

## **Nehad M. Ayoub, Ph.D.**

### **Curriculum vitae**

#### **Personal Information**

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Research Gate: [https://www.researchgate.net/profile/Nehad\\_Ayoub](https://www.researchgate.net/profile/Nehad_Ayoub)  
Google Scholar: <https://scholar.google.com/citations?user=ri8dn3cAAAAJ&hl=en>

#### **Education**

##### Ph.D. in Pharmacy:

The University of Louisiana at Monroe (ULM), Monroe, Louisiana, USA, 2009–2012.  
Dissertation title: *Synergistic anticancer effects from combined treatment of  $\gamma$ -tocotrienol with receptor tyrosine kinase inhibitors.*

##### MSc in Clinical Pharmacy:

Jordan University of Science and Technology (JUST), Irbid, Jordan, 2004–2006.

##### BSc in Pharmacy:

Jordan University of Science and Technology (JUST), Irbid, Jordan, 1999–2004.

#### **Academic and Professional Positions**

##### June 2023-present:

Professor, Department of Clinical Pharmacy, Faculty of Pharmacy, Jordan University of Science and Technology (JUST), Irbid, Jordan.

##### September 2019 – September 2021:

Assistant Dean for Clinical Training Affairs, Faculty of Pharmacy, Jordan University of Science and Technology (JUST), Irbid, Jordan.

##### April 2018–present:

Associate Professor, Department of Clinical Pharmacy, Faculty of Pharmacy, Jordan University of Science and Technology (JUST), Irbid, Jordan.

##### April 2013–April 2018:

Assistant Professor, Department of Clinical Pharmacy, Faculty of Pharmacy, Jordan University of Science and Technology (JUST), Irbid, Jordan.

##### 2009–2012:

Full-time graduate student, Department of Basic Pharmaceutical Sciences, Faculty of Pharmacy, the University of Louisiana at Monroe (ULM), Monroe, Louisiana, USA.

##### 2007–2009:

Full-time lecturer, Department of Clinical Pharmacy, Faculty of Pharmacy, Jordan University of Science and Technology (JUST), Irbid, Jordan.

##### 2006–2007:

Part-time lecturer, Department of Clinical Pharmacy, Faculty of Pharmacy, Jordan University of Science and Technology (JUST), Irbid, Jordan.

**Teaching  
Activities**

PHAR 341: Pharmacology 1  
PHAR 342: Pharmacology 2  
PHAR 344: Introduction to Therapeutics (PharmD students)  
PHAR 442: Therapeutics: Immunology, hematology, and oncology (PharmD students)  
PHAR 548: Comprehensive Therapeutics (PharmD students)  
PHAR 545: Toxicology  
PHAR 402: Community Pharmacy (PharmD students)  
PHAR 547: Therapeutics 2  
PHAR 504: Selected Topics 1  
PHAR 505: Selected Topics 2  
PHAR 593: Clinical Pharmacology  
PHAR 646: Clinical training: Oncology (PharmD students)  
PHAR 667: Clinical Seminar (PharmD students)  
PHAR 670: Clinical training: Nutritional support (PharmD students)  
PHAR 675: Clinical training: Clinical pharmaceutical research (PharmD students)  
PHAR 692: Clinical training: Psychiatry (PharmD students)  
PHAR 700: Scientific writing and research ethics (Graduate course)  
PHAR 703: Therapeutics 1 (Graduate course)  
PHAR 741: Therapeutics (Graduate course)  
PHAR 742: Advanced Therapeutics (Graduate course)  
PHAR 765: Advanced Pharmacology (Graduate course)  
PHAR 770: Seminar (Graduate course)

**Academic  
Supervision and  
Thesis  
Committees**Major Advisor:

- Sajedah Lutfi Mansour Abu Alkishik (MSc in Clinical Pharmacy, Summer 2015): *Awareness, attitudes, and perceptions of breast cancer screening among community pharmacists in Jordan: A national study. July 2015.*
- Abdol Rahman Nizar El Khatib (MSc in Clinical Pharmacy, Spring 2016): *Assessment of microvascular environment in triple-negative and HER2-positive breast cancer patients. May 2016.*
- Alaa Omar Abd-allah Al-Mesleh (MSc in Clinical Pharmacy, Spring 2016): *Assessment of microvascular environment in hormone-dependent breast cancer patients. May 2016.*
- Rawan Fahed Shapep Khsaawnh (MSc in Applied Biological Sciences, Fall 2016): *The effect of exposure to waterpipe smoke on body weight and organs in animal model. January 2017.*
- Yasmeen Ahmad Mahmoud Alshamali (MSc in Clinical Pharmacy, Spring 2017): *Cancer pain in Jordan Patient attitudes and appropriateness of pain management plans. April 2017.*
- Kamal Mohammed Nasser Al-Shami (MSc in Clinical Pharmacy, Spring 2017): *Crizotinib inhibits growth and migration of breast cancer cells by inhibiting c-Met receptor activation and synergizes with chemotherapy. May 2017.*
- Sara Kamel Mohammad Jaradat (MSc in Clinical Pharmacy, Spring 2017): *Correlation of glycemic status with anthropometric measurements and tumor characteristics in breast cancer patients. May 2017.*
- Laila Ibrahim Ahmad Al-Hussban (MSc in Clinical Pharmacy, Fall 2018): *Assessing the effect of breast cancer cells on the behavior of brain microvascular endothelial cells. December 2017.*
- Dalia Rashid Subhi Ibrahim (MSc in Clinical Pharmacy, Fall 2019): *Crizotinib, a c-MET inhibitor, exerts anti-cancer effects on breast cancer cells and synergizes with hormonal and chemotherapeutic drugs. November 2019.*
- Amer Ezzo Al-Khalifa (MSc in Clinical Pharmacy, Spring 2020): *Combined crizotinib and endocrine drugs inhibit proliferation, migration, and colony*

*formation of breast cancer cells mediated by downregulation of c-met and estrogen receptor levels. February 2020.*

- Mona Fares (MSc in Clinical Pharmacy, Spring 2021):  
*The expression of immune markers in breast cancer tissues and its association with clinicopathologic characteristics, prognostic factors, and molecular subtypes. June 2021.*
- Muhsen Thiabat (MSc in Biotechnology and Genetic Engineering, Fall 2021):  
*Tumor expression of MET and PD-L1 and its impact on clinicopathologic features and blood biomarkers in patients with solid cancers: An insight into molecular and pathologic pathways. Ongoing.*
- Moath Alshorman (MSc in Biotechnology and Genetic Engineering, Fall 2021):  
*Tumor expression of EGFR and PD-L1 and its impact on clinicopathologic features and blood biomarkers in patients with solid cancers: An insight into molecular and pathologic pathways. Ongoing.*
- Salam Alsardiah (MSc in Clinical Pharmacy, Spring 2022):  
*Evaluation of the predictive value of blood levels of hepatocyte growth factor and vascular endothelial growth factor in solid cancer patients treated with bevacizumab. Ongoing.*

#### Co-advisor:

- Noor Ali Al-Nadi (MSc in Clinical Pharmacy, Spring 2021):  
*Knowledge and awareness among university students about risk factors associated with cardiovascular diseases: a cross-sectional study in Jordan. June 2021.*
- Lujain Alnsoor (MSc in Clinical Pharmacy, Spring 2022):  
*Evaluation of medication appropriateness in older diabetic adults with polypharmacy: an observational, retrospective, cross-sectional study. Ongoing.*

#### Internal Examiner:

- Wesam Walid Mohammad Ismail (MSc in Clinical Pharmacy, Summer 2013):  
*Correlation between NOXA and PUMA single nucleotide polymorphisms and chemotherapy response in Jordanian patients with colorectal cancer. July 2013.*
- Samar Abdo Hezam Mohammed (MSc in Clinical Pharmacy, Spring 2017):  
*Assessment evaluation and satisfaction of pain management among sickle cell disease pediatric patients. May 2017.*
- Enaam Suleiman Talab Alkhazaleh (MSc in Clinical Pharmacy, Spring 2017):  
*Assessing the effect of Silymarin on diabetes-induced aberrant angiogenesis. May 2017.*
- Marwah Azayzeh (MSc in Clinical Pharmacy, Spring 2018):  
*Evaluation of the Effect of Calcium Sensing Receptor Blocker NPS2143 on Proliferation Migration and Invasion of Two Different Breast Cancer Cell Lines. May 2018.*
- Leen Abdulqader Asaad Asaad (MSc in Clinical Pharmacy, Summer 2019):  
*Investigating the protective effect of metformin against oxidized low-density lipoprotein induced antiangiogenic effect in human brain microvascular endothelial cells. July 2019.*
- Saida Zaid Khaled Makabla (MSc in Clinical Pharmacy, Summer 2019):  
*Investigating the potential of metformin to function as molecular chaperone to reverse ER stress-induced effect on angiogenesis. August 2019.*

## Department and University Committees

- Curriculum committee (Academic years 2013-2014, 2015-2016, and 2019-2020)
- Faculty social committee (Academic year 2013-2014)
- Community service committee (Academic years 2013-2014, 2015-2016)
- Faculty research committee (Academic year 2014-2015)
- Departmental research committee (Academic year 2014-2015)
- Library committee (Academic years 2014-2015, 2015-2016, 2016-2017)
- Scientific and education committee (Academic year 2016-2017)
- Faculty website committee (Academic year 2016-2017)
- Faculty hiring committee (Academic year 2017-2018)
- Accreditation Council for Pharmacy Education (ACPE) sub-committees 8 and 10 (Academic years 2016-2017 and 2017-2018)
- Clinical pharmacy and pharmacy practice committee (Academic years 2017-2018 and 2018-2019)
- Scientific days and conferences committee (Academic year 2017-2018)
- Student disciplinary committee (Spring semester 2018)
- Community pharmacy training committee (Academic year 2018-2019)
- Accreditation and quality assurance committee (Academic years 2019-2020, 2020-2021, and 2021-2022)
- Assessment committee (Academic years 2019-2020, 2020-2021, 2021-2022, and 2022-2023)
- Peer assessment committee (Academic years 2021-2022 and 2022-2023)
- Clinical training committee (Academic years 2019-2020 and 2020-2021)
- Undergraduate student research committee (Academic year 2022-2023)

## Extracurricular University Activities and Community Services

A member of the committee to study the feasibility of establishing a College of Pharmacy at Al Albayt University, Mafraq, Jordan. May 2022.

Presenter/speaker at the Continuous Pharmacy Education program launched by the Faculty of Pharmacy at JUST in association with Jordan Pharmaceutical Association. Presentation title '*The role of pharmacists in cancer care and prevention*'. March 7, 2022.

Organizer and moderator for an educational activity about the risk of drugs and addiction conducted at Jordan University of Science and Technology (JUST), Dec 30, 2021.

A reviewer for grants submitted to the Scientific Research Support Fund, Amman, Jordan.

Organizer of the Advanced Neuroscience School in Neurodegenerative Disorders: "Translation into Clinical Neurology and the International IBRO-MENA Conference" conducted at Jordan University of Science and Technology (JUST), Nov 19-24, 2017.

Organizer and coordinator for the *Clinical Pharmacy Championship (CPC)* for Pharmacy and PharmD students conducted for the academic years 2013-2014 and 2014-2015, JUST, Irbid, Jordan.

Organizer and coordinator for the cancer awareness campaign "*Cancervive*" in association with *Elehsan* company for human development under the theme "*Together Against Cancer*" on May 13, 2014, JUST, Irbid, Jordan.

Chair of the American Association of Pharmaceutical Scientists (AAPS) Student Chapter (2011), the University of Louisiana at Monroe (ULM), Monroe, Louisiana, USA.

AACR Patient Advocate Forum-The Very Early Detection of Cancer Signals. Oct 11, 2022, USA. Virtual meeting.

O. Ababneh, L.M. Al-Kraimeen, Y. Al-Kraimeen, **N. Ayoub**. Prognostic value and immune characteristics of CYP4B1 in lung squamous cell carcinoma: A bioinformatics analysis. *The European Society for Medical Oncology (ESMO) Congress Meeting 2022*. Sept 9-13, 2022, Paris, France. *Poster presentation*.

**Abstract:** *Annals of Oncology* (2022) 33 (suppl\_7): S772-S784.  
10.1016/annonc/annonc1079.

L.M. Al-Kraimeen, O. Ababneh, Y. Al-Kraimeen, **N. Ayoub**. VIPR1 as a novel prognostic biomarker and its correlation with immune infiltrates in lung adenocarcinoma. *The European Society for Medical Oncology (ESMO) Congress Meeting 2022*. Sept 9-13, 2022, Paris, France. *Poster presentation*.

**Abstract:** *Annals of Oncology* (2022) 33 (suppl\_7): S1324-S1325  
<https://doi.org/10.1016/j.annonc.2022.07.1798>

L.M. Al-Kraimeen, O. Ababneh, Y. Al-Kraimeen, **N. Ayoub**. The effect of CA4 on lung adenocarcinoma immune microenvironment. *The European Society for Medical Oncology (ESMO) Congress Meeting 2022*. Sept 9-13, 2022, Paris, France. *Poster presentation*.

**Abstract:** *Annals of Oncology* (2022) 33 (suppl\_7): S1319  
<https://doi.org/10.1016/j.annonc.2022.07.1781>

Frontiers in Cancer Science (FCS) 2021, 13<sup>th</sup> international virtual meeting. Nov 1-3, 2021, Singapore.

Cancer Discovery 10th Anniversary Symposium: The Next Decade of Discoveries. Online conference. June 21-22, 2021, USA.

Virtual Annual Meeting II for the American Association for Cancer Research (AACR) 2020. June 22-24, 2020, USA.

Virtual Annual Meeting I for the American Association for Cancer Research (AACR) 2020. April 27-28, 2020, USA.

Elsevier research academy Online Webinar: Research metrics and evaluation. Oct 14, 2021. JUST, Jordan.

Duphat Online Webinar course: Effect of COVID-19 pandemic on cancer treatment. June 11, 2020, Dubai, UAE.

Alhusban L, Alhusban A, **Ayoub NM**. Antiangiogenic effect of conditioned media derived from triple-negative breast cancer cells in brain microvascular endothelial cells in vitro. *The Annual Meeting for the American Association for Cancer Research (AACR) 2019*, March 29-April 3, 2019, Atlanta, Georgia, USA. *Poster presentation*.

Siddique A, **Ayoub NM**, El Sayed K. Olive oil-derived (-)-oleocanthal for prevention of breast cancer recurrence. *The Annual Meeting for the American Association for Cancer Research (AACR) 2019*, March 29-April 3, 2019, Atlanta, Georgia, USA. *Poster presentation*.

**Ayoub NM**, Al-Shami KM, Alqudah MA, Mhaidat NM. Crizotinib inhibits growth, migration, and invasion of breast cancer cells in vitro and synergizes with chemotherapeutic agents. *The Annual Meeting for the American Association for Cancer Research (AACR) 2018*,

April 14-18, 2018, Chicago, Illinois, USA. *Poster presentation.*

Al-Husein BA, Dawah B, Bani-Hani S, Al Bashir SM, Al-Sawalmeh KM, **Ayoub NM**. Immunomodulatory effect of statins on Regulatory T Lymphocytes in human colorectal cancer is determined by the stage of disease. *The Annual Meeting for the American Association for Cancer Research (AACR) 2018*, April 14-18, 2018, Chicago, Illinois, USA. *Poster presentation.*

**Ayoub NM**, Yaghan RJ, Abdo NM, Mataalka II, Akhu-Zaheya LM, Al-Mohtaseb AH. Impact of obesity on clinico-pathologic characteristics and disease prognosis in pre- and postmenopausal breast cancer patients. *The 9th International Conference of The Royal Medical Services 'Leadership in Healthcare: Commitment & Challenges'*, Oct 30-Nov 2, 2018, Dead Sea, Amman, Jordan. *Oral presentation. CME credits.*

First International Cancer Care Informatics Conference, Amman, Jordan, Nov 19-21, 2018.

**Ayoub NM**, Al Husban AY, Al Husban HM, AlKhatib AN, Al-Mesleh AO, Al-Majali EA. Vascularity and vascular maturity in breast cancer: A comparative analysis of the different molecular subtypes. *The Annual Meeting for the American Association for Cancer Research (AACR) 2017*, April 1-5, 2017, Washington, D.C., USA. *Poster presentation.*

**Ayoub NM**, Al Husban AY, Al Husban HM, AlKhatib AN, Al-Mesleh AO, Al-Majali EA. Assessment of microvascular environment in breast cancer patients. *The 8th International Conference of The Royal Medical Services & the 7th Regional Assembly of the Pan Arab Regional Working Group of the International Committee of Military Medicine*, November 15-18, 2016, Dead Sea, Amman, Jordan. *Oral presentation. CME credits.*

The 8th international medical conference of The College of Medicine 'Continuous Medical Education: Fostering the Young Generation', April 14-16, 2016, KAUH, JUST.

The 8th Scientific Day for Faculty of Pharmacy "Recent Advances in Pharmaceutical Applications: A focus on Vascular Biology", May 7, 2015, JUST. *Oral presentation titled "Cancer angiogenesis: Therapeutic Updates".*

The 7th Scientific Day for Faculty of Pharmacy "Pharmacy Between Academia and Industry", May 15, 2014, JUST.

Pharmacy First National Conference "Recent Trends in Postgraduate Research", Dec 20-21, 2014, Applied Science University (ASU), Amman, Jordan.

**Ayoub NM**, Bachawal SV, Sylvester PW.  $\gamma$ -Tocotrienol inhibits c-Met tyrosine kinase receptor expression and activation in highly malignant mammary tumor cells. *The Annual Meeting for the American Association for Cancer Research (AACR) 2012*, March 31-April 4, 2012, Chicago, Illinois, USA. *Poster presentation.*

**Ayoub NM**, Akl MR, Sylvester PW. Combined  $\gamma$ -tocotrienol and Met inhibitor treatment suppresses mammary cancer cell proliferation, epithelial-to-mesenchymal transition, and migration. *Annual ULM Graduate Student Research Symposium*, April 2012, Monroe, Louisiana, USA. *Poster presentation.*

**Ayoub NM**, Bachawal SV, Sylvester PW.  $\gamma$ -Tocotrienol inhibits c-Met tyrosine kinase

receptor expression and activation in highly malignant mammary tumor cells. *Annual ULM Graduate Student Research Symposium*, April 2011, Monroe, Louisiana, USA. *Oral presentation*.

**Ayoub NM**, Sylvester PW. Combined low dose treatment with  $\gamma$ -tocotrienol, gefitinib, and c-Met inhibitor displays potent anticancer effects in mammary tumor cells *in vitro*. *Annual ULM Graduate Student Research Symposium*, April 2010, Monroe, Louisiana, USA. *Oral presentation*.

**Ayoub NM**, Sylvester PW. Combined low dose treatment with  $\gamma$ -tocotrienol, gefitinib, and c-Met inhibitor displays potent anticancer effects in mammary tumor cells *in vitro*. *American Association of Pharmaceutical Sciences (AAPS) Annual Meeting and Exposition 2010*, November 14–18, New Orleans, Louisiana, USA. *Poster presentation*.

## Workshops and Training

Taylor and Francis: Medical Library Journals & Author Services Platform. Webinar. Tue, Jul 4, 2023.

*Assessment at Wok: Increasing Students Success and Engaging Large Classrooms Workshop*. Academic Development Center, JUST, July 27-28, 2022.

*Developing National Capacities to Develop E-learning in Higher Education Institutions Workshop*. Academic Development Center, JUST, June 29-30, 2021.

*Exams and Assessment Workshop*. Academic Development Center, JUST, June 23-24, 2021.

*Problem-Based Learning Workshop*. Academic Development Center, JUST, March 18-20, 2019.

*Research-Based Teaching Workshop*. Higher Education Reform Experts (HERE) from the Erasmus Plus National Office, JUST, Sept 25, 2018.

Fellowship in the Responsible Conduct of Research (RCR) from JUST and University of California San Diego (UCSD), California, USA in 2015 (July 2014-Sept 2015).

The collaborative Institutional Training Initiative (CITI program) web-based basic course in Responsible Conduct of Research (RCR) at the University of Miami was completed on Oct 16, 2015.

*Grant Writing Workshop*. The Annual Meeting for the American Association for Cancer Research (AACR) 2012, March 31-April 4, 2012, Chicago, Illinois, USA.

## Languages

- Arabic: Native
- English: Fluent in reading, writing, and speaking

## Skills

- Western blot
- Cell culture
- Flow cytometry
- ELISA
- Immunocytochemistry
- Animal Studies

## Programs

- SPSS®
- GraphPad Prism®
- Microsoft Office
- SigmaPlot®
- ImageJ®

## Journal Editor

- BMC Women's Health: Associate Editor: 2017-present
- Frontiers in Pharmacology: Associate Editor: June 2021-present
- Frontiers in Oncology: Associate Editor: June 2021-present
- Oncology letters: Editorial board member: 2019-present
- Experimental and therapeutic medicine: Editorial board member: 2020-present
- Frontiers in Oncology: Lead guest editor [Research topic: Novel Combination Therapies for the Treatment of Solid Cancers]: Nov 2018-June 2021

## Journal Reviewer

- Scientific Reports (Nature Publications)
- Expert Review of Anticancer Therapy (Tylor and Francis Publications)
- International Journal of Oncology (Spandidos Publications)
- Molecular and Clinical Oncology (Spandidos Publications)
- Food and Chemical Toxicology (Elsevier Publications)
- Biomedicine and Pharmacotherapy (Elsevier Publications)
- Cellular Signaling (Elsevier Publications)
- European Journal of Pharmacology (Elsevier Publications)
- BMC Cancer (BMC, Springer Nature Publications)
- Cancer Management and Research (Dove press Publications)
- Breast Cancer: Targets and Therapy (Dove press Publications)
- OncoTargets and Therapy (Dove press Publications)
- Drug Development Research (Wiley Publications)
- Journal of Pharmaceutical Health Services Research (Wiley Publications)
- Biomed Research International (Hindawi Publishing Group)

## Professional Memberships

- American Association for Cancer Research (AACR): Active member 2016-present
- A member of the Tumor Microenvironment (TME) focus group at AACR: 2016-present
- American Association for Cancer Research (AACR): Associate member 2011-2013
- American Association of Pharmaceutical Scientists (AAPS): 2010-2012
- Jordan Pharmaceutical Association (JPA): 2004-present

## Awards

I am included in the AD Scientific Index for World Scientist and University Rankings 2023. I ranked no. 5 in pharmacy and pharmaceutical sciences and no. 20 in medical and health sciences among scientists at Jordan University of Science and Technology (JUST).

*Dean's Honor List* for all academic semesters during my Ph.D. study for my academic record (January 2009-December 2012), ULM, Monroe, LA, USA.

Best oral presentation award. *Annual ULM Graduate Student Research Symposium*, April 2011, Monroe, Louisiana, USA.

*Dean's Honor List* for all academic semesters during my MSc and BSc study for my academic record (1999-2006), JUST, Irbid, Jordan.

Scholarship from JUST to pursue doctoral studies at the University of Louisiana at Monroe (ULM), Monroe, Louisiana USA from January 2009 to December 2012.

## Research Interests

- Pharmacology of novel combinations of tyrosine kinase inhibitors with targeted therapy and/or chemotherapy in the treatment of the different molecular subtypes of

breast cancer. Exploring the signaling and molecular pathways associated with the pharmacological activity of tyrosine kinase inhibitors in breast cancer.

- The impact of the immune microenvironment and immune checkpoints on breast cancer.
- The effect of obesity and metabolic profile on the presentation and prognosis of breast cancer patients and the molecular mechanisms involved.
- Signaling and molecular pathways associated with angiogenesis in breast cancer.
- Clinical pharmacy and pharmaceutical care services.

## Grants

### Ongoing projects

1. Tumor expression of MET and PD-L1 and its impact on clinicopathologic features and blood biomarkers in patients with solid cancers: An insight into molecular and pathologic pathways. Sponsored by Deanship of Research, JUST. Research Grant No: 20220104.
2. Tumor expression of EGFR and PD-L1 and its impact on clinicopathologic features and blood biomarkers in patients with solid cancers: An insight into molecular and pathologic pathways. Sponsored by Deanship of Research, JUST. Research Grant No: 20220170.
3. The impact of circulating adipokines on the blood levels and the tumor expression of programmed death-ligand 1 in breast cancer patients. Sponsored by Deanship of Research, JUST. Research Grant No: 20220420.
4. Evaluation of the predictive value of blood levels of hepatocyte growth factor and vascular endothelial growth factor in solid cancer patients treated with bevacizumab. Sponsored by Deanship of Research, JUST. Research Grant No: 20220599.

### Completed projects

1. R15 proposal: Design of novel c-Met inhibitors inspired by olive phenolics. Sponsored by the National Cancer Institute of the National Institutes of Health. Award Number [R15CA167475]. Amount: \$420,540.
2. R15 proposal: R15CA227675, Novel PCSK9-LDLR interaction inhibitors for the control of breast cancer, submitted 6/22/2017, total cost \$411,002. El Sayed KA, PI, 10% Effort. COPIs: Seetherama Jois, Yong-yu Liu: 3% Efforts each. Collaborators: Professor Judy King, LSUHSC-Shreveport Medical School-Translational Pathology, Dr. Joydeep Bhattacharjee: ULM Biology; Dr. Nehad Ayoub: Jordan University of Science and Technology, Faculty of Pharmacy; Dr. Amal Kaddoumi: ULM. 05/01/2018-4/30/2021.
3. R15 proposal: 1R15CA228096-01: Antiangiogenic tobacco cembranoid: Novel therapeutic and health applications, submitted 6/26/2017, total cost \$411,002, EL Sayed, KA, PI 10% Effort. COPIs: Sharon Meyer, Yong-yu Liu, Amal Kaddoumi: 3% Efforts each. Collaborators: Professor Judy King, LSUHSC-Shreveport Medical School-Translational Pathology, Dr. Joydeep Bhattacharjee: ULM Biology; Dr. Nehad Ayoub: Jordan University of Science and Technology, Faculty of Pharmacy. 05/01/2018-4/30/2021.
4. Description of research ethics committees in Jordan and views of academics in health sciences. Sponsored by the Fogarty International Center of the U.S. National Institutes of Health on behalf of the Research Ethics Program in Jordan. Research Grant No: 5R25TW010026-02.
5. Circulating surrogate biomarkers as predictive and prognostic tools in newly diagnosed

cancer patients. Sponsored by Deanship of Research, JUST. Research Grant No: 20140057.

6. Obesity and breast cancer: Descriptive and mechanistic analysis. Sponsored by Deanship of Research, JUST. Research Grant No: 20150029.

7. Awareness, attitudes, and perceptions of breast cancer screening among community pharmacists in Jordan: A national study. Sponsored by Deanship of Research, JUST. Research Grant No: 20150049.

8. Assessment of molecular pathways associated with metastatic disease among triple-negative breast cancer patients. Sponsored by Deanship of Research, JUST. Research Grant No: 20150195.

9. Evaluation of angiogenic marker expression among different molecular subtypes of breast cancer. Sponsored by Deanship of Research, JUST. Research Grant No: 20150207.

10. Cancer pain in Jordan: Patient attitudes and appropriateness of pain management plans. Sponsored by Deanship of Research, JUST. Research Grant No: 20150168.

11. Correlation of glycemic control and breast cancer characteristics in newly diagnosed cancer cases. Sponsored by Deanship of Research, JUST. Research Grant No: 20160123.

12. Evaluation of the effect of olaparib and crizotinib combination on proliferative, migratory, and invasive potential of breast cancer cells. Sponsored by Deanship of Research, JUST. Grant No: 20160127.

13. Assessing the effect of breast cancer cells on the behavior of brain microvascular endothelial cells. Sponsored by Deanship of Research, JUST. Research Grant No: 20170129.

14. Evaluation for the effect of crizotinib and lapatinib on proliferation, invasion, and migration of breast cancer cells. Sponsored by Deanship of Research, JUST. Research Grant No: 20180289.

15. Evaluation for the effect of crizotinib and tamoxifen combination on proliferation, migration, and invasion of breast cancer cells. Sponsored by Deanship of Research, JUST. Research Grant No: 20180279.

16. Knowledge and practice of breast cancer screening and early detection among female pharmacists in community settings in Jordan. Sponsored by Deanship of Research, JUST. Research Grant No: 20180026.

17. Expression of immune markers in breast cancer tissues and assessment of associations with clinicopathologic characteristics, prognostic factors, and molecular subtypes in breast cancer patients. Sponsored by Deanship of Research, JUST. Research Grant No: 20190529.

18. Knowledge of and readiness for dispensing oral anticancer drug therapy among community pharmacists in Jordan: A cross-sectional study. Sponsored by Deanship of Research, JUST. Research Grant No: 20220022.

19. A survey of knowledge and barriers of healthcare professionals toward opioid analgesics in cancer pain management. Sponsored by Deanship of Research, JUST. Research Grant No: 20210351.

## Publications

1. **Ayoub NM**, Alhamdan YR, Jaradat SK, Jibreel M. Knowledge of and willingness for dispensing oral anticancer drug therapy among community pharmacists: a cross-sectional study from Jordan. *Journal of Pharmaceutical Health Services Research*. 2023; rmad007, <https://doi.org/10.1093/jphsr/rmad007>.
2. **Ayoub NM**, Khalil RW, and Kaddoumi A.  $\alpha$ -Tocopherol for Alzheimer's disease. Chapter 2, In: *Vitamins and Minerals in Neurological Disorders Book*. Editors: Martin, Patel, and Preedy. 2023, pages 13-28. [Book chapter]
3. **Ayoub NM**, Jibreel M, Nuseir K, Al-Taani GM. A Survey of Knowledge and Barriers of Healthcare Professionals toward Opioid Analgesics in Cancer Pain Management. *Int J Clin Pract*. 2022 Apr 12;2022:1136430.
4. **Ayoub NM**, Jaradat SK, Al-Shami KM, Alkhalifa AE. Targeting Angiogenesis in Breast Cancer: Current Evidence and Future Perspectives of Novel Anti-Angiogenic Approaches. *Front Pharmacol*. 2022 Feb 25;13:838133. [Review]
5. Fares M, **Ayoub NM**, Marji R, Al Bashir SM, Al-Shari OM. The impact of tumor-infiltrating lymphocytes on tumor features and pathological characteristics in breast cancer patients: The role of cytotoxic T lymphocytes and regulatory T cells. *Eur Rev Med Pharmacol Sci*. 2022 Jun;26(12):4207-4219.
6. Shatnawi A, **Ayoub NM**, Alkhalifa AE, Ibrahim DR. Estrogen-Related Receptors Gene Expression and Copy Number Alteration Association With the Clinicopathologic Characteristics of Breast Cancer. *Breast Cancer (Auckl)*. 2022 Mar 24; 16: 11782234221086713.
7. Al-Taani GM, **Ayoub NM**. Community pharmacists' routine provision of drug-related problem-reduction services. *PLoS One*. 2022 May 4;17(5):e0267379.
8. Zayed A, Jaber SA, Al Hroot J, Hawamdeh S, **Ayoub NM**, Qinna NA. HPLC with Fluorescence and Photodiode Array Detection for Quantifying Capmatinib in Biological Samples: Application to In Vivo and In Vitro Studies. *Molecules*. 2022 Dec 5;27(23):8582.
9. **Ayoub NM**, Fares M, Marji R, Al Bashir SM, Yaghan RJ. Programmed Death-Ligand 1 Expression in Breast Cancer Patients: Clinicopathological Associations from a Single-Institution Study. *Breast Cancer (Dove Med Press)*. 2021 Nov 13;13:603-615.
10. **Ayoub NM**, Al-Taani GM, Almomani BA, Tahaine L, Nuseir K, Othman A, Mensah KB. Knowledge and Practice of Breast Cancer Screening Methods among Female Community Pharmacists in Jordan: A Cross-Sectional Study. *Int J Breast Cancer*. 2021 Sep 30;2021:9292768.
11. **Ayoub NM**, Ibrahim DR, Alkhalifa AE. Overcoming resistance to targeted therapy using MET inhibitors in solid cancers: evidence from preclinical and clinical studies. *Med Oncol*. 2021 Oct 19;38(12):143. [Review]
12. **Ayoub NM**. Olive oil oleocanthal and estrogen receptor expression. Chapter 55 in book: *Olives and Olive Oil in Health and Disease Prevention (Second Edition)*, 2021,

pages 661-669. [Book chapter]

13. **Ayoub NM**, Alkhalifa AE, Ibrahim DR, Alhusban A. Combined crizotinib and endocrine drugs inhibit proliferation, migration, and colony formation of breast cancer cells via downregulation of MET and estrogen receptor. *Med Oncol*. 2021 Jan 15;38(1):8.
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