

Curriculum Vitae

Name: Rana (M. N.) Abu-Dahab

Date of birth: 08 March 1969

Place of birth: Kuwait

Nationality: Jordanian

Marital status: Married.

Address: PO Box 2107, Amman 11941, JORDAN

Tel: + 962 6 53 55 000 Fax: +962 6 5300 250 Mobile: +962775180803 Email: abudahab@ju.edu.jo

Education

1986 Secondary School Certificate, Scientific branch, Islamic College,

94.1%. Amman, Jordan

1986-1991 B.Sc. Pharmacy with honor degree, Jordan University, Amman, Jordan

1991 Permission to Practice Pharmacy, Amman, Jordan

1995-1996 M.Sc. Biopharmacy with distinction, King's College London, University

of London, UK

1997-2001 Ph.D. Biopharmacy, Saarland University, Germany

Training and Working Experience

1991-1993 Arab Pharmaceutical Manufacturing Company, Research and

Development Department, Salt, Jordan

1993-1995 Faculty of Pharmacy, Jordan University, Teaching Assistant

1996-1997 Faculty of Pharmacy, Jordan University, Lecturer

Oct.1997-June 2001 Ph.D. candidate, Dept. of Biopharmaceutics and Pharmaceutical

Technology, Saarland University, Saarbrücken, Germany

1

1998-2000 European Editor Assistant, EJPB, Germany

Son 2001-Mar 2008	Faculty of Pharmacy, Dept. of Biopharmaceutics and Clinical
Оер. 2001-Mar.2000	Pharmacy, Jordan University, Assistant Professor
Cummor 2004	
Summer 2004	Faculy per Factory Prgramme, Triumpharma, Amman, Jordan
Sep. 2005-Sep 2007	Assistant Dean for Students Affairs, Faculty of Pharmacy, Jordan
	University
Sep. 2007-Sep.2009	Head of Departement of Biopharmaceutics and Clinical Pharmacy,
	Faculty of Pharmacy, Jordan University
March 2008	Assoaciate Professor of Biopharmacy, Faculty of Pharmacy, Jordan
	University
2005- 2007	Member in Bioequivalence Studies Evaluation committee, JFDA
2005- 2006	Member in Registration of Biopharmacueticals committee, JFDA
2008-2012	Member in the Registration of Vaccines and Sera committee, JFDA
Since Jan. 2008	Member in the IRB committee, Pharmaceutical Research Unit, Amman,
	Jordan. From Jan 2020, Chairman of the committee
Sep.2010-Sep.2011	Visiting Associate Prof., Dept of Pharmaceutical Technology, JUST,
	Jordan
Summer 2011	Faculty per Factory Programme, JPM, Naur, Jordan
Sep 2013-Sep 2014	Assistant Dean for Quality Management
Since Nov 2013	Prof. of Biopharmacy, Dept. of Biopharmaceutics and clinical
	pharmacy, The University of Jordan
Sep 2014-May 2016	Member in the Scientific committee in the Jordanian Science Research
	Foundation
Sep 2014-Sep 2015	Sabbatical leave at Zarqa University
Sep 2015-Spe 2016	Vice Dean of Scientific Research, The University of Jordan
July 2018-Sep 2019	Member in Bioequivalence Studies Evaluation Committee, JFDA
April 2019- Sep 2022	Member of the Board of Trustees, Zarqa University, Jordan
Sep 2020-Sep 2022	Member of the JFDA, Higher Registration committe
Sep 2020-Sep 2022	Dean of the School of Pharmacy, The University of Jordan
Since Sep 2022	Member of the Board of Trustees, Mutah University, Jordan
•	•

Publications in Refereed Journals

Bayan Almohammad Aljabr, Malek Zihlif, <u>Rana Abu-Dahab</u>, Hiba Zalloum. Effect of quercetin on doxorubicin cytotoxicity in sensitive and resistant human MCF7 breast cancer cell lines. Biomedical Reports. 2024. https://doi.org/10.3892/br.2024.1745

Nisreen A. Dahshan, <u>Rana Abu-Dahab</u>, Enam A. Khalil, Amal G. Al-Bakri. Bactericidal effect of Iberin combined with photodynamic antimicrobial chemotherapy against *Pseudomonas aeruginosa* biofilm cultured on *ex vivo* wound model. Photodiagnosis and Photodynamic Therapy. 2023. 44 103841. https://doi.org/10.1016/j.pdpdt.2023.103841

Ahmad Telfah, Nour Abu Shari'ah, Riad Ababneh, Ahmad Bahti, M-Ali Al-Akhras, Yusuf Al-Hiari, Inshad Jum'h, Rana Abu-Dahab, Mahmoud Telfah, Qais M Al Bataineh, Roland Hergenröder. 1H-NMR analysis of fluoroquinolone (pyridopyrrole quinoxaline, PPQ) conjugated to gold nanoparticles for synergistic anticancer drug design. Journal of Molecular Structure. 2023. 1292. 136081. https://doi.org/10.1016/j.molstruc.2023.136081

Husam Nassar, Wolfgang Sippl, <u>Rana Abu Dahab</u> and Mutasem Taha. Molecular docking, molecular dynamics simulations and *in vitro* screening reveal cefixime and ceftriaxone as GSK3β covalent inhibitors. RSC Adv., 2023, 13, 11278-11290. DOI: 10.1039/D3RA01145C

R. Ababneh, M. Smadi, NEH Bensiradj, M. Ali Al-Akhras, Yusuf Al-Hiari, Inshad Jum'h, <u>Rana Abu-Dahab</u>, Qais M. Al Bataineh & Ahmad Telfah UV–Vis, FTIR and DFT Studies of the Fluoroquinolone [Pyrido Pyrolo Quinoxaline (PPQ)] Tethered to Gold Nanoparticles as a Novel Anticancer. J Inorg Organomet Polym (2023). https://doi.org/10.1007/s10904-023-02596-x

Lina A Dahabiyeh, Farah Hudaib, Wafa Hourani, Wesam Darwish, Bashaer Abu-Irmaileh, Pran Kishore Deb, Katharigatta N Venugopala, Viresh Mohanlall, Sandeep Chandrashekharappa, Rana Abu-Dahab, Mohammad H Semreen, Yasser Bustanji. Mass Spectrometry-based Metabolomics Approach and in vitro Assays Revealed Promising Role of 2, 3-Dihydroquinazolin-4 (1H)-one Derivatives Against Colorectal Cancer Cell Lines. European Journal of Pharmaceutical Sciences. 2023: 106378

Lina A Dahabiyeh, Wafa Hourani, Wesam Darwish, Farah Hudaib, Bashaer Abu-Irmaileh, Pran Kishore Deb, Katharigatta N Venugopala, Viresh Mohanlall, <u>Rana Abu-Dahab</u>, Mohammad H Semreen, Yasser Bustanji. Molecular and metabolic alterations of 2, 3-dihydroquinazolin-4 (1H)-one derivatives in prostate cancer cell lines, Scientific Reports, 2022, Vol 12, Isuue 1, 1-17.

Duaa Abuarqoub, Nouf N. Mahmoud, Rand Zaza, <u>Rana Abu-Dahab</u>, Enam A. Khalil, and Dima A. Sabbah. The in vitro Immunomodulatory Effects of Gold Nanocomplex on THP-1-Derived macrophages. Journal of Immunology Research, 2022, Article ID 6031776, https://doi.org/10.1155/2022/6031776

Husam Nassar, <u>Rana Abu-Dahab</u> and Mutasem Taha. Inhibition of Protein Kinases by Proton Pump Inhibitors: Computational Screening and In Vitro Evaluation" Medicinal Chemistry Research volume 30, pages 2266–2276 (2021). https://doi.org/10.1007/s00044-021-02812-8

Rana Abu-Dahab, Nouf N Mahmoud, Maha Abdallah, Lama Hamadneh, Suhair Hikmat, Rand Zaza, Duaa Abuarqoub, Enam A Khalil. Cytotoxicity and Cellular Death Modality of Surface-Decorated Gold Nanorods against a Panel of Breast Cancer Cell Lines. 2021. ACS Omega. 6 (24), 15903-15910. DOI: 10.1021/acsomega.1c01386

Nouf N. Mahmoud, Haneen Qabooq, Shrouq Alsotari, Ola A. Tarawneh, Nour H. Aboalhaija, Sawsan Shraim, Alaaldin M. Alkilany, Enam A. Khalil and <u>Rana Abu-Dahab</u>. Quercetin-gold nanorods incorporated into nanofibers: development, optimization and cytotoxicity. 2021. RSC Adv., 11, 19956. DOI: 10.1039/d1ra02004h rsc.li/rsc-advances

Nour Aboalhaija, Fatma Afifi, Maysa Al-Hussaini, M Al-Najjar, <u>Rana Abu-Dahab</u>, Eliza Hasen, Maha Rashed, Sara Abdel Haq, E Khalil. In Vitro and In Vivo Evaluation of the Wound Healing Potential of the Extracts of Schinus molle L.(Anacardiaceae) Grown in Jordan. 2021. Indian Journal of Pharmaceutical Sciences 83 (2), 252-261

Rana Abu-Dahab, Raed AL-Hweiyyan, Areej Abuhammad, Fatma Afifi. Effect of Selected Pure Compounds of Plant Origin on the Proliferation, Adhesion, Migration, and Invasion of Human Prostate Cancer Cells. 2021. Tropical Journal of Natural Product Research. 5(2):253-259. doi.org/10.26538/tjnpr/v5i

Lina Dahabiyeh, Nouf N. Mahmoud, Mohammad A. Al Natour, Laudina Safo, Dong-Hyun Kim, Enam A. Khalil, <u>Rana Abu-Dahab</u>. Phospholipid-Gold Nanorods Induce Energy Crisis in MCF-7 Cells: Cytotoxicity Evaluation Using LC-MS-Based Metabolomics Approach. 2021. Biomolecules. https://doi.org/10.3390/biom11030364

Nouf N. Mahmoud, Hakam Aqabani, Suhair Hikmat, <u>Rana Abu-Dahab</u>. Colloidal stability and Cytotoxicity of Polydopamine-Conjugated Gold Nanorods Against Prostate Cancer Cell Lines. 2021. Molecules. https://doi.org/10.3390/molecules26051299

Nouf N.Mahmoud, <u>Rana Abu-Dahab</u>, Maha Abdallah, Sabaa Al-Dabash, Duaa Abuarqoub, Abdulrahim Albasha, Enam A.Khalil. Interaction of gold nanorods with cell culture media: Colloidal stability, cytotoxicity and cellular death modality. Journal of Drug Delivery Science and Technology. 2020, Volume 60, 101965. https://doi.org/10.1016/j.jddst.2020.101965

Imad I Hamdan, Dina El-Sabawi, Tverdokhleb N.M., Lantushenko A.O, Evstigneev M.P., Rana Abu-Dahab. Studies on potential interaction between cincalcet hydrochloride and diclofenac sodium. Biophysical Chemistry. 2020, Volume 266, 106460, https://doi.org/10.1016/j.bpc.2020.106460

Nouf N. Mahmoud, Duaa Abuarqoub, Rand Zaza, Dima A. Sabbah, Enam A. Khalil, <u>Rana Abu-Dahab</u>. Gold Nanocomplex Strongly Modulates the PI3K/Akt Pathway and Other Pathways in MCF-7 Breast Cancer Cell Line. International Journal of Molecular Sciences. 2020, 21, 3320; doi:10.3390/ijms21093320

Shahd Al-Maaz, <u>Rana Abu-Dahab</u>, Mayyada Wazaify & Munir Shawagfeh (2020) Secondhand exposure to aerosolized intravenous anesthetics (fentanyl) among anesthesiologists in Jordan, Journal of Substance Use, 25:4, 405-411, DOI: <u>10.1080/14659891.2020.1723723</u>

Imad Hamdan, Duaa Farah and Rana Abu-Dahab, Chromatographic Behaviour and Analytical Method Development for Metformin HCl: Application to Permeation Studies through Caco-2 Cells. Acta Poloniae Pharmaceutica - Drug Research, 2020, 77(1): 11-21

Mahmoud, Nouf; <u>Abu-Dahab, Rana</u>; Hamadneh, Lama; Abuarqoub, Duaa; Jafar, Hanan; Khalil, Enam, Insights into the Cellular Uptake, Cytotoxicity and Cellular Death Modality of Phospholipid-Coated Gold Nanorods Toward Breast Cancer Cell Lines. Molecular Pharmaceutics. August 2019. DOI: 10.1021/acs.molpharmaceut.9b00470

Nouf N. Mahmoud, Lubna M. Al-Kharabsheh, Enam A. Khalil, and <u>Rana Abu-Dahab</u>, Interaction of Gold Nanorods with Human Dermal Fibroblasts: Cytotoxicity, Cellular Uptake, and Wound Healing. Nanomaterials 2019, 9, 1131; doi:10.3390/nano9081131

Nagham S. Al-dmour, <u>Rana M.N. Abu-Dahab</u>, Maxim P. Evstigneev, Victor V. Kostjukov, Dina El Sabawi, Imad I. Hamdan. Interaction of Pseudoephedrine and Azithromycin with Losartan: Spectroscopic, Dissolution and Permeation Studies. Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy. 2019. 221 117194. https://doi.org/10.1016/j.saa.2019.117194

Mahmoud, N.N., Sabbah, D.S., <u>Abu-Dahab, R.M</u>, Abuarqoub, D., Rashed, R., Hasan Ibrahim, A., Khalil, E.A. Cholesterol-Coated Gold Nanorods as an Efficient Nano-Carrier for Chemotherapeutic Delivery and Potential Treatment of Breast Cancer: *In vitro* Studies Using MCF-7 Cell Line. *RSC Advances*, 2019, 9 (22):12718-12731

Shahd Al-Maaz , <u>Rana Abu-Dahab</u> , Munir Shawagfeh , and Mayyada Wazaify. Prevalence and pattern of substance use and misuse among anesthesia health-care personnel in Jordan. Journal of Substance Use. 2019. 24:3, 317-322,

DOI: 10.1080/14659891.2019.1570366

Bashar Altaani, Suhair Nimri, Razan Hadad and <u>Rana Abu-Dahab</u>. Preparation and Characterization of an Oral Norethindrone Sustained Release/Controlled release Nanoparticles Formulation Based on Chitosan. AAPS PharmSciTech. 2019. 20(2):54

Dina El-Sabawi, Rana Abu-Dahab, Amal G. Al-Bakri, Imad I Hamdan. Studies on the interaction between ciprofloxacin hydrochloride and diclofenac sodium. Tropical Journal of Pharmaceutical Research. 2019; 18 (2): 377-384

Nirmeen Elmadany, Enam Khalil, Lisa Vaccari, Giovanni Birarda, Ibraheem Yousef, <u>Rana Abu-Dahab.</u> Antiproliferative activity of the combination of doxorubicin/quercetin on MCF7 breast cancer cell line: A Combined Study Using Colorimetric Assay and Synchrotron Infrared Microspectroscopy. Infrared Physics and Technology. 2018. 95:141-147

Dina El-Sabawi, <u>Rana Abu-Dahab</u>, Waleed A. Zalloum, Fadia Ijbara, Imad I. Hamdan. The effect of ferrous ions, calcium ions and citric acid on absorption of ciprofloxacin across Caco-2 cells: practical and structural approach. Drug Development and Industrial Pharmacy. October 2018. DOI: <u>10.1080/03639045.2018.1539495</u>

Aman A Ishaqat, <u>Rana Abu-Dahab</u>, Hana M Hammad , Malek Al-Zihlif , Ismail F Abaza , Zeyad D Nassar and Fatma U Afifi. Phytochemical Analysis and Evaluation of Anti-

angiogenic and Antiproliferative Activities of the Leaves of *Elaeagnus angustifolia L.*Grown in Jordan. Nat Prod Chem Res 2018, 6:3. <u>DOI: 10.4172/2329-6836.1000319</u>

Violet Kasabri, Fatma Afifi, <u>Rana Abu-Dahab</u>, Sundos Mashallah. Mitigating efficacy of Inula graveolens (L.) Desf. (Asteraceae) in breast adenocarcinoma MCF7 and T47D proliferation: In vitro mechanistic studies of a selected ethnomedicinal plant from Jordan. Romanian Biotechnological Letters 1(1):1-9. January 2018

I Hamdan, D. Sabawi, <u>R. Abu-Dahab</u>. Solubility of Gliclazide and Ion-Molecular Interactions with Aminopropanol in Aqueous Solutions. Russian Journal of Physical Chemistry A. 2018, Vol 92 No. 1, pp 84-92

O. Awwad, <u>R. Abu-Dahab</u>, I.F. Abaza, R. Alabbasi, L. Majdalawi and F.U. Afifi. Effect of the galling aphid of Baizongia pistaciae L. on composition and biological activities of essential oils of *Pistacia atlantica* Desf. growing wild in Jordan. Journal of Essential Oil Bearing Plants. 2017. Vol 20, Issue 3: 791-800

Afifi FU, <u>Abu-Dahab R</u>, Beltran S, Alcalde BB, Abaza IF. GC-MS composition and antiproliferative activity of Lavandula angustifolia Mill. essential oils determined by hydrodistillation, SFE and SPME. Arabian Journal of Medicial and Aromatic Plants. 2016. Vol.2. No.2: 71-85

Afifi FU, <u>Abu-Dahab R</u>, Kasabri V and Abaza IM. GC-MS composition and antiproliferative activity of Inula graveolens (L.) Desf. Essential oil. Arabian Journal of Medicinal and Aromatic Plants. 2015. Vol 1, No. 1: 57-66

Adwan S, <u>Abu-Dahab R</u>, Al-Bakri AG, Sallam A. Glyceryl monooleate-based otic delivery system of ofloxacin: release profile and bactericidal activity. Pharm Dev Technol. 2015; 20(3): 361–366

<u>Abu-Dahab R</u>, Abdallah MR, Kasabri V, Mhaidat NM, Afifi FU. Mechanistic studies of antiproliferative effects of Salvia triloba and Salvia dominica (Lamiaceae) on breast cancer cell lines (MCF7 and T47D). Z Naturforsch C. 2014 Nov-Dec; 69(11-12):443-51. doi: 10.5560/znc.2013-0147

Yusuf M. AlHiari, Ashok K. Shakya, Muhammed H. Alzweiri, Talal Aburjai, <u>Rana Abu-Dahab</u>. Synthesis and biological evaluation of substituted tetahydro-1H-Quino[7,8-B][1,4]Benzodiazepine-3-Carboxylic derivatives. Farmacia, 2014, Vol. 62, 3

Rana Abu-Dahab, Violet Kasabri and Fatma U. Afifi. Evaluation of the Volatile Oil Composition and Antiproliferative Activity of Laurus nobilis L. (Lauraceae) on Breast Cancer Cells Line Models. Records of Natural Products 8:2 (2014):136-147

Rana Abu-Dahab, Enam Khalil, Ayman Khdair, Dina El-Sabawi, Imad Hamdan. Antiproliferative activity of selected non-steroidal anti-inflammatory agents: Role of iron complexes. Jordan Journal of Pharmaceutical Sciences, Volume 7, No. 1, 2014: 49-66

Fatma U. Afifi, Violet Kasabri, Rana Abu-Dahab, Ismail M. Abaza. "Chemical composition

And in vitro studies of the essential oil and aqueous extract of Pelargonium graveolens growing in Jordan for hypoglycaemic and hypolipidemic properties" European Journal of Medicinal Plants 4(2):220-233, 2014

Violet Kasabri, Fatma U. Afifi, <u>Rana Abu-Dahab</u>, Nizar Mhaidat, Yasser K. Bustanji, Ismail M. Abaza, Sundus Mashallah. In vitro modulation of metabolic syndrome enzymes and proliferation of obesity related-colorectal cancer cell line panel by salvia species from jordan. Revue Roumaine De Chimie 2014; 59(8):693-705

Zihlif M, Afifi F, <u>Abu-Dahab R</u>, Abdul Majid AM, Somrain H, Saleh MM, Nassar ZD, Naffa R The antiangiogenic activities of ethanolic crude extracts of four Salvia species. BMC Complement Altern Med. 2013 Dec 13;13:358

Sanaa Bardaweel, <u>Rana Abu-Dahab</u> and Noor Almomani. An *in vitro* based investigation into the cytotoxic effects of D-amino acids. ACTA Pharmaceutica, 2013 Dec;63(4):467-78

Rana Abu-Dahab, Fadwa Odeh, Said I. Ismail, Hanan Azzam and Abeer Al Bawab. Preparation, characterization and antiproliferative activity of Thymoquinone-B cyclodextrin self assembly nanoparticles. Die Pharmazie, 2013 Dec;68(12):939-44

Maha Abdallah, <u>Rana Abu-Dahab</u> and Fatma Afifi. Composition of the Essential Oils from *Salvia dominica* L. and *Salvia hormium* L. Grown in Jordan. Jordan Journal of Pharmaceutical Sciences. 2013. 6(1): 40-47

Violet Kasabri, Rana Abu-Dahab, Fatma U. Afifi, Randa Naffa, Lara Majdalawi, Hazar Shawash. *In vitro* effects of Geranium graveolens, Sarcopoterium spinosum and Varthemia iphionoides extracts on pancreatic MIN6 proliferation and insulin secretion and extrapancreatic glucose diffusion. International Journal of Diabetes in Developing Countries. Accepted for publication, January 2013

Odeh F, Ismail SI, <u>Abu-Dahab R</u>, Mahmoud IS, Al Bawab A. Thymoquinone in liposomes: a study of loading efficiency and biological activity towards breast cancer. Drug Deliv. 2012 Nov;19(8):371-7.

Violet Kasabri, <u>Rana Abu-Dahab</u>, Fatma U. Afifi, Randa Naffa, and Lara Majdalawi, Hazar Shawash, In vitro modulation of pancreatic MIN6 insulin secretion and proliferation and extrapancreatic glucose absorption by *Paronychia argentea*, Rheum ribes, and Teucrium polium extracts. Jordan Journal of Pharmaceutical Sciences. 2012, 5(3): 203-219

Rana Abu-Dahab, Fatma Afifi, Violet Kasabri, Lara Majdalawi, Randa Naffa. Comparison of the Antiproliferative Activity of Crude Ethanol Extracts of Nine *Salvia* Species Grown in Jordan Against Breast Cancer Cell Line Models. Pharmacognosy Magazine, 2012, Vol 8: 32: 319-324

Violet Kasabri, <u>Rana Abu-Dahab</u>, Fatma U. Afifi, Randa Naffa, and Lara Majdalawi. Modulation of pancreatic MIN6 insulin secretion and proliferation and extrapancreatic glucose absorption with Achillea santolina, Eryngium creticum and Pistacia atlantica extracts: *in vitro* evaluation. Journal of Experimental and Integrative Medicine, 2(3): 237-244 (2012)

Fatma U. Afifi and Rana Abu Dahab, Phytochemical screening and some biological activities of Eminium spiculatum (Blume) Kuntze (Family Araceae), Natural Product Research, 2012 May;26(9):878-82.

Afifi-Yazar F, Kasabri V and Abu Dahab R. Medicinal Plants from Jordan in the Treatment of Diabetes: Traditional Uses vs. In vitro and In Vivo Evaluations - Part 2. Planta Medica, July 77(11): 1210-20 (2011)

Afifi-Yazar F, Kasabri V and Abu Dahab R. Medicinal Plants from Jordan in the Treatment of Cancer: Traditional Uses vs. In vitro and In Vivo Evaluations - Part 1. Planta Medica, July 77(11): 1203-9 (2011)

Jelnar Z. Al-Kalaldeh, <u>Rana Abu-Dahab</u> and Fatma U. Afifi, Volatile oil composition and antiproliferative activity of *Laurus nobilis*, *Origanum syriacum*, *Origanum vulgare*, and *Salvia triloba* against human breast adenocarcinoma cells. Nutrition Research, 30:271–278 (2010)

Yusuf M. Al-Hiari , <u>Rana Abu-Dahab</u> and Mustafa M. El-Abadelah, Heterocycles [*h*]-Fused Onto 4-Oxoquinoline-3-Carboxylic Acid, Part VIII [1]. Convenient Synthesis and Antimicrobial Properties of Substituted Hexahydro[1,4]diazepino[2,3-*h*]quinoline-9-carboxylic acid and Its Tetrahydroquino[7,8-*b*]benzodiazepine Analog. Molecules, 13: 2880-2893 (2008)

<u>Abu Dahab R</u>, Afifi-Yazar FU, Comparison of antiproliferative activities of ethanolic plant extracts of the Jordanian flora using MCF7 and A549 cells. Planta Medica, Volume 3 (9): 990 (2007)

Rana Abu-Dahab and Fatma Afifi, Antiproliferative activity of selected medicinal plants of Jordan against a breast adenocarcinoma cell line (MCF7), Scientia Pharmaceutica, 75, 121-136 (2007)

Yusuf M. Al-Hiari , Inas Saleh Al-Mazari, Ashok K. Shakya , Rula M. Darwish and <u>Rana Abu-Dahab</u>, Synthesis and Antibacterial Properties of New 8-Nitrofluoroquinolone Derivatives, Molecules, 12, 1240-1258 (2007)

<u>Abu-Dahab, R.</u>, Hakooz, N., "A Primer of an Animal Cell Culture Laboratory for Efficacy, Toxicity and Transport Screening". Jordan Medical Journal, Vol 40 (3) 172-179 (2006)

Hakooz, N., <u>Abu-Dahab</u>, R., Arafat, T., Hamad, M., "A trend of low serum vitamin B₁₂ in Jordanian adults from two ethnic groups in Amman". Jordan Medical Journal. Vol. 40 (2) 80-87 (2006)

Takayuki Nakamura, <u>Rana Abu-Dahab</u>, Michael D. Menger, Ulrich Schaefer, Brigitte Vollmar, Hiromi Wada, Claus-Michael Lehr, and Hans-Joachim Schaefers "Depletion of Alveolar Macrophages by Clodronate-liposomes Aggravates Ischemia - Reperfusion Injury of the Lung". Journal of Heart and Lung Transplantation. Volume 24 (1) 38-45 (2005)

Ehrhardt, C., Fiegel, J., Fuchs, S., <u>Abu-Dahab, R.</u>, Schaefer, UF., Hanes, J., Lehr, C.-M., Drug absorption by the respiratory mucosa-cell culture models and particulate drug carriers, J. Aerosol Medicine, Vol. 15 (2):131-139 (2002)

Brueck, A., <u>Abu-Dahab, R.</u>, Borchard, G., Schaefer, U.F., Lehr, C.-M., Lectin functionalized liposomes for pulmonary drug delivery: interaction with human alveolar epithelial cells. J. Drug Targeting, Vol 9 (4) 241-251, (2001)

<u>Abu-Dahab, R.</u>, Schaefer, U.F., Lehr, C.-M., Lectin functionalized liposomes for pulmonary drug delivery: effect of nebulization on stability and bioadhesion, Eur. J. Pharm Sci., 14: 37-46, (2001)

Sallam, E.; Ibrahim, H.; <u>Abu Dahab, R.;</u> Shubair, M.; Khalil, Enam. Evaluation of fast disintegrants in terfenadine tablets containing a gas-evolving disintegrant. Drug Development and Industrial Pharmacy, 24(6), 501-507. (1998)

Other publications

Ehrhardt C, Fuchs S, <u>Abu-Dahab R</u>, Schaefer UF, Lehr CM, Arzneistoffabsorption durch die Lungenschleimhaut – Zellkulturmodelle und partikulaere Arzneistofftaeger, in G Scheuch "Aerosole in der Inhalationstherapie VI", IndustrieTBmed, München (2002)

Bakowsky U, Oberle V, Hoechstra D, Vogel J, Bendas G, Rothe U, <u>Abu-Dahab R</u>, Kneuer C, Hartmann U, Lehr CM, Untersuchungen pharmazeutisch relevanter Transportsysteme in Wechselwirkung mit biologischen und Modellmembranen charakterisiert durch AFM und QCM, In A.Wisser & W.Nachtigall (eds.): BIONA-Report 14, Akad. Lit., Mainz; GTBB, Saarbrücken, 75-76 (2000)

<u>Abu-Dahab, Rana</u>; Lehr, Claus-Michael. Artificial self-assembling systems for gene delivery, edited by Philip L. Felgner, Michael J. Heller, Pierre Lehn, Jean Paul Behr and Francis C. Szoka, Jr., Journal of Controlled Release, 51(2,3): 343-344 (1998)

Presentations in International Congresses

Abu-Dahab R, Schaefer U, Lehr CM, Stability of DPPC and lectin functionalized liposomes to nebulization, Lecture, CRS German Chapter Annual Meeting, Erlangen, March 19, 1999

<u>Abu-Dahab R</u>, Schaefer U, Lehr CM, Stability of 1,2-dipalmitoyl-glycero-3-phosphocholine (DPPC) and lectin functionalized DPPC liposomes to nebulization, Poster presentation, CRS Boston, June 20-25, 1999

<u>Abu-Dahab R</u>, Fuchs S, Schaefer U, Lehr CM, Interaction of lectin functionalized liposomes with alveolar epithelial cells, Poster presentation, Workshop: Liposome advances: Progress in drug and vaccine delivery, Centro for Drug Delivery Research, The School of Pharmacy, University of London, London, December 13-17, 1999

<u>Abu-Dahab R</u>, Schaefer UF, Lehr CM, Interaction of lectin functionalized liposomes with cells of deep lung, Poster presentation, AAPS Annual Meeting, October 29 – November 2, 2000, Indianapolis

<u>Abu-Dahab R</u>, Nakamura T, Schaefer U, Schaefers H.J., Lehr CM, Characterization of clodronate liposomes for the depletion of alveolar macrophages: in vitro and in vivo studies. Lecture, CRC German Chapter Annual Meeting, Saarbrücken, February 2, 2001

<u>Abu-Dahab R</u>, Schaefer UF, Lehr, CM, Interaction of lectins with cells of deep lung: human alveolar cells in primary culture versus A549 cells. 28th Int. Symposium on controlled release of bioactive materials. June 23-27, 2001, San Diego-USA

<u>Abu-Dahab R.</u>, Schaefer UF, Lehr CM, Lectin functionalized liposomes: a promising drug delivery system to deep lung. Lecture, The 5th scientific congress of the association of the colleges of pharmacy in the Arab world and the 2nd international conference of the faculty of pharmacy / University of Jordan. Amman-Jordan, October 16-18, 2001

<u>Abu-Dahab R</u>, Nakamura T, Schaefer U, Schaefers H.J., Lehr CM, Intratracheal administration of liposome-encapsulated clodronate aggrevates warm ischemia reperfusion injury of the lung, Lecture, The 2nd international conference of the royal jordanian medical services, 7-10 October, 2003, Amman-Jordan

<u>Abu-Dahab Rana</u>, The use of animal cell culture models in pharmaceutical sciences, invited speaker, The 9th international pharmaceutical sciences conference and exposition, December 17-21 Riyadh-Saudi Arabia, 2005. Abstracts published in Saudi Pharmaceutical Journal, 2005, Volume 13, No. 4, 58

R. Abu-Dahab, S. Adwan and A. Sallam, Glycerylmonooleate System Based Delivery System of Ofloxacin: Release Profile and Bactericidal activity. 33rd annual meeting of the controlled release society. July 22-26, 2006, Vienna, Austria

<u>Abu Dahab R</u>, Afifi-Yazar FU, Comparison of antiproliferative activities of ethanolic plant extracts of the Jordanian flora using MCF7 and A549 cells. 55th International congress and annual meeting of the society for medicinal plant research. September 2-6, 2007, Graz, Austria. Poster presented by Prof. Afifi

Fatma U. Afifi-Yazar, <u>Abu-Dahab, Rana</u>, Ismail, Said. Medicinal plants and anticancer activities: Experiences from Jordan Using MCF7 cell line. Oral contribution presented by Prof Afifi in BIT Life Sciences 1st Annual World Cancer Congress-2008, June 12-15, Shanghai, China

Afifi-Yazar F, Abu Dahab R and Kasabri V. Traditional uses and scientific evidence for selected native medicinal plants from Jordan: a critical evaluation. Planta Medica, Volume 76: 1168, (2010) Abstract of 58th International congress and annual meeting of the society for medicinal plant and natural product research. 29th August-2nd September 2010, Berlin Germany

Abdullah Maha, Fatma U Afifi and <u>Abu Dahab Rana</u>, Studies on Salvia Dominica grown in Jordan: volatile oil composition and mechanism of action of its antiprokiferative activity (MCF-7). 11th Eurasia Conference on Chemical Sciences, 6-10 October, The Dead Sea, Jordan. Poster presented by Maha Abdullah

Fatma U Afifi, <u>Rana Abu-Dahab</u> and Violet Kasabri, Volatile oil composition and antiproliferative activity of two Origanum species from Jordan. 11th Eurasia Conference on Chemical Sciences, 6-10 October, The Dead Sea, Jordan. Podium presentation for Prof. Afifi.

Rana Abu-Dahab and Fatma U Afifi, Antiproliferative and antibacterial activity of *Eminium Speculatum* (Blume) Kuntze grown in Jordan. Poster presentation at The 3rd Kuwait International Pharmacy Conference. Kuwait, Februaury, 14-16, 2011.

Violet Kasabri (presenter), Fatma U. Afifi-Yazar, Imad Hamdan, <u>Rana Abu- Dahab</u>. Traditional uses and scientific evidence for a selected native medicinal plant from Jordan: a critical evaluation of *Pistacia atlantica*. First United Arab Emirates Conference on Pure and Applied Chemistry (ECPAC11). American University of Sharjah; March 1-3, 2011, UAE. Oral Podium Presentation.

Violet Kasabri (presenter), Fatma U. Afifi-Yazar, Imad Hamdan, <u>Rana Abu- Dahab</u>. Traditional uses and scientific evidence for a selected native medicinal plant from Jordan: a critical evaluation of *Arum hygrophilum*. Balqa 4th Medical Conference, Al-Sult, Jordan; June 8th-9th, 2011. Oral Podium Presentation

Fatma U.Afifi (presenter), Violet Kasabri, <u>Rana Abu-Dahab</u>. Studies on the *in vitro* determination of the antiproliferative activity of aromatic, edible and medicinal plants from the flora of Jordan. Second International Conference on Holistic Medicine (ICHM-2011) September 11-13, 2011. Kottayam, Kerala, India. Oral Podium Presentation

Fatma U. Afifi (presenter), Imad Hamdan, <u>Rana Abu-Dahab</u>, Violet Kasabri. Evidence-based Traditional Medicine: Critical evaluation of medicinal plants used for antidiabetic properties in Jordan. 13th International Symposium on Natural Product Chemistry (ISNPC-13). September 22-25, 2012. Karachi, Pakistan. Oral Podium Presentation.

Violet Kasabri (presenter), Fatma U. Afifi-Yazar, Imad Hamdan, Rana Abu- Dahab.

Traditional uses and scientific evidence for a selected native medicinal plant from Jordan: a critical evaluation of *Eryngium creticum*. 3ISMP: The 3rd International Symposium on Medicinal Plants Their Cultivation and Aspects of Uses. Al-Balqa Applied University/Shoubak University College/Petra. November 21st-23rd, 2012. Oral Podium Presentation

Violet Kasabri (presenter), Fatma U. Afifi-Yazar, Imad Hamdan, <u>Rana Abu- Dahab</u>. Traditional uses and scientific evidence for a selected native medicinal plant from Jordan: a critical evaluation of *Achillea santolina*. 3ISMP: The 3rd International Symposium on Medicinal Plants Their Cultivation and Aspects of Uses. Al-Balqa Applied University/Shoubak University College/Petra. November 21st-23rd, 2012. Poster Presentation

Rana Abu-Dahab (presenter), Violet Kasabri and Fatma Afifi-Yazar. Evaluation of the Volatile Oil Composition and Antiproliferative Activity of *Laurus nobilis* L. (Lauraceae) on Breast Cancer Cell Line Models The 3rd International Symposium on Medicinal Plants, Their Cultivation and Aspects of Uses. Al-Balqa Applied University/ Shoubak University College/Petra November 21-23, 2012. Poster Presentation.

Rana Abu-Dahab, Fadwa Odeh, Said Ismail, Hanan Azzam and Abeer Al Bawab. Preparation and characterization of Thymoquinone self assembly nanoparticles. Third European Conference on Cyclodextrins, Antalya, Turkey, 2-4 October, 2013. Poster Presentation.

Rana Abu-Dahab, What makes Biologicals Different? The 8th International Conference of The Royal Medical Services. 15-18 November 2016. Oral Presentation.

Rana Abu-Dahab, Aman Ishaqat, Fatma Afifi. Nature as a Source of New Anticancer Agents: Experience from Indigenous Plants from Jordan: Lavendula angustifolia and Eleagenus angustifolia. The 6th Annual Meeting of the Middle Eastern Association of Cancer Research. December. 3-5, 2016. Qatar University, Doha. Oral Presentation

Rana Abu-Dahab, ESARMUS, conference and roundtable discussion, Amman, 12-13 June, 2017

Enam Khalil, <u>Rana Abu-Dahab</u>, Nirmeen Almadany, Giovanni Birarda, Lisa Vaccari and Ibraheem Yousef. Evaluation of cytotoxicity of Doxorubicin/Quercetin combination in MCF7 breast cancer cell line: a combined study using synchrotron infrared microspectroscopy and colorimetric assay. WIRMS 2017, 25-28 September 2017. Oxford, UK. Poster Presentation

Amal G. Al-Bakri, Nisreen Dahshan, <u>Rana Abu-Dahab</u>, Enam Khalil. A novel *ex vivo* skin explants biofilm model for evaluating the effect of photodynamic antimicrobial chemotherapy and iberin treatment towards *Pseudomonas aeruginosa* biofilms. Microbiology Annual Conference (10-13 April, 2018). ICC, Birmingham, UK. Oral Presentation by Al-Bakri

May Tayyem, <u>Rana Abu-Dahab</u> and Amal G. Al-Bakri, Development of a co-culture model simulating cystic fibrosis lung infected with *Pseudomonas aeruginosa*. 12th International conference and workshop on Biological Barriers, Saarbruecken, Germany. Oral presentation.

Tetrault JM., Khoshnood K., Muvvala S., McNeil R., Minahan-Rowley R,. Al-Khateeb Y., <u>Abu-Dahab R</u>., Wazafiy M.; "Yale – UJ (University of Jordan) Joint Training Program in Addiction Medicine." Poster presentation. 11th Annual Yale Global Health Day, March 2022.

Tretrault JM., Khoshnood K., Muvvala S., McNeil R., Minahan-Rowley R., Al-Khateeb Y., <u>Abu-Dahab</u> R., Wazafiy M.; "Yale – University of Jordan Joint Training Program: Student Elective Course Development and Implementation." Poster presentation. 12th Annual Yale Global Health Day, March 2023.

Rana Abu Dahab, Jeanette M. Tetrault, Keveh Khoshnood, Srinivas Muvvala, Rebecca Minahan-Rowley, Yara Al-Khateeb and Mayyada Wazaify. Inter-University Exchange Experience In Interprofessional Education: Yale-UJ Training Program in Addiction Medicine. Poster Presentation. All together Better Health XI, The 11th international conference on Interprofessional practice and education. Qatar University, Qatar, November 2023

Awards

1991	Scientific Achievement Award, Jordan University, Amman, Jordan
1996	Biopharmacy Department Award, King's College London, UK

Supervision of MSc thesis

- In vitro evaluation and cytocompatability of natural polymers for local/systemic delivery of macromolecules. Sanaa Bardaweel. Co-supervisor with Dr. Khaled Aiedeh. July 2006
- Development and characterization of controlled release drug delivery system of ofloxacin for the treatment of otitis externa. Samer Adwan. Co-supervisor Dr. A. Sallam. January 2007
- In vitro cytotoxic activity of selected Jordanian medicinal plants using leukemia cells. Fatima Hassan. Co-supervisor with Prof. Dr. F. Afifi
- Evaluation of the solubilization capacity of Gelucire 44/14 and Pluronic F126 combination. Manar AlGhabish. Co-supervisor with Dr. Hatem Al-Khatib. July 2008
- GC-MS determination of the volatile oil composition and evaluation of antiproliferative activity for selected medicinal plants indogenous to Jordan against breast cancer adenocarcinoma cell line. Jelnar Z. Al-Kalaldeh. Co-supervisor with Prof Dr. Afifi. August 2008
- Studies on some Salvia species grown in Jordan: volatile oil composition and mechanism of action of their antiproliferative activity. Maha Rashed. Co-supervisor with Prof Dr Afifi. July 2010
- Evaluation of Safety and Uptake Mechanism of a Micellar Drug Delivery System Based on poly (ethyleneoxide) - b- poly (propyleneoxide) (PEO- b -PPO) copolymers using Caco-2 cell culture model. Rehan Al-Kasasbeh. December 2013
- Antiproliferative activity of the combination of quercetin/doxorubicin on breast cancer cell lines: possible role of changes in oxidative stress level. Nirmeen Almadany. June 2015
- Phytochemical evaluation of the ethanol extract and volatile oil of the aerial parts of *Phlomis viscosa* L. grown in Jordan and determination of its antioxidant, antimicrobial and anti-proliferative activity against different breast cancer cell lines. Hadeel Hasan. Co-supervisor with Prof. Dr. Afifi. August 2015
- Phytochemical screening and evaluation of antioxidant, antimicrobial and antiproliferative(against breast cancer cell line T47D) activities of the leaves of *Elaeagnusangustifolia* grown in Jordan. Aman Ishagat. Co-supervisor with Prof. Dr. Afifi. August 2015
- Effect of organic anions on the intestinal absorption of metformin HCl. Duaa G. Farah.
 January 2016
- The effect of Iberin against pseudomonas aeruginosa biofilms in cyctic fibrosis artificial sputum medium and on ex vivo skin explant model. PhD thesis. Nisreen Ahmad Dahshan. Co-supervisor with Prof. Dr. Enam Khalil and Prof. Dr Amal Al-Bakri. July, 2016
- The safety and efficacy of Mycamine on fibroblasts and Pseudomonas aeruginosa acute wound model. MSc thesis. Heba I Jaber. Co-supervised with Prof. Dr Amal G Al-Bakri. December 2017
- Development of a co-culture in vitro model simulating cystic fibrosis lung infected with Pseudomonas aeruginosa. MSc thesis. Mai Tayyem. Co-supervisor Prof. Dr Amal G Al-Bakri. December 2017
- Prevalence and Pattern of Substance Use and Misuse among Anesthesia Health
 Care Personnel in Jordan and the Effect of Second Hand Exposure to Aerosolized
 Intravenous Anesthetics (Fentanyl) among Anesthesiologists in Jordan. MSc thesis.
 Shahd AlMuaz. Co supervised with Prof. Dr. Mayyada Al-Wazaify. December 2017

- Effects of selected basic drugs on dissolution and permeation of losartan. MSc thesis, Nagham Al-Dmour. Co-supervisor with Prof. Dr. Imad Hamdan. March 2018
- Determination of the anticancer activity of selected compounds of natural origin: possible involvement of phosphatase of regenerating liver-3 enzyme. MSc thesis. Raed Al-Hweiyan. Co supervisor Dr. Areej AbuHammad. July 2018
- Formulation potential of chitosan-octanoate in beads and microparticles as drug carriers. MSc thesis. Safaa Taha Eyal-Salman. Co supervisor with Dr Ahmad BaniJaber. April 2019
- Cellualr uptake and toxicity of gold nanorods on human dermal fibroblast: effect of nanoparticle surface chemistry. MSc thesis. Lubna Al-Kharabsheh. Co supervisor with Dr Enam Khalil. April 2019
- Synthesis and anticancer activity of novel pyrodoquinoxaline derivatives. MSc thesis.
 Alaa Tabaza. Co supervisor with Dr Yusuf Al-Hiari. April 2019
- Evaluation of the protective effect of probiotics on fibroblast -Pseudomonas aeruginosa acute wound model. MSc thesis. Sarah Darweesh. Co supervisor with Dr Amal Bakri. May 2020
- Assessment of the ability of proton pump inhibitors to suppress cancer growth and enhance chemosensitivty: possible involvement of protein kinases. MSc thesis.
 Husam I. H. Nassar. Co-supervisor Dr Mutasem O Taha. May 2021
- Biological Activity of Albumin-Decorated Gold Nanoparticles on a Panel of Cancer Cell Lines. MSc thesis. Tala Salman. August 2021.
- Co supervisor with Dr. Sanaa Bardaweel January 2023
- Drug Abuse and Misuse among Health Care Professionals in Iraq: a descriptive study. MSc thesis, Hasanen Alani. Co supervisor with Dr Mayyada Alwazaify. April 2023

Taught courses at The University of Jordan since September 2001

- Medical Terminology, 1 credit hour course, 1st year undergraduate PharmD students
- Biopharmaceutics, 2 credit hours course, 4th year undergraduate students
- Pharmacokinetics, 2 credit hours course, 4th year undergraduate students
- Pharmacokinetics workshops, 1 credit hour course, 4th year undergraduate students
- Biochemistry practical, 1 credit hour, 2nd year undergraduate students
- Parapharmaceuticals, 2 credit hour, elective course for 5th year undergraduate students
- Seminar in Biopharmaceutics and clinical pharmacy, 1 credit hour elective course for 5th year undergraduate students
- Drug targeting II, 3 credit hours elective course for MSc students
- Pharmaceutical biotechnology, 3 credit hours elective course for MSc students
- Delivery of biopharmaceuticals, 3 credit hours elective course for PhD students
- Drug Discovery and Biotechnology, 2 credit hours obligatory course for PhD students

Taught courses at Jordan University of Science and Technology, during the academic year 2010-2011

- Drug Delivery, 3 credit hour course, 5th year undergraduate student
- Pharmaceutical Biotechnology, 3 credit hour elective course, 5th year undergraduate student
- Biopharmaceutics and Pharmacokinetics, 3 credit hour elective course, 4th year undergraduate students

Invited Lectures

- Workshop entitled "Implementation of Global Guidelines in Bioequivalence and Stability Studies", arranged by JFDA, 3, March, 2007, Kempenski Hotel, Amman. Lecture title "Biowaivers based on the biopharmaceutics Classification System"
- Workshop entitled "Monitoring and evaluation of serum vaccine registration files and certification. Organized by JFDA, 21, April, 2007, Kempenski Hotel, Amman. Leture title "Biological and Biosimilar Products: where do we stand".
- Continuous Education Program, Jordan Pharmacist Association, "Biologicals versus small molecular weight drugs: what do we need to know". Session hold in Le Meridian Amman, 5. May, 2009.
- The Eleventh Conference on Scientific Research in Jordan. Amman Private University on 11th November 2023. Lecture entitled "Recent approvlas of anticancer agents"

Scientific visits

- Soft X ray Beam user. April 2019. BESSY II Synchrotron, Berlin, Germany.
- FTIR- Beam user times May 2016. Elettra Synchrotron, Trieste, Italy.
- FTIR- Beam user times July August 2015. BESSY II Synchrotron, Berlin, Germany.

Certificates and Training

- Clinical Investigation Training Program (CITP), JFDA, May 2010
- Institutional Review Board Manual Training, JAPM, July, 2010
- IRB manual training, PRU, January, 2011

Funded Projects

- Assessment of drug toxicity/transport using validated tissue culture systems.(PI)
 Deanship of Scientific Research, JU. Funded on April 2002. 12 500 JD
- In vitro cytotoxic activity of selected Jordanian medicinal plants. Deanship of Scientific Research, JU. Funded on June 2004 with 12 800 JD (PI)
- Studies on in vitro insulinotropic activity in pancreatic MIN6 cell line and phytohemical evaluation of selected medicinal plants of Jordan. Deanship of Scientific Research, JU. Funded on July 2008 with 17 300 JD.
- Studies on the mechanisms of antiproliferative active extracts of selected medicinal plants from Jordan. Funded by SRTD (contract JO/2008/RGS/034) on April 2009. 14 000 JD
- Tageted Delivery of macromolecules to cancer cells. Deanship of Scientific Research,
 JU. Funded on March 2009 with 20 000 JD
- Targeted Delivery of Aptamers to cancer cells. Funded by Ministry of Higher Education and Scienctific Research. Funded on April 2010 with 60 000 JD
- Marie Curie Actions—International Research Staff Exchange Scheme- IRSES-FP7, 2010 (32, 000 EUR)
- Antiproliferative activity of the combination of Quercetin/Doxorubicin on breast cancer cell lines. *In vitro* tests vs FTIR micorspectroscopy. Co-Researcher with Prof. Enam Khalil. Scientific Research Support Fund. December 2015. 19550 JOD
- Establishment of a Co culture Model of the Upper Respiratory Tract Cells Representing Cystic Fibrosis and *Pseudomonas aeruginosa*. (PI). June 2014. 10000 JOD
- Screening of some pure compounds (flavonoids, coumarins, volatile compounds) and their simple derivatives isolated from local medicinal plants for their antiproliferative properties. (PI). Deanship of Scientific Research. March 2017. 10 000JOD.
- In vitro biological evaluation of gold nanoparticles against a panel of cancer cells.
 Deanship of Scientific Research. April 2019. 15800 JOD from
- Assessment of the ability of cephalosporines to supress cancer growth by targeting GSK-3B. Deanship of Scientific Research, The University of Jordan. August 2021. 7500 JOD

Areas of Interest

The use of colloidal drug delivery systems for macromolecule delivery and targeting Cell culture models and their use is estimating drug toxicity, transport and activity Estimation of antiproliferative activity of phytochemicals

FTIR spectroscopy and biological testing

In vitro modeling of infected tissues

Language Proficiency

English and German: good command spoken and written