ABDUL ARIF KHAN

Associate Professor
Department of Pharmaceutics & Microbiology
College of Pharmacy,
King Saud University, P.O. Box 2457,
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UNIVERSITY EDUACTION:

2005-2008 **PhD (Doctor of Philosophy, Microbiology)**
College of Life Sciences, Cancer Hospital & Research Institute, Jiwaji University, Gwalior (MP) 474009 INDIA
Supported through research project received from UGC as principal investigator
Thesis title: Study of dental caries associated bacteria with special reference to *S. mutans*
Result: Degree awarded

2000-2002 **MSc (Masters of Science, Applied Microbiology)**
Department of Microbiology, Cancer Hospital & Research Institute, Jiwaji University, Gwalior (MP) 474009 INDIA
Result: 1st Division with securing position among top three students in university **merit list**

1997-2000 **BSc (Bachelor of Science, Biology)**
Government Autonomous Model Science College, Jiwaji University, Gwalior (MP) INDIA
Result: 1st Division

PROFESSIONAL EXPERIENCE

12 Jun 2017- Present **Associate Professor**
Department of Pharmaceutics & Microbiology, College of Pharmacy, King Saud University, Riyadh, Saudi Arabia

10 Jan 2010-11 Jun 2017 **Assistant Professor**
Department of Pharmaceutics & Microbiology, College of Pharmacy, King Saud University, Riyadh, Saudi Arabia

06 Apr 2009-01 Jan 2010 **Faculty Associate**
School of Biotechnology, Gautam Buddha University, Greater Noida (UP) INDIA

02 Mar 2005-04 Apr 2009 **Assistant Professor**
Department of Microbiology, College of Life Sciences, Cancer Hospital & Research Institute, Gwalior (MP) 474009, INDIA

01 Jan 2003–28 Feb 2005 **Teaching Faculty**
Department of Microbiology and Biotechnology, Government Autonomous Kamla Raja Girls College, Gwalior (MP) INDIA

ADJUNCT APPOINTMENT:

2nd Nov 2017- Present **Consultant (Freelance)** Innoscience Research Sdn. Bhd Suites B-5-7, Level 5, Sky Park @ One City, Jalan USJ 25/1, 47650 Subang Jaya, Selangor, Malaysia.

DISTINCTION & AWARDS:

- **"Ramanujan Fellowship"** from SERB, Department of Science and Technology, Government of India (2019).
- **"Certificate for Outstanding Research Achievement"** through Deanship of Scientific Research, King Saud University, KSA (2019)
- "**The 2017 Albert Nelson Marquis Lifetime Achievement Award**" through Marquis Who's Who, USA
- **"Top 100 Scientists-2013"** award by International Biographical Centre, Cambridge, England
- **Young Scientist Meeting Grant Award** from **Federation of European Microbiological Societies (FEMS), Netherlands,** (2007)
- **Young Scientist Award for Best Presentation** in MP Science Congress**, Indian Science Congress Association,** Bhopal Chapter for the year 2004 (Sponsored by Asian Journal of experimental sciences)
- **Graduate Aptitude Test in Engineering 2005** examination with 95.62 percentile (All India Rank 286)
- **Graduate Aptitude Test in Engineering 2004** examination with 84.33 percentile (All India Rank 753)
- Position among top three students in the **merit of Jiwaji University** MSc (Applied Microbiology) 2002 examination

FINANCIAL GRANTS RECEIVED:

RESEARCH PROJECT AS PRINCIPAL INVESTIGATOR

Ramanujan Fellowship project sanctioned by Dept of Science and Technology, New Delhi, India for ***evaluation of role of microflora in colorectal cancer*** for five years. Sanctioned by latter F. No. SB-S2/RJN-102/2018 dated 21 Jan 2019 with the value of **INR 11900000**.

Minor researsch project sanctioned by University Grants Commission, New Delhi, India titled "***Amelioration of dental caries: evaluation of indigenous plant products***" for two years. Sanctioned by latter F. No. 4S-02/2005-06 (MRP/CRO)/105003 dated 24 Feb 2006 with the value of **INR 100000**.

Received Travel grant from **Department of Science and Technology (DST),** Govt. of India, for participation in "International conference on Bioinformatics and Comparative genome analysis" held at Institute of Pasteur, Tunisia from 18-03-2007 to 07-04-2007, sanctioned by latter number SR/PF/66/2007-08 dated 14-03-2007

Received **FEMS young scientist meeting grant** for participation in International conference on "Campylobacter Helicobacter and related organism 2007 (CHRO 2007)" at Rotterdam, Netherlands, through **Federation of European Microbiological Societies, Netherlands**

RESEARCH GRANTS EVALUATOR:

South African Medical Research Council (SA-MRC), Cape Town, South Africa

Research Grants Council (RGC) of Hong Kong

King AbdulAziz city for Science and Technology (KACST) Riyadh, Saudi Arabia

Al-Imam Mohammad Ibn Saud Islamic University (IMSIU) Riyadh, Saudi Arabia

MEMBERSHIP OF PROFESSIONAL SOCIETIES

Senior Member	**:**	The Asia Society of Researcher, Hong Kong
Senior Member	:	International Association of Educators and Researchers, UK
Life Member	:	Society for Immunology and Immunopathology, INDIA
Life member	:	Association of microbiologist of India
Life Member	:	Healthcare & Biological Sciences Research Association (HBSRA)
Member	:	Asian Council of Science Editor, UAE (till 2016)
Member	:	International Association of Engineers, UK
Member	:	The Science Advisory Board, USA

TRAINING AND WORKSHOP:

Selected (**Among 20 candidates globally and only two from Asia**) for the participation in **International course on Bioinformatics and comparative genome analysis** organized by Institute of Pasteur Paris, European Molecular biology organization (UK), CNRS (France), Institute of Pasteur Tunis from 18-03-2007 to 07-04-2007 followed by a general conference on the same topic

INVITED TO DELIVER GUEST LECTURE/ KEYNOTE SPEAKER:

1. 3rd World Cancer Online Conference, Organized in USA (21-24 Jan 2014).
   Title of invited talk: *E. coli* and colon cancer: Who is culprit?
2. 2nd World Cancer Online Conference, Organized in USA. (8-11 Jan 2013)
   Title of invited talk: Normal to cancer microbiome transformation: Giving clue for cancer detection
3. 1st International Conference on Biosciences and Bioengineering: A collaborative approach, India (06-07 July 2012)
   Title of invited talk: Bacteriology and Cancer: An old association revisited
4. For M.Sc. Microbiology and Biotechnology students for Bioinformatics subject in Department of Microbiology and Biotechnology, Dr. H. S. Gaur University (Now Central University), Sager (M.P.) India

EDITORIAL & REVIEWER RESPONSIBILITIES:

Technical Editor	**:**	Research Journal of Microbiology (Since Aug 2008)
Editorial Board Member	:	Journal of Tumor (Since 2013)
		Journal of Immunology and Vaccine Technology (Since 2014)
		Elyns Journal of Cancer Research (Since 2015)

Reviewer	:	Briefings in Bioinformatics Cancer Letters Oncotarget Computational and Structural Biology Journal Critical Review in Food Science and Nutrition Archives of Medical Sciences Trends in Bioinformatics Pakistan Journal of Biological Sciences Toxicology Mechanisms and Methods Inflammation Research Journal of Biomedicine and Biotechnology Environment, Development and Sustainability International Journal of Phytomedicine Pak Journal of Zoology African Health Science Journal Iranian Journal of Kidney Diseases Tumor Biology (Springer) Protein and Peptide Letters (Bentham) Annals of Saudi Med Book "Functional food and human health (Springer India)

POSITIONS IN CONFERENCES AND SYMPOSIA/ UNIVERSITY EXAMINATION

1. Worked as program technical committee member for 3rd ScienceOne conference on Drug Discovery and Development organized on January 21-23, 2014 at Dubai
2. External examiner for B.Sc. practical examination in St. Alloysius College, Affiliated to Rani Durgavati University, Jabalpur (MP) INDIA on 19th February 2007
3. External examiner for B.Sc. practical examination in P.G.V. College affiliated to Jiwaji University, Gwalior (MP) INDIA on 13th and 22nd February 2007
4. External examiner for B.Sc. practical examination in M.G.M. College Morena (MP) affiliated to Jiwaji University, Gwalior (MP) INDIA
5. Examiner in Bundelkhand University, Jhansi (UP) INDIA and Devi Ahilya University, Indore (MP) INDIA
6. Executive member in Indian Council of Medical Research (ICMR), New Delhi sponsored conference "Recent trends in Molecular biology" held on 27-28th February 2006 in College of life Sciences, Cancer Hospital & Research Institute, Gwalior (MP)

RESEARCH SUPERVISION:

1. **Ms. Neetu Sharma** (M.Sc. Microbiology) Jiwaji University, Gwalior (MP) INDIA

Title: Study of dental caries associated bacteria and analysis of conserved sequences in glucosyltransferase through bioinformatics tools.

2. **Mr. Sandeep Nagaich** (M.Sc. Biotechnology) Jiwaji University, Gwalior (MP) INDIA

Title: Study of dental caries associated bacteria and conserved sequence prediction in Glucosyltransferase

3. **Mr. Mahesh Rathore** (M.Sc. Biotechnology) CSJM University, Kanpur (UP) INDIA

Title: Study of teeth decaying bacteria (with special reference to Streptococci spp.) and their phylogenetic analysis through bioinformatics tools.

4. **Mr. Ankur Garg** (M.Sc. Biotech) Jiwaji University, Gwalior (MP) INDIA (2005)

Title: Study of amylase activity by B. megaterium at different pH value

5. **Ms. Jyoti Sharma** (M.Sc. Microbiology) Jiwaji University, Gwalior (MP) INDIA (2008)

Title: In silico analysis of Paramyxovirus F protein with special reference to its antigenic and vaccine potential

6. **Ms. Vinita Shankar** (M.Sc. Microbiology) Bundelkhand University, Jhansi (UP) INDIA (2009)

Title: Development of web resource for Herpes virus and its associated diseases

7. **Mrs. Pinki Kushwaha** (M.Sc. Microbiology) Bundelkhand University, Jhansi (UP) INDIA (2009)

Title: Web resource development for anthrax

8. **Ms. Naila** (M.Sc. Microbiology) Jiwaji University, Gwalior (MP) INDIA (2009)

Title: In silico analysis of Adenovirus penton protein with special reference to its antigenic and vaccine potential

LIST OF PUBLICATIONS:

Books (International)

- **Abdul Arif Khan** (Ed.) *Bacteria and Cancer*, ***Springer Science Publisher, Netherlands*** (2012) (ISBN 978-94-007-2584-3)
- Sudhir Kumar Jain, **Abdul Arif Khan** and M.K.Rai (Ed.) *Geomicrobiology*, ***Science Publisher, Taylors and Francis, CRC Press, USA*** (2010) (ISBN 978-1-57808-665-8)

Research Papers and Reviews (All Impact factors are at the time of publication)

First and/or corresponding author*

1. **Khan A.A.*** et al. (2017) Colorectal cancer-inflammatory bowel disease nexus and felony of *Escherichia coli*. Life Sci **(Impact factor: 2.685)**
2. **Khan A.A.*** et al. (2016) Inter-kingdom prediction certainty evaluation of protein subcellular localization tools: microbial pathogenesis approach for deciphering host microbe interaction. Brief Bioinfor **(Impact factor 8.399) (First & Corresponding author)**
3. **Khan A.A.*** et al. (2016) Cancer associated toll like receptor modulation and insinuation in infection susceptibility: association or coincidence? Ann Oncol **(Impact factor 9.269) (First & Corresponding author).**
4. ¶Shrivastava A., *¶**Khan A.A.*** et al. (2016) Recent developments in the field of L-asparaginase discovery: a potential anticancer agent [¶Equal Contribution] Crit Rev Oncol/Hematol *(¶Both are first author)* **(Impact factor 5.039) (First & Corresponding author)**
5. Khan, Z.*, **Khan A.A.*** et al. (2017) Survivin, a molecular target for therapeutic interventions in squamous cell carcinoma. Cell Mol Biol Lett **(Impact factor 1.753) (Co-first author)**
6. **Khan A.A.*** et al. (2015) Computational prediction of *E. coli* proteins host subcellular targeting and their implications in colorectal cancer etiology. Cancer Letters **(Impact factor 5.016) (First & Corresponding author).**
7. **Khan A.A.*** (2014) *In silico* prediction of *E. coli* proteins targeting the host cell nucleus, with special reference to their role in colon cancer etiology. J Comp Biol **(Impact factor 1.67) (Sole author).**
8. ***Khan A.A.**, Cash P. (2013) *E. coli* and colon cancer: Is *mutY* a culprit? Cancer Letters **(Impact factor 4.25) (First & Corresponding author)**
9. ***Khan A.A.** et al. (2013) Gut microbiota and probiotics: Current status and their role in cancer therapeutics. *Drug Dev. Res.* **(Impact factor 0.869) [Invited article as subject exper**t] **(First & Corresponding author)**
10. **Khan A.A.** et al. (2013) In vitro evaluation of vincristine and fluconazole combination against Candida spp. *Pak J Pharm Sci* **(Impact factor 1.102)**
11. ***Khan A.A.** et al. (2012) Normal to cancer microbiome transformationand its implication in cancer diagnosis. *BBA Rev. Cancer* **(Impact factor 9.886) (First & Corresponding author)**
12. ***Khan A.A.** and Shrivastava A. (2010) Bacterial infection associated with cancer: Possible implication in etiology with special reference to lateral gene transfer. Cancer Metastasis Rev. **(Impact factor 9.345) (First & Corresponding author)**
13. ***Khan A.A.** (2010). Intracellular mechanism of Apoptosis. *J. Biol. Sci.* 10(4):291-305
14. ***Khan A.A.,** Jain S.K., Shrivastav A. (2008) Prevalence of dental caries among the population of Gwalior (India) in relation of different associated factors, *Eur. J. Dent.* **(First & Corresponding author)**

As Co-author

15. Alhowyan A.A., Altamimi M.A., Kalam M.A., **Khan A.A.** et al. (2019) Antifungal efficacy of Itraconazole loaded PLGA-nanoparticles stabilized by vitamin-E TPGS: In vitro and ex vivo studies. J Microbiol Method. **(Impact factor: 1.7)**
16. Kalam M.A., **Khan A.A.** et al. (2018) Solubility of a poorly soluble immunosuppressant in different pure solvents: Measurement, correlation, thermodynamics and molecular interactions. J Mol Liquids **(Impact factor 3.648)**
17. Kalam M.A., **Khan A.A.** et al. (2017) Biodegradable polymeric nanoparticles and vesicular carriers for vaccine delivery via non-invasive routes of administration: A review. Am J Transl Res **(Impact factor 3.146)**
18. Bhat M.A., **Khan A.A.** et al. (2017) Synthesis and anti-Candidal activity of some new pyrazoline derivatives. Biomed Res **(Impact factor 0.226)**
19. Khan A.A., Jabeen M., Alanazi A., **Khan A.A.** (2016) Antifungal efficacy of amphotericin B encapsulated fibrin microsphere for treating Cryptococcus neoformans infection in Swiss albino mice. Brazilian J Infec Dis **(Impact factor 1.412)**
20. Malik A., Kumar D., **Khan A.A.** et al. (2016) Hepatitis B virus precore G1896A mutation in chronic liver disease patients with HBeAg negative serology from North India. Saudi J Biol Sci **(Impact factor 1.257).**

21. Khan S., Imran A., **Khan A.A.** et al. (2016) Systems biology approaches for the prediction of possible role of *Chlamydia pneumoniae* proteins in the etiology of lung cancer. PLOS One **(Impact factor 3.234).**
22. Kalam M.A., **Khan A.A.** et al. (2016) Optimizing Indomethacin-loaded Chitosan nanoparticle size, encapsulation, and release using Box-Behnken experimental design. Int J biol macromol **(Impact factor 2.858).**
23. Khan S., Ansari A.A., **Khan A.A.** et al. (2016) In vitro evaluation of anticancer and biological activities of synthesized Manganese oxide nanoparticles. Med Chem Comm **(Impact factor 2.319)**
24. Khan S., Ansari A.A., **Khan A.A**. et al. (2016) Design, synthesis and in-vitro evaluation of anticancer and antibacterial potential of surface modified Tb(OH)3@SiO2 core-shell nanoparticles. RSC Adv **(Impact factor 3.84).**
25. Bhat M.A., **Khan A.A.** et al. (2016) Synthesis, characterization, X-ray structure and antimicrobial activity of N-(4-Chlorophenyl)-2-(pyridin-4-ylcarbonyl) hydrazinecarbothioamide. Trop J Pharm Res **(Impact factor 0.589)**
26. Khan Z., **Khan A.A.** et al. (2016) Growth inhibition and chemo-radiosensitization of head and neck squamous cell carcinoma (HNSCC) by Survivin-siRNA Lentivirus. Radiotherapy and Oncology **(Impact factor 4.363).**
27. Khurshid M., Akbar R., Nisar M.A., Rahman H., Aslam B., **Khan A.A.** et al. (2015) Bacterial munch for infants: potential pediatric therapeutic interventions of probiotics. Future Microbiology **(Impact factor 4.275)**
28. Khan S., Ansari A.A., **Khan A.A.** et al. (2015) In vitro evaluation of anticancer and antibacterial activities of cobalt oxide nanoparticles. J Biol Inorg Chem. **(Impact factor 2.495)**
29. Muhammad S., Khurshid M., Saleem H.G., **Khan A.A.** (2015) Characteristic and antibiotic resistance of urinary tract pathogens in Punjab. Jundishapur J Microbiol **(Impact factor 0.78)**
30. Bhat M., **Khan A.A.** et al. (2014) Synthesis of new [1,2,4]triazolo[3,4-b][1,3,4]thiadiazines and study of their anti-Candidal and cytotoxic activities. J Chem, Article **(Impact factor 0.622)**
31. Bhat M., **Khan A.A.** et al. (2014) Synthesis and anti-Candida activity of N- (4-aryl/cyclohexyl) -2-(pyridine-4-yl carbonyl) hydrazinecarbothioamide. Bioorg Med Chem Letters **(Impact factor 2.338)**
32. Farooq F., Rai M., Tiwari A., **Khan A.A.** et al. (2012) Medicinal potential of *Moringa oleifera*: An overview of promising healer. *J. Med. Plant. Res.* **(Impact factor 0.879)**
33. Shrivastava A., **Khan A.A.** et al. (2012) Kinetic study of purified L-asparaginase from *Penicillium* sp. *Prep. Biotech. Biochem.* **(Impact factor 0.691)**
34. Shrivastava A., **Khan A.A.** et al. (2010) Biotechnological advancement in isolation of anti-neoplastic compounds from natural origin: a novel source of L-asparaginase. *Acta Biomedica*
35. Bhatnagar P., **Khan A.A.** et al. (2007). Microbiological study of khoa sold in chambal region (Madhya Pradesh): A case study. *Indian J. Microbiol.*
36. Bhatnagar P., **Khan A.A.** et al. (2007). Bacteriological study of khoa sold in Gwalior & Morena city (Madhya Pradesh) in relation to public health. *Asian J. Exp. Sci*
37. Jain M., **Khan A.A.** (2008) An epidemic of typhoid fever in a hostel, *Indian J. Field Vet.*
38. **Khan A.A.** et al. (2009) *In vitro* susceptibility of antibiotics against pathogenic bacteria, *BIOZONE Int. J. Life Sci.*

Chapters in Books

1. **Khan A.A.,** Khan S. (2015) "Probiotics and cancer". Encyclopedia of Cancer (Ed) Manfred Schwab, Springer
2. Shrivastava A., **Khan A.A.** et al. (2012) Bacterial asparaginase: A potential therapeutic agent for leukemia. "Bacteria and Cancer (Ed) Khan A. A., Springer Science Publisher, Netherlands
3. Bhatnagar P, **Khan A.A.** et al. (2010) "Biodeterioration of archaeological monuments: An approach for restoration". Geomicrobiology (Ed) Jain SK, Khan AA, Rai MK, Science Publisher, CRC Press, USA
4. ***Khan A.A.*** et al. (2006) "Recent methods for fungal community analysis with special reference to TGGE and DGGE". Current Advances in Fungal Biotechnology" Rai M.K. (Ed.) IK Inter Pvt Ltd. New Delhi, pp. 450-462

Invited Articles

1. Sharma E., Rochlani D., ***Khan A.A.** (2011) Automated liver function test: An important advancement in rapid testing of liver function. *Medical Equipments and Automation* pp. 55-57
2. ***Khan A.A. (2010)** Automated antibacterial susceptibility testing in clinical laboratories. *Medical Equipments and Automation* pp. 44-47
3. Khan A.R., Farooq F., ***Khan A.A.** (2010) Clinical microbiology laboratory automation: A Way towards improving clinical microbiology diagnosis. *Medical Equipments and Automation* Nov-Dec 2010: pp. 76-80

Web resources developed for scientific community

1. Jha S., Ashraf M.T., **Khan A.A.**, Ahmad S. (2016) "Algae Scan" http://www.algaescan.org/index.aspx
2. Shankar V., Khan A.A. (2009) "Herpes Web" http://herpes.page.tl/

Abstracts Published

1. **Khan A.A.** (2014) "E. coli and colon cancer: Who is the culprit? 3rd TM World Cancer Conference, USA
2. **Khan A.A.** (2012) "Normal to Cancer Microbiome transformation: Giving clue for cancer detection" 2nd TM World Cancer Conference, USA
3. **Khan A.A.** (2012) "Bacteriology and Cancer: An old association revisited" Biosciences and Bioengineering: A collaborative approach, India
4. **Khan A.A.** and Shrivastava A. (2009) "Medical waste disposal system: An integral part of hospital" National seminar on Recent Advances in Environmental Sciences, organized by PG Department of Life Sciences, IASCA, ITM Universe, Gwalior (M.P.)
5. **Khan A.A.** (2006) *Phylogenetic Analysis of Teeth Decaying Oral Bacteria through CLUSTAL W"* 4th Annual Rocky Mountain Bioinformatics conference, Colorado USA
6. **Khan A.A**., Jain M., Shrivastav A., Jain S.K. (2006) "*Bacterial infections jeopardizing patients to cancer*" 47th AMI conference, Bhopal
7. Bhatnagar P., Mishra A., **Khan A.A.,** Shrivastav A., Jain S.K. (2006) "*TGGE & DGGE: An approach for molecular study of microbial community*" 47th AMI conference, Bhopal
8. **Khan A.A.** & Shrivastava A. (2004) "*Effects of leaf extracts on the growth of E. coli"* M.P. Science Congress, Indian science congress association, Bhopal chapter

PARTICIPATION & PRESENTATIONS IN CONFERENCES AND SYMPOSIA

International

- Participated International conference on "Bioinformatics and comparative genome analysis" organized by Institute of Pasteur, Paris, EMBO, and **Institute of Pasteur**, Tunis at Tunisia from 2nd April to 7th April 2007
- Participated International conference on Toxicology, Toxicogenomics and Occupational Health held during 9-11 Oct. 2006 at Jiwaji University, Gwalior and presented a poster titled "*Isolation and analysis of Ochratoxin isolated from Aspergillus ochraceus isolated from dry fruits*"

National

- Participated in National conference on Food 2020 at Centre for food Technology Jiwaji University Gwalior and presented a poster titled "*Food as a vaccine*"
- Participated M. P. Sciences Congress- 2004 (Indian Science Congress Association, Bhopal chapter) and presented a paper titled "*Effect of leaf extracts on the growth of E. coli"*
- Participated in National symposium on Immunomodulation in health and disease held during 14-15 Dec. 2001 at G.B. Pant University, Pantnagar, INDIA
- Participated UGC- DSA National conference on "Bio resource: Utilization and Conservation" held during 17-18 Feb 2006 at Saurashtra University, Rajkot, Gujarat, INDIA
- Participated symposium on "How to write Scientific/Medical paper" held on 24th Sep. 2006 at Cancer Hospital & Research Institute, Gwalior, INDIA
- Participated 47th Association of Microbiologist of India conference at Barkatullah University, Bhopal from 6th to 8th December 2006 and presented a poster titled "Bacterial infections jeopardizing patients to cancer"
- Participated workshop-2008 titled "Nanotechnology of protein estimation" organized by Gajra Raja Medical College, Gwalior (MP) India on 9th Feb 2008
- Participated symposia on "Biotech 2005: Challenges and opportunities" organized by GICTS college, Gwalior on 19th April 2005
- Participated in national seminar on "Nanotech – 2008" organized by College of Life Sciences, Cancer Hospital & Research Institute, Gwalior (MP) on 28th Feb 2008
- Participated in national seminar on "Recent advances in environmental sciences" organized by P.G. department of Life Sciences, Institute of Allied Sciences and computer application, ITM Universe, Gwalior (MP) on 27th- 28th Feb 2009

LANGUAGES KNOWN:

English (Fluent), Hindi (Mother tongue), Urdu (Native), Arabic (Basic)

PERSONAL INFORMATION:

Date of Birth:	26-12-1979
Nationality:	Indian
Marital status:	Married

Briefings in Bioinformatics Advance Access published October 6, 2016

OXFORD

Briefings in Bioinformatics, 2016, 1–11

doi: 10.1093/bib/bbw093
Paper

Inter-kingdom prediction certainty evaluation of protein subcellular localization tools: microbial pathogenesis approach for deciphering host microbe interaction

Abdul Arif Khan, Zakir Khan, Mohd Abul Kalam, and Azmat Ali Khan

Corresponding author. Abdul Arif Khan, Department of Pharmaceutics, College of Pharmacy PO Box 2457, King Saud University, Riyadh 11451, Saudi Arabia. Tel.: +966542854355; E-mail: abdularifkhan@gmail.com.

Abstract

Microbial pathogenesis involves several aspects of host–pathogen interactions, including microbial proteins targeting host subcellular compartments and subsequent effects on host physiology. Such studies are supported by experimental data, but recent detection of bacterial proteins localization through computational eukaryotic subcellular protein targeting prediction tools has also come into practice. We evaluated inter-kingdom prediction certainty of these tools. The bacterial proteins experimentally known to target host subcellular compartments were predicted with eukaryotic subcellular targeting prediction tools, and prediction certainty was assessed. The results indicate that these tools alone are not sufficient for inter-kingdom protein targeting prediction. The correct prediction of pathogen's protein subcellular targeting depends on several factors, including presence of localization signal, transmembrane domain and molecular weight, etc., in addition to approach for subcellular targeting prediction. The detection of protein targeting in endomembrane system is comparatively difficult, as the proteins in this location are channelized to different compartments. In addition, the high specificity of training data set also creates low inter-kingdom prediction accuracy. Current data can help to suggest strategy for correct prediction of bacterial protein's subcellular localization in host cell.

Key words: protein targeting; microbial pathogenesis; in silico; nuclear proteins; mitochondrial proteins

Introduction

Microbial pathogenesis involves a highly coordinated response of the pathogens with the host for their survival, growth and reproduction. This coordination is multifaceted and involves microbial attachment to the host and the subsequent signaling with host cell machinery. These events are managed through multiple processes including pathogen proteins targeting the host cell.

Abdul Arif Khan is working as an Assistant Professor in Department of Pharmaceutics, College of Pharmacy, King Saud University, Riyadh, Saudi Arabia. He has strong research interest in the field of cancer associated infections including study of host-pathogen interactions using system biology approaches. He is involved in using computational approaches to decipher role of microbes in cancer etiology and diagnosis.

Zakir Khan is a Scientist at the Department of Biomedical Sciences, Cedars-Sinai Medical Center, Los Angeles, USA. He has major research interest in understanding of molecular mechanisms for identifying novel targets/strategies in cancer treatment. He is also involved in using computational approaches to understand molecular mechanisms behind cancer etiology.

Mohd Abul Kalam is working as an Assistant Professor at Department of Pharmaceutics, College of Pharmacy, King Saud University, Riyadh, Saudi Arabia. His research area is to conduct rigorous translational nanomedicine for promising improvements of potential therapeutics. His expertise is in nanotechnology including the role for computational approaches in nanotechnology research.

Azmat Ali Khan is working as an Assistant Professor in Pharmaceutical Biotechnology Laboratory, Department of Pharmaceutical chemistry, College of Pharmacy, King Saud University, Riyadh, Saudi Arabia. His research interest focus is on drug delivery via lipid nanoparticles. He is also working on study of host-pathogens interactions using computational and wet lab tools.

Submitted: 14 April 2016; Received (in revised form): 24 August 2016

90. Dorff TB, Tsao-Wei DD, Groshen S et al. Efficacy of oxaliplatin plus pemetrexed in chemotherapy pretreated metastatic castration-resistant prostate cancer. Clin Genitourin Cancer 2013; 11: 416–422.
91. Lee JL, Ahn JH, Choi MK et al. Gemcitabine-oxaliplatin plus prednisolone is active in patients with castration-resistant prostate cancer for whom docetaxel-based chemotherapy failed. Br J Cancer 2014; 110: 2472–2478.
92. Latif T, Wood L, Connell C et al. Phase II study of oral bis (aceto) ammine dichloro (cyclohexamine) platinum (IV) (JM-216, BMS-182751) given daily x 5 in hormone refractory prostate cancer (HRPC). Invest New Drugs 2005; 23: 79–84.
93. Stemberg CN, Whelan P, Hetherington J et al. Phase III trial of satraplatin, an oral platinum plus prednisone vs. prednisone alone in patients with hormone-refractory prostate cancer. Oncology 2005; 68: 2–9.
94. Getnar J, Wilding G, McNeel D et al. A phase 1/1b study of satraplatin (JM-216) in combination with docetaxel in patients with advanced solid tumors and metastatic castrate-resistant prostate cancer. Urol Oncol 2013; 31: 436–441.
95. Vaishampayan UN, Fontana J, Heilbrun LK et al. Phase II trial of bevacizumab and satraplatin in docetaxel-pretreated metastatic castrate-resistant prostate cancer. Urol Oncol 2014; 32: 31 e25–33.
96. Akaza H, Togashi M, Nishio Y et al. Phase II study of cis-diammine(glycolato) platinum, 254-S, in patients with advanced germ-cell testicular cancer, prostatic cancer, and transitional-cell carcinoma of the urinary tract. 254-S Urological Cancer Study Group. Cancer Chemother Pharmacol 1992; 31: 187–192.
97. Marshall ME, Wolf MK, Crawford ED et al. Phase II trial of CHIP for the treatment of advanced, hormonally refractory carcinoma of the prostate. A Southwest Oncology Group Study. Am J Clin Oncol 1995; 18: 400–402.
98. Oh WK, Tay MH, Huang J. Is there a role for platinum chemotherapy in the treatment of patients with hormone-refractory prostate cancer? Cancer 2007; 109: 477–486.
99. Beer TM, Armstrong AJ, Rathkopf DE et al. Enzalutamide in metastatic prostate cancer before chemotherapy. N Engl J Med 2014; 317: 424–433.
100. Tan DS, Kaye SB. Chemotherapy for patients with BRCA1 and BRCA2-mutated ovarian cancer: same or different? Am Soc Clin Oncol Educ Book 2015; 114–121.
101. Tan DS, Rothermundt C, Thomas K et al. "BRCAness" syndrome in ovarian cancer: a case-control study describing the clinical features and outcome of patients with epithelial ovarian cancer associated with BRCA1 and BRCA2 mutations. J Clin Oncol 2008; 26: 5530–5536.
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Cancer-associated toll-like receptor modulation and insinuation in infection susceptibility: association or coincidence?

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Toll-like receptors (TLRs) are key players in maintaining protection against any invading pathogen. These molecules are microbial sensing proteins which detect pathogen-associated molecular patterns and induce the body's innate immune system to elicit a response against invading pathogens. In addition to their role in pathogen recognition and elimination, these proteins are highly important in cancer biology and also play a variety of roles in normal to cancerous transformation or its prevention. There is much published literature on the role of TLRs in pathogen recognition and elimination, but recently the number of articles relevant to the role of TLR in carcinogenesis has increased due to their importance in this

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Original Articles

Computational prediction of *Escherichia coli* proteins host subcellular targeting and their implications in colorectal cancer etiology

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ABSTRACT

Recent evidences indicate potential *Escherichia coli* involvement in colorectal cancer etiology. Colorectal cancer cells are exclusively colonized by enteroinvasive *E. coli*, which regulates several factors that can affect colorectal cancer progression in susceptible individuals. Earlier, we predicted nuclear targeting of *E. coli* proteins and their role in colorectal cancer etiology. In this study, we predict targeting of *E. coli* proteins in host cell mitochondria and cytoplasm and their role in colorectal cancer. Several important biological processes are regulated in the cell cytoplasm and mitochondria, where the targeting of *E. coli* proteins may have several possible implications. A total of 87/561 and 315/561 *E. coli* proteins were found to target host cell mitochondria and cytoplasm respectively. These include several proteins with the ability to influence normal growth behavior. The current article provides an outline for *E. coli* protein targeting in host cells and suggests that these proteins can contribute to the colorectal cancer etiology through a variety of strategies.

Introduction

Escherichia coli is suspiciously involved in colorectal cancer (CRC) etiology because of its ability to induce chronic inflammation in the colon. It is involved in colitis, which is a risk factor for CRC [1]. Chronic inflammatory diseases of the colon, including inflammatory bowel disease, ulcerative colitis and Crohn's disease, involve *E. coli* as one of the etiological factors [2,3] and predispose an individual for the development of CRC. It has been demonstrated that cells undergoing the above-mentioned inflammatory conditions as well as colon cancer cells are specifically colonized by enteroinvasive *E. coli* (EIEC), a form of *E. coli* that grows inside the cell [4].

After the discovery of an epidemiological association between *E. coli*-associated chronic inflammation and CRC, several mechanisms have been indicated in *E. coli* that possibly contribute to tumor development. Recently, when germ free IL-10 $^{-/-}$ mice were colonized with *E. coli*, it was found that *E. coli* increased the development of colitis and colon cancer. This study further indicated that the polyketide synthase (*pks*) pathogenicity island enhances the ability of *E. coli* to cause colon cancer. Removal of *pks* from *E. coli* resulted in less DNA damage and neoplastic lesions in colonized IL-10 $^{-/-}$ mice [5]. *pks* pathogenecity island genes code for multienzyme machinery that is responsible for synthesis of several important metabolites, including colibactin. Colibactin increases the oncogenic potential of cells through its ability to induce senescence [6]. Nevertheless, this association is still lacking a complete framework on how *E. coli* intracellular infection can influence progression of inflammatory diseases into colon cancer.

An alternative hypothesis is that EIEC proteins directly influence host cellular functions as a consequence of their subcellular localization and active participation in several biochemical pathways. EIEC remains in close contact with the host cell due to its intracellular residence, and can act as a cellular component. It can be assumed that the bacterial proteins will act as a part of the entire host cellular proteome, and its subcellular targeting will be regulated as per the targeting information present on the bacterial protein. Protein targeting of intracellular pathogens in host cell plays an important role in host cell regulation, including cell growth and apoptosis [7]. Earlier, we have predicted nuclear targeting of *E. coli* proteins in host cell during intracellular infection through *in silico* methods. We have shown that several gene-expression-associated *E. coli* proteins can migrate to the host nucleus, where they can play

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Head and neck radiobiology

Growth inhibition and chemo-radiosensitization of head and neck squamous cell carcinoma (HNSCC) by survivin-siRNA lentivirus

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ABSTRACT

Background: Survivin expression is often associated with aggressive tumor behavior and therapy resistance. In this study, we investigated the effect of survivin knockdown by survivin-siRNA lentiviral vector (Svv-Lent) on the response of HNSCC to chemo-radiotherapy, tumor growth and metastasis.

Methods: Four human HNSCC (OSC19, Cal27, Cal33 and FaDu) and one normal HOK cell lines were included in the study, and survivin knockdown was achieved with Svv-Lent treatment. Cell proliferation and apoptosis were measured by MTT and TUNEL assay, respectively. Transwell assays were performed to measure *in vitro* cell migration and matrigel invasion. Xenograft tumors were developed in nude mice by injecting Cal27 cells subcutaneously and following tail-vein injection of lung and liver metastasis.

Results: Knockdown of survivin significantly suppressed HNSCC cell proliferation and induced apoptosis *in vitro*. Survivin inhibition could also significantly reduce *in vitro* cell migration and matrigel invasion that might be due to inactivation of matrix metalloproteinases. *In vivo* studies showed significant repression of Cal27 xenograft tumor growth and tissue metastasis leading to improvement in mice survival in the Svv-Lent treated group compared to controls. Our data indicated that survivin expression in HNSCC cells contributed to chemo-radioresistance, and its down-regulation increased anti-cancer effects of paclitaxel, cisplatin and radiation.

Conclusions: Our findings suggest that sustained survivin expression facilitates HNSCC tumor growth and confers resistance to chemo-radiotherapy. Svv-Lent therapy may be able to enhance the cytotoxic effect of commonly used anticancer drugs such as cisplatin and paclitaxel, and radiotherapy that could provide a promising strategy for the effective control of resistant head and neck cancer.

Head and neck squamous cell carcinoma (HNSCC) is a sixth most common form of cancer worldwide with more than 90% of head and neck cancer [1,2]. Comprehensive efforts have been made to understand the effective therapy regimens for HNSCC, but long-term survival of HNSCC patients has not improved since the last couple of decades and in most of the cases relapse is mainly due to therapy resistance leading to tumor recurrence [3,4]. The treatment of HNSCC in advance stages requires a combination of radiation, surgery and chemotherapy [5]. Cisplatin (CCDP, cis-diamminedichloroplatinum II) and paclitaxel are two widely used chemotherapeutic drugs for the treatment of solid tumors, mostly in combination with radiotherapy. However, a major obstacle in the use of these drugs for the treatment of advance or recurrent HNSCC tumors is the development of resistance at clinically relevant doses [4,6,7]. Further improvements in HNSCC treatment will depend on understanding the mechanism of resistance and identifying molecular targets for sensitizing cancer cells for conventional therapies.

Overexpression of tumor markers is often linked with the tumor resistance, recurrence and metastasis. Survivin is a novel anti-apoptotic protein that belongs to inhibitor of apoptosis (IAP) family [8]. Its overexpression is associated with carcinogenesis, cancer progression and drug resistance in several cancers [9–11], which makes it an ideal target for cancer therapeutics. In earlier studies, we have shown that survivin is overexpressed in premalignant and malignant HNSCC tissues [12]. Our results demonstrated that increased expression of survivin plays a critical role in HNSCC cell survival [8–10,13]. Here we used lentiviral vector (Svv-Lent) for survivin knockdown in HNSCC cells and investigated the role of

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Review

Normal to cancer microbiome transformation and its implication in cancer diagnosis

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ABSTRACT

Microbial communities coexisting with humans are collectively known as microbiome. It influences almost every aspect of an individual's body function. Microbiome is idiosyncratic for body condition and its alteration is indicative for several abnormalities. This article discusses about recent ideas for developing microbiology based cancer indicators using alterations in microbiome. It is noteworthy that large exploratory studies are required to identify cancer indicator microorganisms from complex and diverse microbiome constituents. This complexity also warrants that these markers should be used in conjunction with other routine cancer indicators. The present article concludes that such studies can spur development of novel microbiome based cancer diagnostics.

Contents

1. Introduction

Our body is made up of many cells, which collectively forms tissues and thus organs. On this basis, it is evident that human organs are made up of millions of cells, those are eukaryotic in nature. With the advent of recent advances in the scientific field, another important component of our body has been identified, which is not exclusively made up of eukaryotic cells. Despite this, it forms a body part akin to human organ. Furthermore, it has become clear from recent advancements that, this is more like an organ than an accessory [1]. This enigmatic and cardinal component of our body is collectively known as microbiome. Human microbiome consists of innumerable number of microorganisms, present in and on our body. Perhaps, it is a prodigy that number of microorganisms in human microbiome generally outnumbers the human cells by factor of 10 to 1 [2]. It is worthy to note that the association of microorganisms with human is a nonrandom process and these organisms adapt themselves to the specific body habitat. Due to this attribute of human microbiome, the colonization patterns of organisms at two different sites in an individual will be different, whereas the same site in two different individuals will have almost similar microbiome. This site specific

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