechnol. Adv.*, **2014**, *32* (8), 1550–1561. https://doi.org/10.1016/j.biotechadv.2014.10.010.

del Pozo-Rodriguez A, Delgado D, Gascon AR, et al. Lipid nanoparticles as drug/gene delivery systems to the retina. Journal of Ocular Pharmacology and Therapeutics. 2013 Mar;29(2):173-88.

Detoni, C. B.; De Oliveira, D. M.; Santo, I. E.; Pedro, A. S.; El-Bacha, R.; Da Silva Velozo, E.; Ferreira, D.; Sarmento, B.; De Magalhães Cabral-Albuquerque, E. C. Evaluation of Thermal-Oxidative Stability and Antiglioma Activity of Zanthoxylum Tingoassuiba Essential Oil Entrapped into Multi- and Unilamellar Liposomes. *J. Liposome Res.*, **2012**, *22* (1), 1–7. https://doi.org/10.3109/08982104.2011.573793.

Doktorovova S, Kovacevic AB, Garcia ML, et al. Preclinical safety of solid lipid nanoparticles and nanostructured lipid carriers: Current evidence from in vitro and in vivo evaluation. Eur J Pharm Biopharm. 2016 Nov;108:235-252.

Doktorovova S, Santos DL, Costa I, et al. Cationic solid lipid nanoparticles interfere with the activity of antioxidant enzymes in hepatocellular carcinoma cells. Int J Pharm. 2014 Aug 25;471(1-2):18-27.

Doktorovova S, Shegokar R, Martins-Lopes P, et al. Modified Rose Bengal assay for surface hydrophobicity evaluation of cationic solid lipid nanoparticles (cSLN). Eur J Pharm Sci. 2012 Apr 11;45(5):606-12.

Doktorovova S, Shegokar R, Rakovsky E, et al. Cationic solid lipid nanoparticles (cSLN): structure, stability and DNA binding capacity correlation studies. Int J Pharm. 2011 Nov 28;420(2):341-9.

Doktorovova S, Shegokar R, Souto EB. Role of Excipients in formulation development and biocompatibility of lipid nanoparticles (SLNs/NLCs). Nanostructures for Novel Therapy: Elsevier; 2017. p. 811-843.

Doktorovova S, Shegokar R, Souto EB. Role of Excipients in formulation development and biocompatibility of lipid nanoparticles (SLNs/NLCs). In: Nanostructures for Novel Therapy [Internet]. Elsevier; 2017. p. 811–43. Available from: http://dx.doi.org/10.1016/B978-0-323-46142-9/00030-X

Doktorovova S, Silva AM, Gaivao I, et al. Comet assay reveals no genotoxicity risk of cationic solid lipid nanoparticles. J Appl Toxicol. 2014 Apr;34(4):395-403.

Doktorovova S, Souto EB, Silva AM. Nanotoxicology applied to solid lipid nanoparticles and nanostructured lipid carriers - a systematic review of in vitro data. Eur J Pharm Biopharm. 2014 May;87(1):1-18.

Donsì, F.; Ferrari, G. Essential Oil Nanoemulsions as Antimicrobial Agents in Food. *J. Biotechnol.*, **2016**, *233*, 106–120. https://doi.org/10.1016/j.jbiotec.2016.07.005.

Drying, I.; Val, S.; Sciences, P. Spray Drying of Lipid Nanosystems (SLN and NLC) Loaded with Syzygium Aromaticum Essential Oil. **2018**, No. September, 11–14.

Ebani, V.; Nardoni, S.; Bertelloni, F.; Najar, B.; Pistelli, L.; Mancianti, F. Antibacterial and Antifungal Activity of Essential Oils against Pathogens Responsible for Otitis Externa in Dogs and Cats. *Medicines*, **2017**, *4* (2), 21. https://doi.org/10.3390/medicines4020021.

Efferth, T.; Li, P. C. H.; Konkimalla, V. S. B.; Kaina, B. From Traditional Chinese Medicine to Rational Cancer Therapy. *Trends Mol. Med.*, **2007**, *13* (8), 353–361. https://doi.org/10.1016/j.molmed.2007.07.001.

El-Housiny S, Shams Eldeen MA, El-Attar YA, et al. Fluconazole-loaded solid lipid nanoparticles topical gel for treatment of pityriasis versicolor: formulation and clinical study. Drug Deliv. 2018 Nov;25(1):78-90.

Elnaggar YS, El-Massik MA, Abdallah OY. Fabrication, appraisal, and transdermal permeation of sildenafil citrate-loaded nanostructured lipid carriers versus solid lipid nanoparticles. Int J Nanomedicine. 2011;6:3195-205.

Elshafie, H. S.; Camele, I. An Overview of the Biological Effects of Some Mediterranean Essential Oils on Human Health. *Biomed Res. Int.*, **2017**, *2017*, 1–14. https://doi.org/10.1155/2017/9268468.

Essaghraoui A, Belfkira A, Hamdaoui B, et al. Improved Dermal Delivery of Cyclosporine A Loaded in Solid Lipid Nanoparticles. Nanomaterials (Basel, Switzerland). 2019;9(9):1204.

Fan X, Chen J, Shen Q. Docetaxel-nicotinamide complex-loaded nanostructured lipid carriers for transdermal delivery. Int J Pharm. 2013 Dec 31;458(2):296-304.

Fang JY, Fang CL, Liu CH, et al. Lipid nanoparticles as vehicles for topical psoralen delivery: solid lipid nanoparticles (SLN) versus nanostructured lipid carriers (NLC). European journal of pharmaceutics and biopharmaceutics : official journal of Arbeitsgemeinschaft fur Pharmazeutische Verfahrenstechnik eV. 2008 Oct;70(2):633-40.

Fang Z, Bhandari B. Encapsulation Techniques for Food Ingredient Systems. In: Food Materials Science and Engineering [Internet]. Oxford, UK: Wiley-Blackwell; 2012. p. 320–48. Available from: http://doi.wiley.com/10.1002/9781118373903.ch12

Fangueiro JF, Gonzalez-Mira E, Martins-Lopes P, et al. A novel lipid nanocarrier for insulin delivery: production, characterization and toxicity testing. Pharmaceutical development and technology. 2013 May-Jun;18(3):545-9.

Farah, C. S.; McIntosh, L.; McCullough, M. J. Mouthwashes. *Aust. Prescr.*, **2009**, *32* (6), 162–164. https://doi.org/10.18773/austprescr.2009.080.

Farboud ES, Nasrollahi SA, Tabbakhi Z. Novel formulation and evaluation of a Q10-loaded solid lipid nanoparticle cream: in vitro and in vivo studies. Int J Nanomedicine. 2011;6:611-7.

Farias-Junior, P. A.; Rios, M. C.; Moura, T. A.; Almeida, R. P.; Alves, P. B.; Blank, A. F.; Fernandes, R. P. M.; Scher, R. Leishmanicidal Activity of Carvacrol-Rich Essential Oil from *Lippia Sidoides* Cham. *Biol. Res.*, **2012**, *45* (4), 399–402. https://doi.org/10.4067/S0716-97602012000400012.

Favaro-Trindade, C.; Okuro, P.; de Matos, F. Encapsulation via Spray Chilling/Cooling/Congealing. *Handb. Encapsulation Control. Release*, **2015**, No. December, 71–87. https://doi.org/10.1201/b19038-8.

Fernandes, L. P.; Oliveira, W. P.; Sztatisz, J.; Szilágyi, I. M.; Novák, C. Solid State Studies on Molecular Inclusions of *Lippia Sidoides* Essential Oil Obtained by Spray Drying. *J. Therm. Anal. Calorim.*, **2009**, *95* (3), 855–863. https://doi.org/10.1007/s10973-008-9149-1.

Fernandes, L. P.; Turatti, I. C. C.; Lopes, N. P.; Ferreira, J. C.; Candido, R. C.; Oliveira, W. P. Volatile Retention and Antifungal Properties of Spray-Dried Microparticles of *Lippia Sidoides* Essential Oil. *Dry. Technol.*, **2008**, *26* (12), 1534–1542. https://doi.org/10.1080/07373930802464034.

Fernandes, L.P. Desenvolvimento tecnológico de produtos particulados obtidos a partir de *Lippia sidoides* pela técnica de spray drying e avaliação das propriedades antifúngicas, UNIVERSIDADE DE SÃO PAULO, 2008.

Flanagan, J.; Singh, H. Microemulsions: A Potential Delivery System for Bioactives in Food. *Crit. Rev. Food Sci. Nutr.*, **2006**, *46* (3), 221–237. https://doi.org/10.1080/10408690590956710.

Fontenelle ROS, Morais SM, Brito EHS, Kerntopf MR, Brilhante RSN, Cordeiro RA, et al. Chemical composition, toxicological aspects and antifungal activity of essential oil from *Lippia sidoides* Cham. J Antimicrob Chemother [Internet]. 2007 Mar 15;59(5):934–40. Available from: http://www.jac.oxfordjournals.org/cgi/doi/10.1093/jac/dkm066

Francenia Santos-Sánchez, N.; Salas-Coronado, R.; Villanueva-Cañongo, C.; Hernández-Carlos, B. Antioxidant Compounds and Their Antioxidant Mechanism. In *Antioxidants*; IntechOpen, 2019. https://doi.org/10.5772/intechopen.85270.

Freitas, I. R.; Cattelan, M. G. Antimicrobial and Antioxidant Properties of Essential Oils in Food Systems-An Overview. **2018**. https://doi.org/10.1016/B978-0-12-811515-2.00015-9.

Gaba B, Fazil M, Khan S, et al. Nanostructured lipid carrier system for topical delivery of terbinafine hydrochloride. Bulletin of Faculty of Pharmacy, Cairo University. 2015;53(2):147-159.

Ganesan P, Narayanasamy D. Lipid nanoparticles: Different preparation techniques, characterization, hurdles, and strategies for the production of solid lipid nanoparticles and nanostructured lipid carriers for oral drug delivery. Sustainable Chemistry and Pharmacy. 2017;6:37-56.

Gao S, Tian B, Han J, et al. Enhanced transdermal delivery of lornoxicam by nanostructured lipid carrier gels modified with polyarginine peptide for treatment of carrageenan-induced rat paw edema. Int J Nanomedicine. 2019;14:6135-6150.

Garg A, Singh S. Enhancement in antifungal activity of eugenol in immunosuppressed rats through lipid nanocarriers. Colloids and surfaces B, Biointerfaces. 2011 Oct 15;87(2):280-8.

Garg A, Singh S. Targeting of eugenol-loaded solid lipid nanoparticles to the epidermal layer of human skin. Nanomedicine (Lond). 2014;9(8):1223-38.

Gasco MR, inventor; Google Patents, assignee. Method for producing solid lipid microspheres having a narrow size distribution1993.

Gaur PK, Mishra S, Verma A, et al. Ceramide–palmitic acid complex based Curcumin solid lipid nanoparticles for transdermal delivery: pharmacokinetic and pharmacodynamic study. Journal of Experimental Nanoscience. 2016 2016/01/02;11(1):38-53.

Geetha T, Kapila M, Prakash O, et al. Sesamol-loaded solid lipid nanoparticles for treatment of skin cancer. J Drug Target. 2015 Feb;23(2):159-69.

Ghanbarzadeh S, Hariri R, Kouhsoltani M, et al. Enhanced stability and dermal delivery of hydroquinone using solid lipid nanoparticles. Colloids Surf B Biointerfaces. 2015 Dec 1;136:1004-10.

Ghayempour, S.; Montazer, M. Micro / Nanoencapsulation of Essential Oils and Fragrances : Focus on Perfumed , Antimicrobial , Mosquito-Repellent and Medical Textiles. *J. Microencapsul.*, **2016**, *0* (0), 000. https://doi.org/10.1080/02652048.2016.1216187.

Gonçalves, J. C. R.; de Meneses, D. A.; de Vasconcelos, A. P.; Piauilino, C. A.; Almeida, F. R. de C.; Napoli, E. M.; Ruberto, G.; de Araújo, D. A. M. Essential Oil Composition and Antinociceptive Activity of Thymus Capitatus. *Pharm. Biol.*, **2017**, *55* (1), 782–786. https://doi.org/10.1080/13880209.2017.1279672.

Gonullu U, Uner M, Yener G, et al. Formulation and characterization of solid lipid nanoparticles, nanostructured lipid carriers and nanoemulsion of lornoxicam for transdermal delivery. Acta Pharm. 2015 Mar;65(1):1-13.

Gonzalez-Mira E, Egea MA, Souto EB, et al. Optimizing flurbiprofen-loaded NLC by central composite factorial design for ocular delivery. Nanotechnology. 2011 Jan 28;22(4):045101.

Gonzalez-Mira E, Nikolic S, Garcia ML, et al. Potential use of nanostructured lipid carriers for topical delivery of flurbiprofen. J Pharm Sci. 2011 Jan;100(1):242-51.

Gordillo-Galeano A, Mora-Huertas CE. Solid lipid nanoparticles and nanostructured lipid carriers: A review emphasizing on particle structure and drug release. European journal of pharmaceutics and biopharmaceutics : official journal of Arbeitsgemeinschaft fur Pharmazeutische Verfahrenstechnik eV. 2018 Dec;133:285-308.

Gottardo, B.; Lemes, T.H.; Byzynski, G.; Paziani, M.H.; Von-Zeska-Kress, M.R.; de Almeida, M.T.G.; Volanti, D.P. One-pot synthesis and antifungal activity of nontoxic silver-loaded hydroxyapatite nanocomposites against Candida species. *ACS Appl. Nano Mater.* **2019**, *2*, 2112–2120, doi:10.1021/acsanm.9b00091.

Grangeia HB, Silva C, Simões SP, Reis MS. Quality by design in pharmaceutical manufacturing: A systematic review of current status, challenges and future perspectives. Eur J Pharm Biopharm [Internet]. 2020 Feb;147:19–37. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0939641119313189

Gratieri T, Krawczyk-Santos AP, da Rocha PBR, et al. SLN- and NLC-encapsulating antifungal agents: skin drug delivery and their unexplored potential for treating onychomycosis. Current pharmaceutical design. 2017 Nov 14.

Guan, Y.; Wu, J.; Zhong, Q. Eugenol Improves Physical and Chemical Stabilities of Nanoemulsions Loaded with β-Carotene. *Food Chem.*, **2016**, *194*, 787–796. https://doi.org/10.1016/j.foodchem.2015.08.097.

Guimarães KL, Ré MI. Lipid Nanoparticles as Carriers for Cosmetic Ingredients: The First (SLN) and the Second Generation (NLC). Nanocosmetics and Nanomedicines. Berlin, Heidelberg: Springer Berlin Heidelberg; 2011. p. 101-122.

Guo D, Dou D, Li X, et al. Ivermection-loaded solid lipid nanoparticles: preparation, characterisation, stability and transdermal behaviour. Artificial Cells, Nanomedicine, and Biotechnology. 2018 2018/02/17;46(2):255-262.

Gupta M, Tiwari S, Vyas SP. Influence of various lipid core on characteristics of SLNs designed for topical delivery of fluconazole against cutaneous candidiasis. Pharm Dev Technol. 2013 May-Jun;18(3):550-9.

Gupta M, Vyas SP. Development, characterization and in vivo assessment of effective lipidic nanoparticles for dermal delivery of fluconazole against cutaneous candidiasis. Chem Phys Lipids. 2012 May;165(4):454-61.

Gupta, P.D.; Birdi, T.J. Development of botanicals to combat antibiotic resistance. *J. Ayurveda Integr. Med.* **2017**, *8*, 266–275, doi:10.1016/j.jaim.2017.05.004.

Gupta, S.; Variyar, P. S. Nanoencapsulation of Essential Oils for Sustained Release: Application as Therapeutics and Antimicrobials. In *Encapsulations*; Grumezescu, A. M., Ed.; Academic Press, 2016; pp 641–672. https://doi.org/10.1016/B978-0-12-804307-3.00015-6.

Hădărugă, D. I.; Hădărugă, N. G.; Costescu, C. I.; David, I.; Gruia, A. T. Thermal and Oxidative Stability of the Ocimum Basilicum L. Essential Oil/β-Cyclodextrin Supramolecular System. *Beilstein J. Org. Chem.*, **2014**, *10*, 2809–2820. https://doi.org/10.3762/bjoc.10.298.

Han F, Yin R, Che X, et al. Nanostructured lipid carriers (NLC) based topical gel of flurbiprofen: design, characterization and in vivo evaluation. Int J Pharm. 2012 Dec 15;439(1-2):349-57.

Handbook of Pharmaceutical Excipients. 6th ed. Rowe RC, Sheskey PJ, Quinn ME, editors.: Pharmaceutical Press and American Pharmacists Association; 2009. English. (Pharmacy International).

Harde H, Agrawal AK, Katariya M, et al. Development of a topical adapalene-solid lipid nanoparticle loaded gel with enhanced efficacy and improved skin tolerability [10.1039/C5RA06047H]. RSC Advances. 2015;5(55):43917-43929.

Hensel, A.; Bauer, R.; Heinrich, M.; Spiegler, V.; Kayser, O.; Hempel, G.; Kraft, K. Challenges at the Time of COVID-19: Opportunities and Innovations in Antivirals from Nature. *Planta Med.*, **2020**, *86* (10), 659–664. https://doi.org/10.1055/a-1177-4396.

Herman, A.; Herman, A. P. Essential Oils and Their Constituents as Skin Penetration Enhancer for Transdermal Drug Delivery: A Review. *J. Pharm. Pharmacol.*, **2015**, *67* (4), 473–485. https://doi.org/10.1111/jphp.12334.

Herman, A.; Herman, A.P. Herbal Products and Their Active Constituents Used Alone and in Combination with Antifungal Drugs against Drug-Resistant Candida sp. *Antibiotics* **2021**, *10*, 655, doi:10.3390/antibiotics10060655.

Heurtault B, Saulnier P, Pech B, et al. A Novel Phase Inversion-Based Process for the Preparation of Lipid Nanocarriers [journal article]. Pharmaceutical Research. 2002 June 01;19(6):875-880.

Hinkle DE, Wiersma W, Jurs SG. Applied Statistics for the Behavioral Sciences. 5th ed. Michigan: Houghton Mifflin; 2003. 756 p.

Horton, M. V; Nett, J.E. Candida auris Infection and Biofilm Formation: Going Beyond the Surface., doi:10.1007/s40588-020-00143-7.

Hua, T.-C.; Liu, B.-L.; Zhang, H. Freeze Drying of Pharmaceuticals. In *Freeze-Drying of Pharmaceutical and Food Products*; Elsevier, 2010; pp 187–215. https://doi.org/10.1533/9781845697471.187.

Huang ZR, Hua SC, Yang YL, et al. Development and evaluation of lipid nanoparticles for camptothecin delivery: a comparison of solid lipid nanoparticles, nanostructured lipid carriers, and lipid emulsion. Acta pharmacologica Sinica. 2008 Sep;29(9):1094-102.

Hyldgaard, M.; Mygind, T.; Meyer, R.L. Essential oils in food preservation: Mode of action, synergies, and interactions with food matrix components. *Front. Microbiol.* **2012**, *3*, 1–24, doi:10.3389/fmicb.2012.00012.

Ignasiak, K.; Maxwell, A. Galleria mellonella (greater wax moth) larvae as a model for antibiotic susceptibility testing and acute toxicity trials. *BMC Res. Notes* **2017**, *10*, 428, doi:10.1186/s13104-017-2757-8.

Ilijeva, R.; Buchbauer, G. Biological Properties of Some Volatile Phenylpropanoids. *Nat. Prod. Commun.*, **2016**, *11* (10), 1934578X1601101. https://doi.org/10.1177/1934578X1601101041.

Ingvarsson, P. T.; Yang, M.; Nielsen, H. M.; Rantanen, J.; Foged, C. Stabilization of Liposomes during Drying. **2011**, 375–388.

Jaafar-Maalej C, Diab R, Andrieu V, Elaissari A, Fessi H. Ethanol injection method for hydrophilic and lipophilic drug-loaded liposome preparation. J Liposome Res [Internet]. 2010 Sep 9;20(3):228–43. Available from: http://www.tandfonline.com/doi/full/10.3109/08982100903347923

Jafari, S. M.; He, Y.; Bhandari, B. Encapsulation of Nanoparticles of D-Limonene by Spray Drying: Role of Emulsifiers and Emulsifying Techniques. *Dry. Technol.*, **2007**, *25* (6), 1069–1079. https://doi.org/10.1080/07373930701396758.

Jafari, S. M.; He, Y.; Bhandari, B. Production of Sub-Micron Emulsions by Ultrasound and Microfluidization Techniques. *J. Food Eng.*, **2007**, *82* (4), 478–488. https://doi.org/10.1016/j.jfoodeng.2007.03.007.

Jahangir, G. Z.; Ashraf, D. S.; Nasir, I. A.; Sadiq, M.; Shahzad, S.; Naz, F.; Iqbal, M.; Saeed, A. The Myth of Oral Hygiene Using Synthetic Mouthwash Products. *Springerplus*, **2016**, *5* (1). https://doi.org/10.1186/s40064-016-3158-5.

Jain A, Garg NK, Jain A, et al. A synergistic approach of adapalene-loaded nanostructured lipid carriers, and vitamin C co-administration for treating acne. Drug development and industrial pharmacy. 2016;42(6):897-905.

Jain A, Mehra NK, Nahar M, et al. Topical delivery of enoxaparin using nanostructured lipid carrier. J Microencapsul. 2013;30(7):709-15.

Jain AK, Jain A, Garg NK, et al. Adapalene loaded solid lipid nanoparticles gel: an effective approach for acne treatment. Colloids and Surfaces B: Biointerfaces. 2014;121:222-229.

Jain S, Jain S, Khare P, et al. Design and development of solid lipid nanoparticles for topical delivery of an anti-fungal agent. Drug Deliv. 2010 Aug;17(6):443-51.

Jain S, Mistry MA, Swarnakar NK. Enhanced dermal delivery of acyclovir using solid lipid nanoparticles. Drug Deliv Transl Res. 2011 Oct;1(5):395-406.

Jaiswal P, Gidwani B, Vyas A. Nanostructured lipid carriers and their current application in targeted drug delivery. Artif Cells Nanomed Biotechnol. 2016;44(1):27-40.

Janniger, E.J.; Kapila, R. Public health issues with Candida auris in COVID-19 patients. *World Med. Heal. Policy* **2021**, doi:10.1002/wmh3.472.

Jeffery-Smith, A.; Taori, S.K.; Schelenz, S.; Jeffery, K.; Johnson, E.M.; Borman, A.; Manuel, R.; Brown, C.S. Candida auris: a Review of the literature. *Clin. Microbiol. Rev.* **2018**, *31*, doi:10.1128/CMR.00029-17.

Jensen LB, Petersson K, Nielsen HM. In vitro penetration properties of solid lipid nanoparticles in intact and barrier-impaired skin. Eur J Pharm Biopharm. 2011 Sep;79(1):68-75.

Jeon HS, Seo JE, Kim MS, et al. A retinyl palmitate-loaded solid lipid nanoparticle system: effect of surface modification with dicetyl phosphate on skin permeation in vitro and anti-wrinkle effect in vivo. Int J Pharm. 2013 Aug 16;452(1-2):311-20.

Joshi M, Patravale V. Formulation and evaluation of Nanostructured Lipid Carrier (NLC)-based gel of Valdecoxib. Drug development and industrial pharmacy. 2006 Sep;32(8):911-8.

Joshi MD, Muller RH. Lipid nanoparticles for parenteral delivery of actives. European journal of pharmaceutics and biopharmaceutics : official journal of Arbeitsgemeinschaft fur Pharmazeutische Verfahrenstechnik eV. 2009 Feb;71(2):161-72.

Joshi SA, Jalalpure SS, Kempwade AA, et al. Fabrication and in-vivo evaluation of lipid nanocarriers based transdermal patch of colchicine. Journal of Drug Delivery Science and Technology. 2017;41:444-453.

Junyaprasert VB, Teeranachaideekul V, Souto EB, et al. Q10-loaded NLC versus nanoemulsions: stability, rheology and in vitro skin permeation. Int J Pharm. 2009 Jul 30;377(1-2):207-14.

Kaliamurthi, S.; Selvaraj, G.; Hou, L.; Li, Z.; Wei, Y.; Gu, K.; Wei, D. Synergism of Essential Oils with Lipid Based Nanocarriers: Emerging Trends in Preservation of Grains and Related Food Products. *Grain Oil Sci. Technol.*, **2019**, *2* (1), 21–26. https://doi.org/10.1016/j.gaost.2019.04.003.

Kang JH, Chon J, Kim YI, et al. Preparation and evaluation of tacrolimus-loaded thermosensitive solid lipid nanoparticles for improved dermal distribution. Int J Nanomedicine. 2019;14:5381-5396.

Karn-Orachai K, Smith SM, Phunpee S, et al. The effect of surfactant composition on the chemical and structural properties of nanostructured lipid carriers. Journal of microencapsulation. 2014;31(6):609-18.

Kawadkar J, Pathak A, Kishore R, et al. Formulation, characterization and in vitro-in vivo evaluation of flurbiprofen-loaded nanostructured lipid carriers for transdermal delivery. Drug Development and Industrial Pharmacy. 2013 Apr;39(4):569-78.

Keck CM, Kovacevic A, Muller RH, et al. Formulation of solid lipid nanoparticles (SLN): the value of different alkyl polyglucoside surfactants. International journal of pharmaceutics. 2014 Oct 20;474(1-2):33-41.

Kelidari HR, Saeedi M, Akbari J, et al. Formulation optimization and in vitro skin penetration of spironolactone loaded solid lipid nanoparticles. Colloids Surf B Biointerfaces. 2015 Apr 1;128:473-479.

Khameneh B, Halimi V, Jaafari MR, et al. Safranal-loaded solid lipid nanoparticles: evaluation of sunscreen and moisturizing potential for topical applications. Iran J Basic Med Sci. 2015 Jan;18(1):58-63.

Kheradmandnia S, Vasheghani-Farahani E, Nosrati M, et al. Preparation and characterization of ketoprofen-loaded solid lipid nanoparticles made from beeswax and carnauba wax. Nanomedicine : nanotechnology, biology, and medicine. 2010 Dec;6(6):753-9.

Khosa A, Reddi S, Saha RN. Nanostructured lipid carriers for site-specific drug delivery. Biomedicine & pharmacotherapy = Biomedecine & pharmacotherapie. 2018 Jul;103:598-613.

Khurana S, Bedi PM, Jain NK. Preparation and evaluation of solid lipid nanoparticles based nanogel for dermal delivery of meloxicam. Chem Phys Lipids. 2013 Oct-Nov;175-176:65-72.

Khurana S, Jain NK, Bedi PM. Development and characterization of a novel controlled release drug delivery system based on nanostructured lipid carriers gel for meloxicam. Life Sci. 2013 Nov 13;93(21):763-72.

Kim BS, Na YG, Choi JH, et al. The Improvement of Skin Whitening of Phenylethyl Resorcinol by Nanostructured Lipid Carriers. Nanomaterials (Basel). 2017 Aug 28;7(9).

Kim, Y.-G.; Lee, J.-H.; Gwon, G.; Kim, S.-I.; Park, J. G.; Lee, J. Essential Oils and Eugenols Inhibit Biofilm Formation and the Virulence of Escherichia Coli O157:H7. *Sci. Rep.*, **2016**, *6* (1), 36377. https://doi.org/10.1038/srep36377.

Kimbaris, A. C.; González-Coloma, A.; Andrés, M. F.; Vidali, V. P.; Polissiou, M. G.; Santana-Méridas, O. Biocidal Compounds from Mentha Sp. Essential Oils and Their Structure-Activity Relationships. *Chem. Biodivers.*, **2017**, *14* (3), e1600270. https://doi.org/10.1002/cbdv.201600270.

Kong X, Zhao Y, Quan P, et al. Development of a topical ointment of betamethasone dipropionate loaded nanostructured lipid carrier. asian journal of pharmaceutical sciences. 2016;11(2):248-254.

Korkm E, Gokce EH, Ozer O. Development and evaluation of coenzyme Q10 loaded solid lipid nanoparticle hydrogel for enhanced dermal delivery. Acta Pharmaceutica. 2013;63(4):517-529.

Korntner, S.; Lehner, C.; Gehwolf, R.; Wagner, A.; Grütz, M.; Kunkel, N.; Tempfer, H.; Traweger, A. Limiting Angiogenesis to Modulate Scar Formation. *Adv. Drug Deliv. Rev.*, **2019**, *146*, 170–189. https://doi.org/10.1016/j.addr.2018.02.010.

Koul, O.; Singh, R.; Kaur, B.; Kanda, D. Comparative Study on the Behavioral Response and Acute Toxicity of Some Essential Oil Compounds and Their Binary Mixtures to Larvae of Helicoverpa Armigera, Spodoptera Litura and Chilo Partellus. *Ind. Crops Prod.*, **2013**, *49*, 428–436. https://doi.org/10.1016/j.indcrop.2013.05.032.

Kovacevic A, Savic S, Vuleta G, et al. Polyhydroxy surfactants for the formulation of lipid nanoparticles (SLN and NLC): effects on size, physical stability and particle matrix structure. International journal of pharmaceutics. 2011 Mar 15;406(1-2):163-72.

Kovacs A, Berko S, Csanyi E, et al. Development of nanostructured lipid carriers containing salicyclic acid for dermal use based on the Quality by Design method. Eur J Pharm Sci. 2017 Mar 1;99:246-257.

Kumagai, H.; Kashima, N.; Seki, T.; Sakurai, H.; Ishii, K.; Ariga, T. Analysis of Volatile Components in Essential Oil of Upland Wasabi and Their Inhibitory Effects on Platelet Aggregation. *Biosci. Biotechnol. Biochem.*, **1994**, *58* (12), 2131–2135. https://doi.org/10.1271/bbb.58.2131.

Kuo, Y.C.; Ko, H.F. Targeting delivery of saquinavir to the brain using 83-14 monoclonal antibody-grafted solid lipid nanoparticles. *Biomaterials* **2013**, *34*, 4818–4830, doi:10.1016/j.biomaterials.2013.03.013.

Kurakula M, Ahmed OA, Fahmy UA, et al. Solid lipid nanoparticles for transdermal delivery of avanafil: optimization, formulation, in-vitro and ex-vivo studies. J Liposome Res. 2016 Dec;26(4):288-96.

Lanas, A.; Scheiman, J. Low-Dose Aspirin and Upper Gastrointestinal Damage:Epidemiology, Prevention and Treatment. *Curr. Med. Res. Opin.*, **2007**, *23* (1), 163–173. https://doi.org/10.1185/030079907X162656.

Langford, A.; Bhatnagar, B.; Walters, R.; Tchessalov, S.; Ohtake, S. Drying of Biopharmaceuticals: Recent Developments, New Technologies and Future Direction. *Japan J. Food Eng.*, **2018**, *19* (1), 15–25. https://doi.org/10.11301/jsfe.18514.

Lauterbach A, Muller-Goymann CC. Applications and limitations of lipid nanoparticles in dermal and transdermal drug delivery via the follicular route. European journal of pharmaceutics and biopharmaceutics : official journal of Arbeitsgemeinschaft fur Pharmazeutische Verfahrenstechnik eV. 2015 Nov;97(Pt A):152-63.

Leal, L.K.A.M.; Oliveira, V.M.; Araruna, S.M.; Miranda, M.C.C.; Oliveira, F.M.A. Análise de timol por CLAE na tintura de *Lippia sidoides* Cham. (alecrim-pimenta) produzida em diferentes estágios de desenvolvimento da planta. *Rev. Bras. Farmacogn.* **2003**, *13*, 9–11.

Lee MH, Shin GH, Park HJ. Solid lipid nanoparticles loaded thermoresponsive pluronic–xanthan gum hydrogel as a transdermal delivery system. 2018;135(11):46004.

Lee MH, Shin GH, Park HJ. Solid lipid nanoparticles loaded thermoresponsive pluronic–xanthan gum hydrogel as a transdermal delivery system. Journal of Applied Polymer Science. 2018;135(11):46004.

Lee SG, Jeong JH, Kim SR, et al. Topical formulation of retinyl retinoate employing nanostructured lipid carriers. Journal of pharmaceutical investigation. 2012;42(5):243-250.

Lian T, Ho RJY. Trends and Developments in Liposome Drug Delivery Systems. J Pharm Sci [Internet]. 2001 Jun 1 [cited 2018 Aug 8];90(6):667–80. Available from: https://www.sciencedirect.com/science/article/pii/S0022354916307626

Lin WJ, Duh YS. Nanostructured lipid carriers for transdermal delivery of acid labile lansoprazole. Eur J Pharm Biopharm. 2016 Nov;108:297-303.

Lin Y-K, Al-Suwayeh SA, Leu Y-L, et al. Squalene-containing nanostructured lipid carriers promote percutaneous absorption and hair follicle targeting of diphencyprone for treating alopecia areata. Pharmaceutical research. 2013;30(2):435-446.

Lin YK, Huang ZR, Zhuo RZ, et al. Combination of calcipotriol and methotrexate in nanostructured lipid carriers for topical delivery. Int J Nanomedicine. 2010 Mar 9;5:117-28.

Lippacher A, Müller RH, Mäder K. Investigation on the viscoelastic properties of lipid based colloidal drug carriers. International Journal of Pharmaceutics. 2000;196(2):227-230.

Liu D, Ge Y, Tang Y, et al. Solid lipid nanoparticles for transdermal delivery of diclofenac sodium: preparation, characterization and in vitro studies. J Microencapsul. 2010;27(8):726-34.

Lobo, V.; Patil, A.; Phatak, A.; Chandra, N. Free Radicals, Antioxidants and Functional Foods: Impact on Human Health. *Pharmacogn. Rev.*, **2010**, *4* (8), 118–126. https://doi.org/10.4103/0973-7847.70902.

Loeffler, M.; Beiser, S.; Suriyarak, S.; Gibis, M.; Weiss, J. Antimicrobial efficacy of emulsified essential oil components against weak acid–adapted spoilage yeasts in clear and cloudy apple juice. *J. Food Prot.* **2014**, *77*, 1325–1335, doi:10.4315/0362-028X.JFP-13-393.

Loizzo, M. R.; Saab, A. M.; Tundis, R.; Statti, G. A.; Menichini, F.; Lampronti, I.; Gambari, R.; Cinatl, J.; Doerr, H. W. Phytochemical Analysis and in Vitro Antiviral Activities of the Essential Oils of Seven Lebanon Species. *Chem. Biodivers.*, **2008**, *5* (3), 461–470. https://doi.org/10.1002/cbdv.200890045.

Lone, S.A.; Ahmad, A. Candida auris —the growing menace to global health. *Mycoses* **2019**, *62*, 620–637, doi:10.1111/myc.12904.

Lopez-Rubio A, Gavara R, Lagaron JM. Bioactive packaging: turning foods into healthier foods through biomaterials. Trends Food Sci Technol [Internet]. 2006 Oct;17(10):567–75. Available from: http://linkinghub.elsevier.com/retrieve/pii/S0924224406001932

Madan JR, Khude PA, Dua K. Development and evaluation of solid lipid nanoparticles of mometasone furoate for topical delivery. Int J Pharm Investig. 2014 Apr;4(2):60-4.

Maestrelli F, González-Rodríguez ML, Rabasco AM, Mura P. Preparation and characterisation of liposomes encapsulating ketoprofen–cyclodextrin complexes for transdermal drug delivery. Int J Pharm [Internet]. 2005 Jul 14 [cited 2018 Aug 8];298(1):55–67. Available from: https://www.sciencedirect.com/science/article/pii/S0378517305001973

Majeed, H.; Bian, Y.-Y.; Ali, B.; Jamil, A.; Majeed, U.; Khan, Q. F.; Iqbal, K. J.; Shoemaker, C. F.; Fang, Z. Essential Oil Encapsulations: Uses, Procedures, and Trends. *RSC Adv.*, **2015**, *5* (72), 58449–58463. https://doi.org/10.1039/C5RA06556A.

Marto J, Sangalli C, Capra P, et al. Development and characterization of new and scalable topical formulations containing N-acetyl-d-glucosamine-loaded solid lipid nanoparticles. Drug Dev Ind Pharm. 2017 Nov;43(11):1792-1800.

Masters, K. *Spray Drying Handbook*, 5th ed.; Longman Scientific & Technical. Wiley: New York, 1991.

McClements DJ, Gumus CE. Natural emulsifiers - Biosurfactants, phospholipids, biopolymers, and colloidal particles: Molecular and physicochemical basis of functional performance. Advances in colloid and interface science. 2016 Aug;234:3-26.

McClements, D. J. Critical Review of Techniques and Methodologies for Characterization of Emulsion Stability. *Crit. Rev. Food Sci. Nutr.*, **2007**, *47* (7), 611–649. https://doi.org/10.1080/10408390701289292.

McClements, D. J.; Decker, E. A.; Park, Y.; Weiss, J. Structural Design Principles for Delivery of Bioactive Components in Nutraceuticals and Functional Foods. *Crit. Rev. Food Sci. Nutr.*, **2009**, *49* (6), 577–606. https://doi.org/10.1080/10408390902841529.

McCormack B, Gregoriadis G. Drugs-in-cyclodextrins-in liposomes: a novel concept in drug delivery. Int J Pharm [Internet]. 1994 Dec 5 [cited 2018 Aug 8];112(3):249–58. Available from: https://www.sciencedirect.com/science/article/pii/0378517394903611

Medrano, J. J. A. Essential Oils in the Development of New Medicinal Products. In *Essential Oils - Oils of Nature*; El-Shemy, H., Ed.; IntechOpen, 2020; pp 1–12. https://doi.org/10.5772/intechopen.86572.

Mehnert W, Mader K. Solid lipid nanoparticles Production, characterization and applications. Advanced Drug Delivery Reviews. 2001;47(2-3):165-196.

Melo NFSd, Campos EVR, Franz-Montan M, et al. Characterization of Articaine-Loaded Poly(ε-caprolactone) Nanocapsules and Solid Lipid Nanoparticles in Hydrogels for Topical Formulations. Journal of Nanoscience and Nanotechnology. 2018 //;18(6):4428-4438.

Mendes AI, Silva AC, Catita JA, et al. Miconazole-loaded nanostructured lipid carriers (NLC) for local delivery to the oral mucosa: improving antifungal activity. Colloids and surfaces B, Biointerfaces. 2013 Nov 1;111:755-63.

Mendes IT, Ruela ALM, Carvalho FC, et al. Development and characterization of nanostructured lipid carrier-based gels for the transdermal delivery of donepezil. Colloids and Surfaces B: Biointerfaces. 2019 2019/05/01/;177:274-281.

Mimica-Dukić, N.; Orč Ić, D.; Lesjak, M.; Šibul, F. Essential Oils as Powerful Antioxidants: Misconception or Scientific Fact? *ACS Symp. Ser.*, **2016**, *1218*, 187–208. https://doi.org/10.1021/bk-2016-1218.ch012.

Miraglia, D.B.; Rodríguez, J.L.; Minardi, R.M.; Schulz, P.C. Critical Micelle Concentration and HLB of the Sodium Oleate–Hexadecyltrimethylammonium Bromide Mixed System. *J. Surfactants Deterg.* **2011**, *14*, 401–408, doi:10.1007/s11743-010-1239-y.

Miranda, H. A. de; Gonçalves, J.; … J. C.-N.; 2010, U. Evaluation of the Sesquiterpene (−)-α-Bisabolol as a Novel Peripheral Nervous Blocker. *Neurosci. Lett.*, **2010**, *472* (1), 11–15.

Mishra, D. K.; Shandilya, R.; Mishra, P. K. Lipid Based Nanocarriers: A Translational Perspective. *Nanomedicine Nanotechnology, Biol. Med.*, **2018**, *14* (7), 2023–2050. https://doi.org/10.1016/j.nano.2018.05.021.

Misra, A.; Jinturkar, K.; Patel, D.; Lalani, J.; Chougule, M. Recent Advances in Liposomal Dry Powder Formulations: Preparation and Evaluation. *Expert Opin. Drug Deliv.*, **2009**, *6* (1), 71–89. https://doi.org/10.1517/17425240802652309.

Mitri, K.; Shegokar, R.; Gohla, S.; Anselmi, C.; Müller, R.H. Lipid nanocarriers for dermal delivery of lutein: Preparation, characterization, stability and performance. *Int. J. Pharm.* **2011**, *414*, 267–275, doi:10.1016/j.ijpharm.2011.05.008.

Moghddam SM, Ahad A, Aqil M, et al. Optimization of nanostructured lipid carriers for topical delivery of nimesulide using Box-Behnken design approach. Artif Cells Nanomed Biotechnol. 2017 May;45(3):617-624.

Mogosan, C.; Vostinaru, O.; Oprean, R.; Heghes, C.; Filip, L.; Balica, G.; Moldovan, R. A Comparative Analysis of the Chemical Composition, Anti-Inflammatory, and Antinociceptive Effects of the Essential Oils from Three Species of Mentha Cultivated in Romania. *Molecules*, **2017**, *22* (2), 263. https://doi.org/10.3390/molecules22020263.

Mohammadi-Samani S, Zojaji S, Entezar-Almahdi E. Piroxicam loaded solid lipid nanoparticles for topical delivery: Preparation, characterization and in vitro permeation assessment. Journal of Drug Delivery Science and Technology. 2018;47:427-433.

Mohammed, N. K.; Tan, C. P.; Manap, Y. A.; Muhialdin, B. J.; Hussin, A. S. M. Spray Drying for the Encapsulation of Oils—A Review. *Molecules*, **2020**, *25* (17), 1–16. https://doi.org/10.3390/molecules25173873.

Montalvo G, Khan A. Rheological properties of a surfactant-induced gel for the lysozyme-sodium dodecyl sulfate-water system. Colloid Polym Sci [Internet]. 2005 Jan 7;283(4):402–12. Available from: http://link.springer.com/10.1007/s00396-004-1161-9

Montenegro L, Panico AM, Santagati LM, et al. Solid Lipid Nanoparticles Loading Idebenone Ester with Pyroglutamic Acid: In Vitro Antioxidant Activity and In Vivo Topical Efficacy. Nanomaterials (Basel). 2018 Dec 29;9(1).

Montenegro L, Pasquinucci L, Zappala A, et al. Rosemary Essential Oil-Loaded Lipid Nanoparticles: In Vivo Topical Activity from Gel Vehicles. Pharmaceutics. 2017 Oct 21;9(4).

Montenegro L, Sinico C, Castangia I, et al. Idebenone-loaded solid lipid nanoparticles for drug delivery to the skin: In vitro evaluation. International journal of pharmaceutics. 2012;434(1-2):169-174.

Moraes, T. M.; Kushima, H.; Moleiro, F. C.; Santos, R. C.; Machado Rocha, L. R.; Marques, M. O.; Vilegas, W.; Hiruma-Lima, C. A. Effects of Limonene and Essential Oil from Citrus Aurantium on Gastric Mucosa: Role of Prostaglandins and Gastric Mucus Secretion. *Chem. Biol. Interact.*, **2009**, *180* (3), 499–505. https://doi.org/10.1016/j.cbi.2009.04.006.

Morais SR, Oliveira TLS, Oliveira LP, Tresvenzol LMF, Conceição EC, Rezende MH, et al. Essential Oil Composition, Antimicrobial and Pharmacological Activities of *Lippia sidoides* Cham. (Verbenaceae) From São Gonçalo do Abaeté, Minas Gerais, Brazil. Pharmacogn Mag [Internet]. 2016 [cited 2017 Jun 9];12(48):262–70. Available from: http://www.ncbi.nlm.nih.gov/pubmed/27867267

Morais, A. R. D. V.; Alencar, É. D. N.; Xavier Júnior, F. H.; Oliveira, C. M. De; Marcelino, H. R.; Barratt, G.; Fessi, H.; Egito, E. S. T. Do; Elaissari, A. Freeze-Drying of Emulsified Systems: A Review. *Int. J. Pharm.*, **2016**, *503* (1–2), 102–114. https://doi.org/10.1016/j.ijpharm.2016.02.047.

Mortensen, A.; Aguilar, F.; Crebelli, R.; Di Domenico, A.; Dusemund, B.; Frutos, M.J.; Galtier, P.; Gott, D.; Gundert-Remy, U.; Leblanc, J.; et al. Re-evaluation of fatty acids (E 570) as a food additive. *EFSA J.* **2017**, *15*, e04785, doi:10.2903/j.efsa.2017.4785.

Muchow M, Maincent P, Muller RH. Lipid nanoparticles with a solid matrix (SLN, NLC, LDC) for oral drug delivery. Drug Development and Industrial Pharmacy. 2008 Dec;34(12):1394-405.

Müller RH, Radtke M, Wissing SA. Solid lipid nanoparticles (SLN) and nanostructured lipid carriers (NLC) in cosmetic and dermatological preparations. Advanced drug delivery reviews. 2002;54:S131-S155.

Muller, R. H.; Mader, K.; Gohla, S. Solid Lipid Nanoparticles (SLN) for Controlled Drug Delivery - a Review of the State of the Art. *Eur. J. Pharm. Biopharm.*, **2000**, *50* (1), 161–177. https://doi.org/10.1016/S0939-6411(00)00087-4.

Müller, R. H.; Shegokar, R.; Keck, C. M. 20 Years of Lipid Nanoparticles (SLN & NLC): Present State of Development & Industrial Applications. *Curr. Drug Discov. Technol.*, **2011**, *8* (3), 207–227. https://doi.org/10.2174/157016311796799062.

Nakazato, G.; Favaro, W.J.; Castro, G.R.; Duran, N. The Use of Candida auris Therapies based on Nanotechnology as Potential Novel Strategy against COVID-19 Infection: A Mini Review. *AIJR Prepr.* **2021**, *337*.

Naseri N, Valizadeh H, Zakeri-Milani P. Solid Lipid Nanoparticles and Nanostructured Lipid Carriers: Structure, Preparation and Application. Advanced pharmaceutical bulletin. 2015 Sep;5(3):305-13.

Negi LM, Jaggi M, Talegaonkar S. Development of protocol for screening the formulation components and the assessment of common quality problems of nano-structured lipid carriers. International journal of pharmaceutics. 2014 Jan 30;461(1-2):403-10.

Nejatian, M.; Abbasi, S. Formation of Concentrated Triglyceride Nanoemulsions and Nanogels: Natural Emulsifiers and High Power Ultrasound. **2019**. https://doi.org/10.1039/c9ra04761a.

Nguyen CN, Nguyen TTT, Nguyen HT, et al. Nanostructured lipid carriers to enhance transdermal delivery and efficacy of diclofenac. Drug Deliv Transl Res. 2017 Oct;7(5):664-673.

Nieto, G.; Ros, G.; Castillo, J. Antioxidant and Antimicrobial Properties of Rosemary (Rosmarinus Officinalis, L.): A Review. *Medicines*, **2018**, *5* (3), 98. https://doi.org/10.3390/medicines5030098.

Nikolic S, Keck CM, Anselmi C, et al. Skin photoprotection improvement: synergistic interaction between lipid nanoparticles and organic UV filters. International journal of pharmaceutics. 2011 Jul 29;414(1-2):276-84.

Nnamani PO, Hansen S, Windbergs M, et al. Development of artemether-loaded nanostructured lipid carrier (NLC) formulation for topical application. Int J Pharm. 2014 Dec 30;477(1-2):208-17.

Oh, C. M.; Guo, Q.; Wan Sia Heng, P.; Chan, L. W. Spray-Congealed Microparticles for Drug Delivery-an Overview of Factors Influencing Their Production and Characteristics. *Expert Opin. Drug Deliv.*, **2014**, *11* (7), 1047–1060. https://doi.org/10.1517/17425247.2014.915805.

Okonogi S, Riangjanapatee P. Physicochemical characterization of lycopene-loaded nanostructured lipid carrier formulations for topical administration. Int J Pharm. 2015 Jan 30;478(2):726-35.

Oliveira WP, Bott RF, Souza CRF. Manufacture of Standardized Dried Extracts from Medicinal Brazilian Plants. Dry Technol [Internet]. 2006 May;24(4):523–33. Available from: http://0-www.tandfonline.com.innopac.up.ac.za/doi/abs/10.1080/07373930600612073%5Cnhttp://www.tandfonline.com/doi/abs/10.1080/07373930600612073

Oliveira, W. P.; Freitas, L. A. P.; Freire, J. T. Drying of Pharmaceutical Products. In *Transport Phenomena In Particulate Systems*; P. de Oliveira, W., Alexandre P. de Freitas, L., Teixeira

Freire, J., Eds.; BENTHAM SCIENCE PUBLISHERS, 2012; pp 148–171. https://doi.org/10.2174/978160805227111201010148.

Ouellette, R.J.; Rawn, J.D. Conjugated alkenes and allylic systems. In *Organic Chemistry*; Elsevier, 2014; pp. 357–395.

Pal, A.; Chaudhary, S. Ionic liquids effect on critical micelle concentration of SDS: Conductivity, fluorescence and NMR studies. *Fluid Phase Equilib.* **2014**, *372*, 100–104, doi:10.1016/j.fluid.2014.03.024.

Pan, K.; Chen, H.; Davidson, P.M.; Zhong, Q. Thymol nanoencapsulated by sodium caseinate: Physical and antilisterial properties. *J. Agric. Food Chem.* **2014**, *62*, 1649–1657, doi:10.1021/jf4055402.

Pandey, A. K.; Kumar, P.; Singh, P.; Tripathi, N. N.; Bajpai, V. K. Essential Oils: Sources of Antimicrobials and Food Preservatives. *Front. Microbiol.*, **2017**, *7* (JAN), 1–14. https://doi.org/10.3389/fmicb.2016.02161.

Pandya, N.; Cag, Y.; Pandak, N.; Pekok, A.U.; Poojary, A.; Ayoade, F.; Fasciana, T.; Giammanco, A.; Caskurlu, H.; Rajani, D.P.; et al. International Multicentre Study of Candida auris Infections. *J. Fungi* **2021**, *7*, 878, doi:10.3390/jof7100878.

Pardeike J, Hommoss A, Muller RH. Lipid nanoparticles (SLN, NLC) in cosmetic and pharmaceutical dermal products. International journal of pharmaceutics. 2009 Jan 21;366(1-2):170-84.

Paudel A, Worku ZA, Meeus J, et al. Manufacturing of solid dispersions of poorly water soluble drugs by spray drying: formulation and process considerations. International journal of pharmaceutics. 2013 Aug 30;453(1):253-84.

Paziani, M.H.; Tonani, L.; de Menezes, H.D.; Bachmann, L.; Wainwright, M.; Braga, G.Ú.L.; von Zeska Kress, M.R. Antimicrobial photodynamic therapy with phenothiazinium photosensitizers in non-vertebrate model Galleria mellonella infected with Fusarium keratoplasticum and Fusarium moniliforme. *Photodiagnosis Photodyn. Ther.* **2019**, *25*, 197–203, doi:10.1016/j.pdpdt.2018.12.010.

Peng S, Wu C. Surfactant effect on pH and temperature sensitivities of poly(N - vinylcaprolactam- c o -sodium acrylate) microgels. Macromolecules [Internet]. 2001 Jan 1;34(3):568–71. Available from: https://pubs.acs.org/doi/10.1021/ma0009909

Pereira I, Zielinska A, Ferreira NR, et al. Optimization of linalool-loaded solid lipid nanoparticles using experimental factorial design and long-term stability studies with a new centrifugal sedimentation method. Int J Pharm. 2018 Oct 5;549(1-2):261-270.

Pinto NOF, Rodrigues THS, Pereira R de CA, Silva LMA, Cáceres CA, Azeredo HMC, et al. Production and physico-chemical characterization of nanocapsules of the essential oil from *Lippia sidoides* Cham. Ind Crops Prod [Internet]. 2016 Aug;86:279–88. Available from: http://dx.doi.org/10.1016/j.indcrop.2016.04.013

Pokharkar VB, Mendiratta C, Kyadarkunte AY, et al. Skin delivery aspects of benzoyl peroxide-loaded solid lipid nanoparticles for acne treatment. Ther Deliv. 2014 Jun;5(6):635-52.

Pokharkar VB, Shekhawat PB, Dhapte VV, et al. Development and optimization of eugenol loaded nanostructured lipid carriers for peridontal delivery. International Journal of Pharmacy and Pharmaceutical Sciences.3(4):138-143.

Pool, H.; Mendoza, S.; Xiao, H.; McClements, D.J. Encapsulation and release of hydrophobic bioactive components in nanoemulsion-based delivery systems: impact of physical form on quercetin bioaccessibility. *Food Funct.* **2013**, *4*, 162–174, doi:10.1039/C2FO30042G.

Pradhan M, Singh D, Murthy SN, et al. Design, characterization and skin permeating potential of Fluocinolone acetonide loaded nanostructured lipid carriers for topical treatment of psoriasis. Steroids. 2015;101:56-63.

Pradhan M, Singh D, Singh MR. Influence of selected variables on fabrication of Triamcinolone acetonide loaded solid lipid nanoparticles for topical treatment of dermal disorders. Artif Cells Nanomed Biotechnol. 2016;44(1):392-400.

Puglia C, Offerta A, Tirendi GG, et al. Design of solid lipid nanoparticles for caffeine topical administration. Drug Deliv. 2016;23(1):36-40.

Puglia, C.; Santonocito, D. Cosmeceuticals: Nanotechnology-Based Strategies for the Delivery of Phytocompounds. *Curr. Pharm. Des.*, **2019**, *25* (21), 2314–2322. https://doi.org/10.2174/1381612825666190709211101.

Queiroz, R. M. de; Takiya, C. M.; Guimarães, L. P. T. P.; Rocha, G. da G.; Alviano, D. S.; Blank, A. F.; Alviano, C. S.; Gattass, C. R. Apoptosis-Inducing Effects of Melissa Officinalis L. Essential Oil in Glioblastoma Multiforme Cells. *Cancer Invest.*, **2014**, *32* (6), 226–235. https://doi.org/10.3109/07357907.2014.905587.

Quek SY, Chok NK, Swedlund P. The physicochemical properties of spray-dried watermelon powders. Chem Eng Process Process Intensif [Internet]. 2007 May;46(5):386–92. Available from: http://linkinghub.elsevier.com/retrieve/pii/S0255270106002133

Quintanar-Guerrero D, Tamayo-Esquivel D, Ganem-Quintanar A, et al. Adaptation and optimization of the emulsification-diffusion technique to prepare lipidic nanospheres. European journal of pharmaceutical sciences : official journal of the European Federation for Pharmaceutical Sciences. 2005 Oct;26(2):211-8.

Radomska-Soukharev A. Stability of lipid excipients in solid lipid nanoparticles. Adv Drug Deliv Rev. 2007 Jul 10;59(6):411-8.

Radünz, M.; da Trindade, M. L. M.; Camargo, T. M.; Radünz, A. L.; Borges, C. D.; Gandra, E. A.; Helbig, E. Antimicrobial and Antioxidant Activity of Unencapsulated and Encapsulated Clove (Syzygium Aromaticum, L.) Essential Oil. *Food Chem.*, **2019**, *276*, 180–186. https://doi.org/10.1016/j.foodchem.2018.09.173.

Rai, M.; Paralikar, P.; Jogee, P.; Agarkar, G.; Ingle, A. P.; Derita, M.; Zacchino, S. Synergistic Antimicrobial Potential of Essential Oils in Combination with Nanoparticles: Emerging Trends and Future Perspectives. *Int. J. Pharm.*, **2017**, *519* (1–2), 67–78. https://doi.org/10.1016/j.ijpharm.2017.01.013.

Rai, M.; Paralikar, P.; Jogee, P.; Agarkar, G.; Ingle, A. P.; Derita, M.; Zacchino, S.; Salústio, P. J.; Pontes, P.; Conduto, C.; et al. Encapsulation of Bioactive Compounds through

Electrospinning/Electrospraying and Spray Drying: A Comparative Assessment of Food-Related Applications. *Dry. Technol.*, **2017**, *26* (2), 404–412. https://doi.org/10.1080/07373930903517532.

Raj R, Mongia P, Ram A, et al. Enhanced skin delivery of aceclofenac via hydrogel-based solid lipid nanoparticles. Artificial Cells, Nanomedicine, and Biotechnology. 2016 2016/08/17;44(6):1434-1439.

Rangsimawong W, Opanasopit P, Rojanarata T, et al. Skin Transport of Hydrophilic Compound-Loaded PEGylated Lipid Nanocarriers: Comparative Study of Liposomes, Niosomes, and Solid Lipid Nanoparticles. Biol Pharm Bull. 2016;39(8):1254-62.

Rangsimawong W, Opanasopit P, Rojanarata T, et al. Terpene-containing PEGylated liposomes as transdermal carriers of a hydrophilic compound. Biol Pharm Bull. 2014;37(12):1936-43.

Raut, J. S.; Karuppayil, S. M.; Raut, Jayant Shankar, and S. M. K. A Status Review on the Medicinal Properties of Essential Oils. *Ind. Crops Prod.*, **2014**, *62*, 250–264. https://doi.org/10.1016/j.indcrop.2014.05.055.

Raza K, Singh B, Singal P, et al. Systematically optimized biocompatible isotretinoin-loaded solid lipid nanoparticles (SLNs) for topical treatment of acne. Colloids Surf B Biointerfaces. 2013 May 1;105:67-74.

Rhodes, J. Rapid worldwide emergence of pathogenic fungi. *Cell Host Microbe* **2019**, *26*, 12–14, doi:10.1016/j.chom.2019.06.009.

Rhodes, J.; Fisher, M.C. Global epidemiology of emerging Candida auris. *Curr. Opin. Microbiol.* **2019**, *52*, 84–89, doi:10.1016/j.mib.2019.05.008.

Ridolfi DM, Marcato PD, Justo GZ, et al. Chitosan-solid lipid nanoparticles as carriers for topical delivery of tretinoin. Colloids and Surfaces B: Biointerfaces. 2012;93:36-40.

Rigon RB, Fachinetti N, Severino P, et al. Skin Delivery and in Vitro Biological Evaluation of Trans-Resveratrol-Loaded Solid Lipid Nanoparticles for Skin Disorder Therapies. Molecules. 2016 Jan 20;21(1):E116.

Ríos, J.-L. Essential Oils: What They Are and How the Terms Are Used and Defined. In *Essential Oils in Food Preservation, Flavor and Safety*; Elsevier, 2016; pp 3–10. https://doi.org/10.1016/B978-0-12-416641-7.00001-8.

Rocha KAD, Krawczyk-Santos AP, Andrade LM, et al. Voriconazole-loaded nanostructured lipid carriers (NLC) for drug delivery in deeper regions of the nail plate. International journal of pharmaceutics. 2017 Oct 5;531(1):292-298.

Rodríguez-Rojo, S.; Visentin, A.; Maestri, D.; Cocero, M. J. Assisted Extraction of Rosemary Antioxidants with Green Solvents. *J. Food Eng.*, **2012**, *109* (1), 98–103. https://doi.org/10.1016/j.jfoodeng.2011.09.029.

Romera, D.; Aguilera-Correa, J.-J.; García-Coca, M.; Mahillo-Fernández, I.; Viñuela-Sandoval, L.; García-Rodríguez, J.; Esteban, J. The Galleria mellonella infection model as a system to investigate the virulence of Candida auris strains. *Pathog. Dis.* **2020**, *78*, doi:10.1093/femspd/ftaa067.

Rostamkalaei SS, Akbari J, Saeedi M, et al. Topical gel of Metformin solid lipid nanoparticles: A hopeful promise as a dermal delivery system. Colloids and Surfaces B: Biointerfaces. 2019 2019/03/01/;175:150-157.

Rowe RC, Sheskey PJ, Quinn ME. Handbook of Pharmaceutical Excipients [Internet]. 6th ed. Rowe RC, Sheskey PJ, Quinn ME, editors. Pharmacy International. London, Chicago: Pharmaceutical Press and American Pharmacists Association; 2009. 888 p. Available from: http://linkinghub.elsevier.com/retrieve/pii/S0168365901002437

Saad, N. Y.; Muller, C. D.; Lobstein, A. Major Bioactivities and Mechanism of Action of Essential Oils and Their Components. *Flavour Fragr. J.*, **2013**, *28* (5), 269–279. https://doi.org/10.1002/ffj.3165.

Saifullah, M.; Shishir, M. R. I.; Ferdowsi, R.; Tanver Rahman, M. R.; Van Vuong, Q. Micro and Nano Encapsulation, Retention and Controlled Release of Flavor and Aroma Compounds: A Critical Review. *Trends in Food Science and Technology*. Elsevier Ltd April 1, 2019, pp 230–251. https://doi.org/10.1016/j.tifs.2019.02.030.

Salminen H, Gommel C, Leuenberger BH, et al. Influence of encapsulated functional lipids on crystal structure and chemical stability in solid lipid nanoparticles: Towards bioactive-based design of delivery systems. Food chemistry. 2016 Jan 1;190:928-937.

Santana Neto, M.C.; Costa, M.L.V. de A.; Fialho, P.H. da S.; Lopes, G.L.N.; Figueiredo, K.A.; Pinheiro, I.M.; de Lima, S.G.; Nunes, R. de S.; Quelemes, P.V.; Carvalho, A.L.M. Development of chlorhexidine digluconate and *Lippia sidoides* essential oil loaded in microemulsion for disinfection of dental root canals: Substantivity profile and antimicrobial activity. *AAPS PharmSciTech* **2020**, *21*, 302, doi:10.1208/s12249-020-01842-6.

Santos GA, Angelo T, Andrade LM, et al. The role of formulation and follicular pathway in voriconazole cutaneous delivery from liposomes and nanostructured lipid carriers. Colloids and surfaces B, Biointerfaces. 2018 Oct 1;170:341-346.

Santos, D.; Maurício, A. C.; Sencadas, V.; Santos, J. D.; Fernandes, M. H.; Gomes, P. S. Spray Drying: An Overview. In *Biomaterials - Physics and Chemistry - New Edition*; InTech, 2018. https://doi.org/10.5772/intechopen.72247.

Saporito, F.; Sandri, G.; Bonferoni, M.C.; Rossi, S.; Boselli, C.; Icaro Cornaglia, A.; Mannucci, B.; Grisoli, P.; Vigani, B.; Ferrari, F. Essential oil-loaded lipid nanoparticles for wound healing. *Int. J. Nanomedicine* **2017**, *Volume 13*, 175–186, doi:10.2147/IJN.S152529.

Sarkic, A.; Stappen, I. Essential Oils and Their Single Compounds in Cosmetics-a Critical Review. *Cosmetics*, **2018**, *5* (1), 1–21. https://doi.org/10.3390/cosmetics5010011.

Satoh, K.; Makimura, K.; Hasumi, Y.; Nishiyama, Y.; Uchida, K.; Yamaguchi, H. Candida auris sp. nov., a novel ascomycetous yeast isolated from the external ear canal of an inpatient in a Japanese hospital. *Microbiol. Immunol.* **2009**, *53*, 41–44, doi:10.1111/j.1348-0421.2008.00083.x.

Savic V, Ilic T, Nikolic I, et al. Tacrolimus-loaded lecithin-based nanostructured lipid carrier and nanoemulsion with propylene glycol monocaprylate as a liquid lipid: Formulation characterization and assessment of dermal delivery compared to referent ointment. Int J Pharm. 2019 Oct 5;569:118624.

Schafer-Korting M, Mehnert W, Korting HC. Lipid nanoparticles for improved topical application of drugs for skin diseases. Adv Drug Deliv Rev. 2007 Jul 10;59(6):427-43.

Schubert M, Müller-Goymann CC. Solvent injection as a new approach for manufacturing lipid nanoparticles – evaluation of the method and process parameters. European Journal of Pharmaceutics and Biopharmaceutics. 2003;55(1):125-131.

Schubert MA, Harms M, Muller-Goymann CC. Structural investigations on lipid nanoparticles containing high amounts of lecithin. Eur J Pharm Sci. 2006 Feb;27(2-3):226-36.

Schubert MA, Muller-Goymann CC. Characterisation of surface-modified solid lipid nanoparticles (SLN): influence of lecithin and nonionic emulsifier. European journal of pharmaceutics and biopharmaceutics : official journal of Arbeitsgemeinschaft fur Pharmazeutische Verfahrenstechnik eV. 2005 Sep;61(1-2):77-86.

Sebaaly C, Charcosset C, Stainmesse S, Fessi H, Greige-Gerges H. Clove essential oil-in-cyclodextrin-in-liposomes in the aqueous and lyophilized states: From laboratory to large scale using a membrane contactor. Carbohydr Polym [Internet]. 2016;138:75–85. Available from: http://dx.doi.org/10.1016/j.carbpol.2015.11.053

Sebaaly C, Greige-Gerges H, Agusti G, Fessi H, Charcosset C. Large-scale preparation of clove essential oil and eugenol-loaded liposomes using a membrane contactor and a pilot plant. J Liposome Res [Internet]. 2015 Jun 23;26(2):1–13. Available from: https://www.ncbi.nlm.nih.gov/pubmed/26099849

Sercombe, L.; Veerati, T.; Moheimani, F.; Wu, S. Y.; Sood, A. K.; Hua, S. Advances and Challenges of Liposome Assisted Drug Delivery. *Front. Pharmacol.*, **2015**, *6*. https://doi.org/10.3389/fphar.2015.00286.

Severino P, Andreani T, Macedo AS, et al. Current State-of-Art and New Trends on Lipid Nanoparticles (SLN and NLC) for Oral Drug Delivery. Journal of drug delivery. 2012;2012:750891.

Severino P, Pinho SC, Souto EB, et al. Polymorphism, crystallinity and hydrophilic-lipophilic balance of stearic acid and stearic acid-capric/caprylic triglyceride matrices for production of stable nanoparticles. Colloids and surfaces B, Biointerfaces. 2011 Aug 1;86(1):125-30.

Severino P, Santana MH, Souto EB. Optimizing SLN and NLC by 2(2) full factorial design: effect of homogenization technique. Mater Sci Eng C Mater Biol Appl. 2012 Aug 1;32(6):1375-9.

Severino P, Souto EB, Pinho SC, et al. Hydrophilic coating of mitotane-loaded lipid nanoparticles: preliminary studies for mucosal adhesion. Pharm Dev Technol. 2013 May-Jun;18(3):577-81.

Shamma RN, Aburahma MH. Follicular delivery of spironolactone via nanostructured lipid carriers for management of alopecia. Int J Nanomedicine. 2014;9:5449-60.

Sharma N, Bhandari S, Deshmukh R, et al. Development and characterization of embelin-loaded nanolipid carriers for brain targeting. Artif Cells Nanomed Biotechnol. 2017 May;45(3):409-413.

Sharma, A. Liposomes in Drug Delivery: Progress and Limitations. *Int. J. Pharm.*, **1997**, *154* (2), 123–140. https://doi.org/10.1016/S0378-5173(97)00135-X.

Shellhammer TH, Rumsey TR, Krochta JM. Viscoelastic properties of edible lipids. Journal of Food Engineering. 1997;33(3-4):305-320.

Sheng, J.J. Surfactant–Polymer Flooding. In *Enhanced Oil Recovery Field Case Studies*; Elsevier, 2013; pp. 117–142.

Sherry, M.; Charcosset, C.; Fessi, H.; Greige-Gerges, H. Essential Oils Encapsulated in Liposomes: A Review. *J. Liposome Res.*, **2013**, *23* (4), 268–275. https://doi.org/10.3109/08982104.2013.819888.

Sheskey PJ, Hancock BC, Moss GP, Goldfarb DJ. Handbook of Pharmaceutical Excipients. 9th ed. London, UK: Pharmaceutical Press; 2020. 1296 p.

Shi, F.; Zhao, J.-H.; Liu, Y.; Wang, Z.; Zhang, Y.-T.; Feng, N.-P. Preparation and Characterization of Solid Lipid Nanoparticles Loaded with Frankincense and Myrrh Oil. *Int. J. Nanomedicine*, **2012**, *7*, 2033–2043. https://doi.org/10.2147/IJN.S30085.

Shimojo AAM, Fernandes ARV, Ferreira NRE, et al. Evaluation of the Influence of Process Parameters on the Properties of Resveratrol-Loaded NLC Using 2(2) Full Factorial Design. Antioxidants (Basel). 2019 Aug 3;8(8).

Shrestha, H.; Bala, R.; Arora, S. Lipid-based drug delivery systems. *J. Pharm.* **2014**, *2014*, 10, doi:10.1155/2014/801820.

Shrotriya SN, Ranpise NS, Vidhate BV. Skin targeting of resveratrol utilizing solid lipid nanoparticle-engrossed gel for chemically induced irritant contact dermatitis. Drug Delivery and Translational Research. 2017 2017/02/01;7(1):37-52.

Shrotriya SN, Vidhate BV, Shukla MS. Formulation and development of Silybin loaded solid lipid nanoparticle enriched gel for irritant contact dermatitis. Journal of Drug Delivery Science and Technology. 2017;41:164-173.

Silva AC, Amaral MH, Sousa Lobo JM, et al. Editorial: Applications of Solid Lipid Nanoparticles (SLN) and Nanostructured Lipid Carriers (NLC): State of the Art. Current Pharmaceutical Design. 2018;23(43):6551-6552.

Silva AC, Gonzalez-Mira E, Garcia ML, et al. Preparation, characterization and biocompatibility studies on risperidone-loaded solid lipid nanoparticles (SLN): high pressure homogenization versus ultrasound. Colloids and surfaces B, Biointerfaces. 2011 Aug 1;86(1):158-65.

Silva AM, Martins-Gomes C, Coutinho TE, et al. Soft Cationic Nanoparticles for Drug Delivery: Production and Cytotoxicity of Solid Lipid Nanoparticles (SLN). Applied Sciences. 2019;9(20):4438.

Silva AM, Martins-Gomes C, Fangueiro JF, et al. Comparison of antiproliferative effect of epigallocatechin gallate when loaded into cationic solid lipid nanoparticles against different cell lines. Pharm Dev Technol. 2019 Dec;24(10):1243-1249.

Silva EL, Carneiro G, De Araujo LA, et al. Solid Lipid Nanoparticles Loaded with Retinoic Acid and Lauric Acid as an Alternative for Topical Treatment of Acne Vulgaris. J Nanosci Nanotechnol. 2015 Jan;15(1):792-9.

Silva LA, Andrade LM, de Sa FA, et al. Clobetasol-loaded nanostructured lipid carriers for epidermal targeting. J Pharm Pharmacol. 2016 Jun;68(6):742-50.

Singh S, Singh M, Tripathi CB, et al. Development and evaluation of ultra-small nanostructured lipid carriers: novel topical delivery system for athlete's foot. Drug Deliv Transl Res. 2016 Feb;6(1):38-47.

Solans, C.; Solé, I. Nano-Emulsions: Formation by Low-Energy Methods. *Curr. Opin. Colloid Interface Sci.*, **2012**, *17* (5), 246–254. https://doi.org/10.1016/j.cocis.2012.07.003.

Song SH, Lee KM, Kang JB, et al. Improved skin delivery of voriconazole with a nanostructured lipid carrier-based hydrogel formulation. Chem Pharm Bull (Tokyo). 2014;62(8):793-8.

Souto EB, Almeida AJ, Müller RH. Lipid Nanoparticles (SLN®, NLC®) for Cutaneous Drug Delivery:Structure, Protection and Skin Effects. Journal of Biomedical Nanotechnology. 2007 //;3(4):317-331.

Souto EB, Anselmi C, Centini M, et al. Preparation and characterization of n-dodecyl-ferulate-loaded solid lipid nanoparticles (SLN). International journal of pharmaceutics. 2005 May 13;295(1-2):261-8.

Souto EB, Baldim I, Oliveira WP, Rao R, Yadav N, Gama FM, et al. SLN and NLC for topical, dermal, and transdermal drug delivery. Expert Opin Drug Deliv [Internet]. 2020 Mar 3;17(3):357–77. Available from: https://doi.org/10.1080/17425247.2020.1727883

Souto EB, Dias-Ferreira J, Oliveira J, et al. Atopic dermatitis and current trends in pharmacological treatment - a nanoparticulate approach. International Journal of Molecular Sciences. 2019.

Souto EB, Doktorovova S, Boonme P. Lipid-based colloidal systems (nanoparticles, microemulsions) for drug delivery to the skin: materials and end-product formulations. Journal of Drug Delivery Science and Technology. 2011;21(1):43-54.

Souto EB, Doktorovova S, Campos JR, et al. Surface-tailored anti-HER2/neu-solid lipid nanoparticles for site-specific targeting MCF-7 and BT-474 breast cancer cells. Eur J Pharm Sci. 2019 Feb 1;128:27-35.

Souto EB, Doktorovova S, Zielinska A, et al. Key production parameters for the development of solid lipid nanoparticles by high shear homogenization. Pharmaceutical development and technology. 2019 Nov;24(9):1181-1185.

Souto EB, Doktorovova S. Chapter 6 - Solid lipid nanoparticle formulations pharmacokinetic and biopharmaceutical aspects in drug delivery. Methods Enzymol. 2009;464:105-29.

Souto EB, Muller RH. Investigation of the factors influencing the incorporation of clotrimazole in SLN and NLC prepared by hot high-pressure homogenization. J Microencapsul. 2006 Jun;23(4):377-88.

Souto EB, Muller RH. Lipid nanoparticles: effect on bioavailability and pharmacokinetic changes. Handb Exp Pharmacol. 2010 (197):115-41.

Souto EB, Muller RH. SLN and NLC for topical delivery of ketoconazole. Journal of microencapsulation. 2005 Aug;22(5):501-10.

Souto EB, Wissing SA, Barbosa CM, et al. Comparative study between the viscoelastic behaviors of different lipid nanoparticle formulations. J Cosmet Sci. 2004 Sep-Oct;55(5):463-71.

Souto EB, Wissing SA, Barbosa CM, et al. Evaluation of the physical stability of SLN and NLC before and after incorporation into hydrogel formulations. Eur J Pharm Biopharm. 2004 Jul;58(1):83-90.

Souto EMB. SLN and NLC for topical delivery of antifungals. Freien Universitat Berlin; 2005.

Souto, E. B.; Baldim, I.; Oliveira, W. P.; Rao, R.; Yadav, N.; Gama, F. M.; Mahant, S. SLN and NLC for Topical, Dermal, and Transdermal Drug Delivery. *Expert Opin. Drug Deliv.*, **2020**, *17* (3), 357–377. https://doi.org/10.1080/17425247.2020.1727883.

Souto, E.B.; Doktorovova, S.; Boonme, P. Lipid-Based Colloidal Systems (Nanoparticles, Microemulsions) for Drug Delivery to the Skin: Materials and End-Product Formulations. *J. Drug Deliv. Sci. Technol.*, **2011**, *21* (1), 43–54. https://doi.org/10.1016/S1773-2247(11)50005-X.

Souto, E.B.; Baldim, I.; Oliveira, W.P.; Rao, R.; Yadav, N.; Gama, F.M.; Mahant, S. SLN and NLC for topical, dermal, and transdermal drug delivery. *Expert Opin. Drug Deliv.* **2020**, *17*, 357–377, doi:10.1080/17425247.2020.1727883.

Souto, E.B.; Mehnert, W.; Müller, R.H. Polymorphic behaviour of Compritol888 ATO as bulk lipid and as SLN and NLC. *J. Microencapsul.* **2006**, *23*, 417–33, doi:10.1080/02652040600612439.

Souza CRF, Oliveira WP. Drying of Phytochemical Compositions by Spouted Bed. In: Phytotechnology [Internet]. Boca Raton: CRC Press; 2021. p. 141–71. Available from: https://www.taylorfrancis.com/books/9781003225416/chapters/10.1201/9781003225416-8

Subramani, R.; Narayanasamy, M.; Feussner, • Klaus-D Plant-derived antimicrobials to fight against multi-drug-resistant human pathogens. *3 Biotech 7*, doi:10.1007/s13205-017-0848-9.

Svilenov H, Tzachev C. Solid lipid nanoparticles - A promising drug delivery system. Nanomedicine. Vol. 82014. p. 187-237.

Tan, A.; Rao, S.; Prestidge, C. A. Transforming Lipid-Based Oral Drug Delivery Systems into Solid Dosage Forms : An Overview of Solid Carriers , Physicochemical Properties , and Biopharmaceutical Performance. **2013**, 2993–3017. https://doi.org/10.1007/s11095-013-1107-3.

Tapeinos, C.; Battaglini, M.; Ciofani, G. Advances in the Design of Solid Lipid Nanoparticles and Nanostructured Lipid Carriers for Targeting Brain Diseases. *J. Control. Release*, **2017**, *264* (July), 306–332. https://doi.org/10.1016/j.jconrel.2017.08.033.

Taveira SF, De Santana DC, Araujo LM, et al. Effect of iontophoresis on topical delivery of doxorubicin-loaded solid lipid nanoparticles. J Biomed Nanotechnol. 2014 Jul;10(7):1382-90.

Teeranachaideekul V, Chantaburanan T, Junyaprasert VB. Influence of state and crystallinity of lipid matrix on physicochemical properties and permeation of capsaicin-loaded lipid nanoparticles for topical delivery. Journal of Drug Delivery Science and Technology. 2017;39:300-307.

Teixeira MC, Carbone C, Souto EB. Beyond liposomes: Recent advances on lipid based nanostructures for poorly soluble/poorly permeable drug delivery. Prog Lipid Res. 2017 Oct;68:1-11.

Toscano-Garibay, J. D.; Arriaga-Alba, M.; Sánchez-Navarrete, J.; Mendoza-García, M.; Flores-Estrada, J. J.; Moreno-Eutimio, M. A.; Espinosa-Aguirre, J. J.; González-Ávila, M.; Ruiz-Pérez, N. J. Antimutagenic and Antioxidant Activity of the Essential Oils of Citrus Sinensis and Citrus Latifolia. *Sci. Rep.*, **2017**, *7* (1), 11479. https://doi.org/10.1038/s41598-017-11818-5.

Trotta M, Debernardi F, Caputo O. Preparation of solid lipid nanoparticles by a solvent emulsification–diffusion technique. International Journal of Pharmaceutics. 2003;257(1-2):153-160.

Tsai MJ, Wu PC, Huang YB, et al. Baicalein loaded in tocol nanostructured lipid carriers (tocol NLCs) for enhanced stability and brain targeting. Int J Pharm. 2012 Feb 28;423(2):461-70.

Tupal A, Sabzichi M, Ramezani F, et al. Dermal delivery of doxorubicin-loaded solid lipid nanoparticles for the treatment of skin cancer. J Microencapsul. 2016 Jun;33(4):372-80.

U.S. Code of Federal Regulations. Title 21, Food and Drugs Part 182 - Substances generally recognized as safe, Section 182.20 - Essential oils, oleoresins (solvent-free), and natural extractives (including distillates).

Uprit S, Kumar Sahu R, Roy A, et al. Preparation and characterization of minoxidil loaded nanostructured lipid carrier gel for effective treatment of alopecia. Saudi Pharm J. 2013 Oct;21(4):379-85.

USP 29-NF 24. Bulk density and tapped density of powders. In: United States Pharmacopeia and National Formulary (USP 29-NF 24). Rockville, MD: USP; 2006. p. 2704.

Vaghasiya H, Kumar A, Sawant K. Development of solid lipid nanoparticles based controlled release system for topical delivery of terbinafine hydrochloride. Eur J Pharm Sci. 2013 May 13;49(2):311-22.

Valli, M.; Bolzani, V. S. Natural Products: Perspectives and Challenges for Use of Brazilian Plant Species in the Bioeconomy. *An. Acad. Bras. Cienc.*, **2019**, *91* (suppl 3). https://doi.org/10.1590/0001-3765201920190208.

Varshosaz J, Eskandari S, Tabbakhian M. Freeze-drying of nanostructure lipid carriers by different carbohydrate polymers used as cryoprotectants. Carbohydr Polym [Internet]. 2012 May;88(4):1157–63. Available from: http://dx.doi.org/10.1016/j.carbpol.2012.01.051

Veras HNH, Rodrigues FFG, Botelho MA, Menezes IRA, Coutinho HDM, Costa JGM. Enhancement of aminoglycosides and β-lactams antibiotic activity by essential oil of *Lippia*

sidoides Cham. and the Thymol. Arab J Chem [Internet]. 2017 May;10:S2790–5. Available from: http://www.sciencedirect.com/science/article/pii/S1878535213003705

Veras HNH, Rodrigues FFG, Colares A V., Menezes IRA, Coutinho HDM, Botelho MA, et al. Synergistic antibiotic activity of volatile compounds from the essential oil of *Lippia sidoides* and thymol. Fitoterapia [Internet]. 2012 Apr;83(3):508–12. Available from: http://dx.doi.org/10.1016/j.fitote.2011.12.024

Verma, R. S.; Padalia, R. C.; Goswami, P.; Verma, S. K.; Chauhan, A.; Darokar, M. P. Chemical Composition and Antibacterial Activity of Foliage and Resin Essential Oils of Araucaria Cunninghamii Aiton Ex D.Don and Araucaria Heterophylla (Salisb.) Franco from India. *Ind. Crops Prod.*, **2014**, *61*, 410–416. https://doi.org/10.1016/j.indcrop.2014.07.040.

Vieira R, Severino P, Nalone LA, et al. Sucupira Oil-Loaded Nanostructured Lipid Carriers (NLC): Lipid Screening, Factorial Design and Cytotoxicity. Molecules. 2019;accepted.

Vishali, D. A.; Monisha, J.; Sivakamasundari, S. K.; Moses, J. A.; Anandharamakrishnan, C. Spray Freeze Drying: Emerging Applications in Drug Delivery. *J. Control. Release*, **2019**, *300* (October 2018), 93–101. https://doi.org/10.1016/j.jconrel.2019.02.044.

Waghule T, Rapalli VK, Singhvi G, et al. Voriconazole loaded nanostructured lipid carriers based topical delivery system: QbD based designing, characterization, in-vitro and ex-vivo evaluation. Journal of Drug Delivery Science and Technology. 2019 2019/08/01/;52:303-315.

Walters, R. H.; Bhatnagar, B.; Tchessalov, S.; Izutsu, K. I.; Tsumoto, K.; Ohtake, S. Next Generation Drying Technologies for Pharmaceutical Applications. *J. Pharm. Sci.*, **2014**, *103* (9), 2673–2695. https://doi.org/10.1002/jps.23998.

WAYNE; PA Reference method for broth dilution antifungal susceptibility testing of yeasts, Approved standard-second edition. *CLSI Doc. M27-A2* **2002**.

Wehrung D, Geldenhuys WJ, Oyewumi MO. Effects of gelucire content on stability, macrophage interaction and blood circulation of nanoparticles engineered from nanoemulsions. Colloids Surf B Biointerfaces. 2012 Jun 1;94:259-65.

Weiss, J.; Gaysinsky, S.; Davidson, M.; McClements, J. Nanostructured Encapsulation Systems. In *Global Issues in Food Science and Technology*; Elsevier, 2009; pp 425–479. https://doi.org/10.1016/B978-0-12-374124-0.00024-7.

Wissing SA, Kayser O, Muller RH. Solid lipid nanoparticles for parenteral drug delivery. Advanced Drug Delivery Reviews. 2004 May 7;56(9):1257-72.

Wurtzen, G. Shortcomings of Current Strategy for Toxicity Testing of Food Chemicals: Antioxidants. *Food Chem. Toxic.*, **1990**, *28* (11), 743–745.

Xia Q, Saupe A, Muller RH, et al. Nanostructured lipid carriers as novel carrier for sunscreen formulations. International Journal of Cosmetic Science. 2007 Dec;29(6):473-82.

Xu, X.; Sun, Q.; McClements, D. J. Enhancing the Formation and Stability of Emulsions Using Mixed Natural Emulsifiers: Hydrolyzed Rice Glutelin and Quillaja Saponin. *Food Hydrocoll.*, **2019**, *89* (October 2018), 396–405. https://doi.org/10.1016/j.foodhyd.2018.11.020.

Yang Y, Corona A, 3rd, Schubert B, et al. The effect of oil type on the aggregation stability of nanostructured lipid carriers. Journal of colloid and interface science. 2014 Mar 15;418:261-72.

Yang, S.; Liu, L.; Han, J.; Tang, Y. Encapsulating Plant Ingredients for Dermocosmetic Application: An Updated Review of Delivery Systems and Characterization Techniques. *Int. J. Cosmet. Sci.*, **2020**, *42* (1), 16–28. https://doi.org/10.1111/ics.12592.

Yap, P.S.X.; Yiap, B.C.; Ping, H.C.; Lim, S.H.E. Essential oils, a new horizon in combating bacterial antibiotic resistance. *Open Microbiol. J.* **2014**, *8*, doi:10.2174/1874285801408010006.

Yue, Y.; Zhao, D.; Yin, Q. Hyaluronic acid modified nanostructured lipid carriers for transdermal bupivacaine delivery: In vitro and in vivo anesthesia evaluation. *Biomed. Pharmacother.* **2018**, *98*, 813–820, doi:10.1016/j.biopha.2017.12.103.

Zanatta CF, Sato AMC de F, Camargo Junior FB de, Campos PMBGM, Rocha-Filho PA. Rheological behavior, zeta potential, and accelerated stability tests of Buriti oil (Mauritia flexuosa) emulsions containing lyotropic liquid crystals. Drug Dev Ind Pharm [Internet]. 2010 Jan 8;36(1):93–101. Available from: http://www.ncbi.nlm.nih.gov/pubmed/19656003

Zhang YT, Han MQ, Shen LN, et al. Solid Lipid Nanoparticles Formulated for Transdermal Aconitine Administration and Evaluated In Vitro and In Vivo. J Biomed Nanotechnol. 2015 Feb;11(2):351-61.

Zhao J, Piao X, Shi X, et al. Podophyllotoxin-Loaded Nanostructured Lipid Carriers for Skin Targeting: In Vitro and In Vivo Studies. Molecules. 2016 Nov 17;21(11).

Zheng, W.; Wang, S. Y. Antioxidant Activity and Phenolic Compounds in Selected Herbs. *J. Agric. Food Chem.*, **2001**, *49* (11), 5165–5170. https://doi.org/10.1021/jf010697n.

Zhou, F.; Ji, B.; Zhang, H.; Jiang, H.; Yang, Z.; Li, J.; Li, J.; Yan, W. The antibacterial effect of cinnamaldehyde, thymol, carvacrol and their combinations against the foodborne pathogen Salmonella typhimurium. *J. Food Saf.* **2007**, *27*, 124–133, doi:10.1111/j.1745-4565.2007.00064.x.

Ziegler, M.; Quirin, K.-W.; Gerard, D.; Reichelt, M.; Salzer, U.-J.; Deicke, K. H. Manufacturing Processes: Physical Processes. In *Flavourings*; Ziegler, H., Ed.; Weinheim, 2007; pp 15–119. https://doi.org/10.1002/9783527611454.ch2a.

Zielinska A, Ferreira NR, Durazzo A, et al. Development and Optimization of Alpha-Pinene-Loaded Solid Lipid Nanoparticles (SLN) Using Experimental Factorial Design and Dispersion Analysis. Molecules. 2019 Jul 24;24(15).

Zielinska A, Martins-Gomes C, Ferreira NR, et al. Anti-inflammatory and anti-cancer activity of citral: Optimization of citral-loaded solid lipid nanoparticles (SLN) using experimental factorial design and LUMiSizer(R). Int J Pharm. 2018 Dec 20;553(1-2):428-440.

Zoubari G, Staufenbiel S, Volz P, et al. Effect of drug solubility and lipid carrier on drug release from lipid nanoparticles for dermal delivery. European journal of pharmaceutics and biopharmaceutics : official journal of Arbeitsgemeinschaft fur Pharmazeutische Verfahrenstechnik eV. 2017 Jan;110:39-46.


UNIVERSIDADE DE SÃO PAULO
SCIENTIA VINCES