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Overview

Currently, I am an Assistant Professor at the Faculty of Pharmacy, An-Najah National University.

I started the position at An-Najah National University in Sep 2023 and my role includes building courses for the cosmetic and skincare program and teaching pharmaceutical technology and cosmetic courses for undergraduate and master students. Within my role, I am a supervisor of a number of research projects for undergraduate and Master students. In addition, I serve as the Head of the Pharmaceutical Research Unit and a member of the Pharmaceutical Nanotechnology Research Group at The Medical and Health Sciences Research Center, Scientific Centers, An-Najah National University. I focus in my research on multidisciplinary research aiming to develop novel delivery systems for medical and cosmetic applications.

I co-authored several publications including original research and review articles and a book chapter. I am a co-inventor of seven patents and patent applications and a recipient of the prestigious Kaye innovation award, The Hebrew University of Jerusalem, 2022 for my contribution to the invention of a new nanotechnology to enhance drug delivery to the brain.

Academic Education

- 2012 – 2018 Ph.D. degree in Pharmaceutical Sciences. Thesis entitled "Nasal Delivery of Peptides and Hydrophilic Molecules to Brain by Vesicular Carriers". The PhD research focused on the development and characterization the Phospholipid Magnesome- a novel nanovesicular carrier for nasal delivery of active molecules to the brain.

- 2009 – 2012 M.Sc. degree in Pharmaceutical Sciences, The Hebrew University of Jerusalem. Thesis entitled "Nasal Delivery to Brain".

- 2000 – 2005 B. Pharm degree, School of Pharmacy. An-Najah National University, Palestinian Authority.

Experience

Visiting Assistant Professor at An-Najah National University: Sep 2023- Present

Building and preparing new courses for the cosmetic and skincare program

Teaching pharmaceutical sciences and cosmetic courses for ungraduated and Matser students at the Faculty of Pharmacy, An-Najah National University.

In collaboration with colleagues in my department and University, I have established multidisciplinary research focusing on the following topics:

- Development of novel nano systems for enhanced drug delivery to the brain
- Design and investigation of novel nanocarriers for dermal/transdermal delivery of medical and cosmetic ingredients
- Medical applications and dosage form design using 3D printing technology for personalized medical and cosmetic applications

In our research we aim to employ standard qualitative and quantitative *in vivo* and *in vivo* methods as well as material engineering methods.

Part-time Academic Staff Member at An-Najah National University: Jan 2023- Sep 2023

Teaching pharmaceutical sciences courses for ungraduated students at the Department of Pharmacy, the Faculty of Medicine and Health Sciences, An-Najah National University.

During this period, I started to build multidisciplinary research focusing on the following topics:

- Development of novel systems for enhanced drug delivery to the brain
- Design and investigation of dermal/transdermal delivery systems for medical and cosmetic purposes
- Cosmeceutical research

Research Fellow at The Hebrew University of Jerusalem: Jan 2023- Jan 2024

Conducting research focusing on Tech transfer of novel drug delivery systems for transdermal drug delivery for medical and cosmetic applications and for nasal

administration for treatment of brain and CNS disorders such as impaired memory, anxiety, depression, pain and Parkinson's Disease.
Planning and execution of several studies on drugs penetration into and through the skin from various drug delivery systems in collaboration with industry.

Lecturer at The Hebrew University of Jerusalem: 2021

Pharmaceutical Sciences: Introduction to pharmaceutics, dosage forms and extemporaneous formulations- Preparative course for the Israeli Pharmacy Practice Board. Institute for Drug Research, Faculty of Medicine, Hebrew University of Jerusalem**.**

Post-doctoral fellow at the Hebrew University of Jerusalem: 2018 – 2022

The role in Prof. Touitou's lab includes investigating delivery systems for enhanced drug penetration into and through the skin and other biological membranes. The role was to plan, execute, monitor, and document of a number of pharmaceutical projects according to the highest standards.
The activity in the lab includes the following:

- Design and characterization of novel pharmaceutical formulations for systemic and targeted delivery of active ingredients.
- Planning experiments, preparing protocols and performing *in vivo* and *in vitro* experiments using various methods.
- Experimental methods: in vivo animal models of pain, insomnia, Parkinson's disease, anxiety, depression, memory impairment, arthritis and inflammation; in vivo administration of oral, nasal, topical and parenteral dosage forms; in vivo pharmacokinetic studies; drug extraction from several organs; in vitro skin penetration and permeation studies; confocal laser scanning microscopy (CLSM); electron microscopy; multiphoton microscopy; dynamic light scattering (DLS); differential scanning calorimetry (DSC); high-performance liquid chromatography (HPLC) assays; liquid chromatography mass spectrometry (LC-MS/MS) assays.
- Scientific and academic writing (thesis, original research articles, review articles, ethical proposals, and grants application).
- Training and advising MSc and PhD students (including theoretical and practical guidance, safe laboratory work tutorials, software tutorials,

experimental simulation, experimental exemplification, monitoring and feedback)

- Administrative lab duties, including relationships with suppliers, chemical and equipment orders, and financial reports.

Tutor and Teaching Assistant at the Hebrew University of Jerusalem: 2012-2016

Semisolid and Topical Pharmaceutical Preparations (preparation of emulsions, creams, medicated creams, ointments, gels, lotions, micellar solutions, pastes and suppositories), Pharmaceutical Technology Course for undergraduates. Pharmaceutical Science Department. School of Pharmacy, The Hebrew University of Jerusalem.

Pharmacist at the Pharmacy of Share Zedek Medical Center: 2008

Clinical round, prescription dispensing, preparation of pharmaceutical sterile formulations including TPN, eye drops, formulations for parenteral use and non-sterile pharmaceutical formulations such as syrups, suspensions, ointments and creams.

Pharmacist: 2006–2007

Community pharmacist at Habash Pharmacy, old city, Jerusalem.

Continuous Education and Courses

- 2024 Academic Teaching Certificate, An-Najah National University
- 2024 AI tools applications in academic teaching, An-Najah National University
- 2019 Medical Cannabis. Continuous Pharmacy Education. Israeli Medical Cannabis Agency, Ministry of Health and the Hebrew University of Jerusalem.
- 2018 Perfect Your Academic Writing Skills. Radboud Summer School. Nijmegen, The Netherlands.
- 2018 Regulation and Drug registration. Continuous Pharmacy Education. The Hebrew University of Jerusalem and the ministry of Health, Tel Aviv, Israel.
- 2009 Ethical use and care of animals in biomedical research (rodents and rabbits), Authority for Biological and Biomedical Models, The Hebrew University of Jerusalem.

Other Activities

- Advisory Board Member at BioPass Pharma, a start up company specialized in nasal drug delivery to the brain based on the technology I have developed during my PhD research
- Reviewer for several peer-reviewed journals in the field of pharmaceutics, cosmetics and drug delivery.
- Voluntary work in high and middle schools in East Jerusalem including:
    - Workshops on several topics such as academic writing and choosing career path.
    - Lectures aiming to raise the awareness among youth to the importance of female high education.

Awards and Grants

- 2022 The Kaye Innovation Award for students, the Hebrew University of Jerusalem for her role in the invention "A New Nanotechnology for Enhanced Drug Delivery to the Brain".
- 2018 Erasmus+ grant. Perfect Your Academic Writing Skills. Radboud Summer School, Nijmegen, The Netherlands.
- 2012-2016 Scholarship for excellent students, The School of Pharmacy, The Hebrew University of Jerusalem.

Other skills and qualifications

Cosmetic formulations and drug delivery systems expert and consultant

Certified Cosmetician:

- Since 07.2023 I started to specialize as a cosmetician and aesthetic expert as part of my role in establishing new courses in the program of cosmetics and skincare at An-Najah National University

Computer Knowledge:

- Working experience in a computerized control environment.
- Experience in Microsoft Office programs (Word, Excel and Power Point)
- Several software programs e.g. Prism, ImageJ and ImagePro, ZEN, IrfanView.

Languages:

- Arabic: Mother tongue level.
- English and Hebrew: High level, reading, writing, and speaking.

List of Publications

Book Chapters

- Touitou, E., Natsheh, H. (2022) Hemp for skin anti-aging. In: P. Morganti (Ed) Biofunctional Textiles for an Ageing Skin -From the Bench to the Market. pp 263-292, Lambert Academic Publishing, Republic of Moldova.

Peer reviewed Articles

- Natsheh, H., Eid, A.M., Kittana, N. *et al.* (2025). Transethosomal System for Enhanced Dermal Delivery of Clindamycin. BioNanoScience, 224(15) 5

- Natsheh, H., Qneibi, M., Kittana, N., Jaradat, N., Assali, M., Shaqour, B., ... & Bdair, M. (2025). Transethosomal system for enhanced transdermal delivery and therapeutic effect of caryophyllene oxide. International Journal of Pharmaceutics, *670*, 125111.

- Shaqour, B., Natsheh, H., Kittana, N., Jaradat, N., Abualhasan, M., Eid, A. M., ... & Vanhoorne, V. (2024). Modified Release 3D-Printed Capsules Containing a Ketoprofen Self-Nanoemulsifying System for Personalized Medical Application. ACS Biomaterials Science & Engineering, 10(6), 3833-3841.

- Hawash, M., Qneibi, M., Natsheh, H., Mohammed, N. H., Hamda, L. A., Kumar, A., ... & Bdair, M. (2024). Evaluating the Neuroprotective Potential of Novel Benzodioxole Derivatives in Parkinson's Disease via AMPA Receptor Modulation. ACS Chemical Neuroscience, 15(11), 2334-2349.

- Touitou, E., & Natsheh, H. (2024). The Evolution of Emerging Nanovesicle Technologies for Enhanced Delivery of Molecules into and across the Skin. Pharmaceutics, 16(2), 267.

- Messer, L., Zoabi, A., Yakobi, R., Natsheh, H., Touitou, E., & Margulis, K. (2024). Evaluation of nasal delivery systems of olanzapine by desorption electrospray ionization mass spectrometry imaging. International Journal of Pharmaceutics, 650, 123664.

- Eid, A. M., Natsheh, H., Issa, L., Zoabi, M., Amer, M., Mahamid, E., & Mousa, A. (2024). Capsicum annuum oleoresin nanoemulgel-design characterization and in vitro investigation of anticancer and antimicrobial activities. Current Pharmaceutical Design, 30(2), 151-160.

- Hawash, M., Al-Smadi, D., Kumar, A., Olech, B., Dominiak, P. M., Jaradat, N., Antari, S., Mohammed, S., Nasasrh, A., Abualhasan, M., Musa, A., Suboh, S., Çapan, İ., Qneibi, M., & Natsheh, H. (2023). Characterization and Investigation of Novel Benzodioxol Derivatives as Antidiabetic Agents: An In Vitro and In Vivo Study in an Animal Model. Biomolecules, *13*(10), 1486

- Touitou, E., Natsheh, H., Zailer, J. (2023). Film Forming Systems for Delivery of Active Molecules into and Across the Skin. Pharmaceutics in press

- Natsheh, H., & Touitou, E. (2022). Improved Efficiency of Pomegranate Seed Oil Administrated Nasally. Pharmaceutics, 14(5), 918.

- Touitou, E., & Natsheh, H. (2021). Topical Administration of Drugs Incorporated in Carriers Containing Phospholipid Soft Vesicles for the Treatment of Skin Medical Conditions. Pharmaceutics, 13(12), 2129.

- Touitou, E., Natsheh, H., Boukeileh, S. and Awad, R. (2021) Short Onset and Enhanced Analgesia Following Nasal Administration of Non-Controlled Drugs in Nanovesicular Systems. Pharmaceutics, 13:978.

- Natsheh, H., Touitou, E. (2020) Phospholipid Vesicles for Dermal/Transdermal and Nasal Administration of Active Molecules: The Effect of Surfactants and Alcohols on the Fluidity of Their Lipid Bilayers and Penetration Enhancement Properties. Molecules, 25: 2959.

- Touitou, E., Duchi, S., Natsheh, H. (2020) A new nanovesicular system for nasal drug administration. Int. J. Pharm., 119243.

- Natsheh, H., Vettorato, E., Touitou, E. (2019) Ethosomes for dermal administration of natural active molecules. Curr. Pharm. Des., 25: 2338-2348.

- Touitou, E., Natsheh, H., Duchi, S. (2018) Buspirone nanovesicular nasal system for non-hormonal hot flushes treatment. Pharmaceutics,10: 82.

- Natsheh, H., Touitou, E. (2018) Phospholipid Magnesome—a nasal vesicular carrier for delivery of drugs to brain. Drug. Deliv. Transl. Res., 8: 806-819.
- Cohen, G., Natsheh, H., Sunny, Y., Bawiec, CR., Touitou, E., Lerman, MA., Lazarovici, P., Lewin, PA. (2015) Enhanced Therapeutic Anti-Inflammatory Effect of Betamethasone on Topical Administration with Low-Frequency, Low-Intensity (20 kHz, 100 mW/cm(2)) Ultrasound Exposure on Carrageenan-Induced Arthritis in a Mouse Model.Ultrasound. Med. Biol., 41: 2449-2457.

Patents and Patent Applications

- Margulis, K., Touitou E., Al Hija, M., Zoabi, A., Natsheh H. New and useful improvements in innovative sunscreens. Application No. 63/775,079. Filing date 20.03 2025
- Touitou, E., Natsheh, H. Compositions for dermal/transdermal delivery and cosmetic use. International Application No.PCT/IL2023/050976. International Filing date 21.03.2024
- Touitou, E., Natsheh, H. Compositions and methods for nasal administration of drugs to brain and for systemic effect. US Patent 11,389,404. Publication date 20.08.2024
- Touitou, E., Natsheh, H. Orally administrable cannabinoids-containing compositions and methods. US Patent App. 17/289,932. Publication date 13.01.2022
- Touitou, E., Natsheh, H. Cannabinoids-containing beverages. US Patent App. 17/289,576. Publication date 13.01.2022
- Touitou, E., Natsheh, H. Cannabinoids compositions and methods. US Patent App. 16/767,799. Publication date 15.11.2020
- Touitou, E., Natsheh, H. Nasal compositions and methods. US Patent App. 17/290,908. Publication date 02.12.2021

Conference proceedings

- Natsheh H. Modified Release 3D-Printed Capsules Containing Ketoprofen Self-Nanoemulsifying System for Personalized Medical Applications. NanoInnovation. 2024, Rome, Italy.
- Natsheh H, Touitou E. Improved Efficiency of Pomegranate Seed Oil Administrated Nasally. Oral Presentation at Scholars International Conference and Exhibition on Pharmaceutics and Drug Delivery Research. 2022; Dubai, UAE.
- Natsheh H, Touitou E. Peptides Delivery to Brain by Nasal Administration. Nanoinnovation Conference and Exhibition. 2020; Rome, Italy.
- Natsheh H, Touitou E. Nasal administration of tramadol and oxytocin in animal model for pain using phospholipid magnesome carrier. 18th Annual Congress on Pharmaceutics & Drug Delivery Systems. 2019; Amsterdam, The Netherlands
- Natsheh H, Duchi S, Touitou E. Treatment of animal model for hot flushes by nasal administration of a non-hormonal drug delivery system. International Pharma Research and Drug Development Summit. 2019; Brussels, Belgium
- Natsheh H. A nasal vesicular carrier for delivery of drugs to brain. 17th Annual Congress on Pharmaceutics & Drug Delivery Systems. Pharm Anal Acta, 2018; Prague, Czech Republic; doi: 10.4172/2153-2435-C2-036
- Natsheh H, Touitou E. Nasal delivery of drugs by specially designed nanovesicular carriers (NVC). The annual meeting of the Institute of Drug Research. 2017; Tiberias, Israel

List of Courses (including taught and established courses)

- **Advanced Cosmetics:** First Year, Master's Degree Studies in pharmaceutical sciences

- **Industrial Pharmaceutical Training:** First Year, Master's Degree Studies in pharmaceutical sciences
- **Cosmetic Formulations I:** Second year, undergraduate cosmetic and skincare program
- **Cosmetic Formulations II:** Third year, undergraduate cosmetic and skincare program
- **Raw Materials in Cosmetics:** Third year, undergraduate cosmetic and skincare program
- **Skincare Products:** Third year, undergraduate cosmetic and skincare program
- **Hair and Nail Care Products:** Third year, undergraduate cosmetic and skincare program
- **Signs of Aging and Prevention Methods:** Third year, undergraduate cosmetic and skincare program
- **Eye Cosmetics:** Third year, undergraduate cosmetic and skincare program
- **Antiaging Protocols and Methods:** Fourth year, undergraduate cosmetic and skincare program
- **Nano-cosmetics:** Fourth year, undergraduate cosmetic and skincare program
- **Pharmaceutics II:** Third year, undergraduate pharmacy program
- **Pharmaceutics II:** Third year, undergraduate pharmacy program
- **Graduation Research Project:** Fourth year, undergraduate cosmetic and skincare program
- **Graduation Research Project:** Fourth year, undergraduate pharmacy program