

## Dr Qurra-tul-Ann Afza Gardner



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**Date of Birth:** 13-09-1980

### EDUCATION

- **Ph.D. in Biological Sciences (specialization in Biochemistry)**, 2003–2009, from School of Biological Sciences, University of the Punjab, Lahore  
**Thesis:** “Studies on the Production of Recombinant Human Insulin and its Precursors” under the supervision of Prof M Akhtar FRS
- **M.Sc. in Biochemistry**, 2000–2002 (1<sup>st</sup> Division), from Institute of Biochemistry and Biotechnology, University of the Punjab, Lahore. **Thesis:** Evaluation of thyroidal disorders during pregnancy.
- **B.Sc. (Pre-medical; Zoology, Botany & Chemistry)**, 1998–2000 (1<sup>st</sup> Division), Lahore College for Women, Lahore
- **F.Sc. (Pre-medical; Biology, Chemistry, Physics)**, 1998, (1<sup>st</sup> Division), Lahore College for Women, Lahore
- **Senior Cambridge (Biology, Chemistry, Physics)**, 1995 (19 Grade) from Cathedral High School, Hall Road, Lahore

### AWARDS/ HONOUR/ FELLOWSHIPS

- HEC approved supervisor for conducting PhD research
- I have been selected as an **international reviewer** for the journal **Rapid communication in mass spectrometry (2013)**, and for the **Pakistan Journal of Zoology (August 2016)**, in which I dealt with paper related to mass spectrometry as my expertise in biological mass spectrometry.
- **Ph.D. fellowship** in School of Biological Sciences, University of the Punjab, Lahore (2003 – 2008)
- **Post-doctoral fellowship** in School of Biological Sciences, University of the Punjab, Lahore (December 2009 – May 2011)

- **HEC funded training abroad in mass spectrometry** in Imperial College London for six months under the supervision of Prof Anne Dell CBE FRS FmedSci (August – October, 2010 and August – October, 2011)
- **As a Guest Mass Spectrometrists Speaker:** I have been invited twice as a guest mass spectrometrists speaker at the 1<sup>st</sup> and 2<sup>nd</sup> National training workshop on Chromatography & Mass Spectrometry” held in National Institute for Biotechnology and Genetic Engineering (NIBGE), Faisalabad (April 02 – 06, 2012 and 28<sup>th</sup> October – 1<sup>st</sup> November , 2013 respectively).
- Member of organizing committee for workshop conducted on **First International Workshop on Recombinant Biotechnology 22<sup>nd</sup> – 29<sup>th</sup> April 2013.**
- **MSc Scholarship** from Institute of Biochemistry and Biotechnology, University of the Punjab, Lahore (2002).
- **Scholarship from Lahore College for Women, Lahore** (2001).
- **President’s Talent Scholarship from University Grants Commission (UGC)** (1999).

**CURRENT POSITION:** (November 2011 to-date) Presently working as an Assistant Professor in biological mass spectrometry and biochemistry, in School of Biological Sciences, University of the Punjab, Quaid-e-Azam Campus, Lahore. I am in charge of core biophysical facilities, which includes the maintenance, providing central mass spectrometric and protein purification facilities (HPLC and FPLC) and radioactive laboratory as a radiation protection officer.

**RESEARCH INTERESTS AND BIOLOGICAL MASS SPECTROMETRY:**

My research focuses on the production of proteins, insulin, proinsulin and their various mutagenic derivatives to enhance refolding, expression of eukaryotic proteins with signal peptide and to study the role of signal peptide in recombinant protein expression and refolding, studies on enzymes of biopharmaceutical importance, serum amyloid proteins involved in amyloidosis and diseased conditions, interferon and to study post-translational modification of proteins. The studies involve the structural elucidation of these proteins by employing biophysical techniques, among which mass spectrometry technique is indispensable for the characterization of protein. My research group has established a platform and infra-structure for above studies and directing these studies to scale-up them.

I have established core mass spectrometric facilities in our department under the supervision of director general Prof Akhtar FRS and have developed protocols for various kinds of mass spectrometric analyses. Later I have been trained in advanced mass spectrometric field by BRUKER DALTONIKS (Germany, Gmbh), and Prof Anne Dell FRS (Imperial College London).

**My mass spectrometric expertises are in the following areas:**

- Intact protein mass analysis (unlabeled,  $^{13}\text{C}$  and  $^{15}\text{N}$  labelled, *perdeuterio*),
- Structural elucidation of properly refolded and misfolded proteins,
- N-terminal processing,
- Post-translational and chemical modification of protein by proteomics and de novo sequencing,
- Proteomics and Glycoproteomics,
- Studying enzyme kinetics in-conjunction to mass spectrometry,
- MALDI biotyping (identification of microorganisms by MALDI finger printing).

**TEACHING EXPERIENCE**

I am fully involved in teaching various MPhil and PhD courses and conducting admission and comprehensive examinations. I am a course coordinator for Protein Chemistry and Enzymology Lab (**course 509**), Analytical and mechanistic enzymology (**course 508**), and Metabolism (**course 502**; sharing with Prof Akhtar FRS). For Phd classes, I evaluate, “**Protein Structure module course-605**”. I try my level best that my teaching methodology is interactive and students are fully involved during their course. I am also conducting International subject GRE preparation classes for Biochemistry. The aim of such sessions is to develop an understanding of the key concepts of GRE course topics among students so that they can develop the ability and skill to solve the GRE based questions.

**ADMINISTRATIVE DUTIES**

As an in charge of core mass spectrometric and purification HPLC/ FPLC purification laboratory, I have to deal with the challenging task of the maintenance, service record and accessories required of these machines and to make sure that our mass spectrometers and purification systems are in working condition. To fulfil these requirements, I am frequently in contact with engineers and suppliers for the proper maintenance and husbandry of these equipments.

I am also a member of the Board of Faculty of Life Sciences, as constituted since November, 2013, and participate in their meetings which mainly focus on syllabi designing and contents.

I am an active member of the departmental library committee, for the selection and purchase of books and also serving as an assistant superintendent of new SBS, PU girls' hostel.

## **PREVIOUS EMPLOYMENT**

- **Senior Experimental officer (BS-19): (2<sup>nd</sup> June-14<sup>th</sup> November 2011), in biological mass spectrometry** in School of Biological Science (SBS PU), and also performed teaching and research duties.
- **Post-doctorate: (December 2009 – May 2011), in Mass Spectrometry and Proteomics with Prof M Akhtar FRS**, in School of Biological Sciences, University of the Punjab, Lahore. I also performed teaching and research duties during this period.
- **Research Officer: (June – December 2009), as a mass spectrometrist** in School of Biological Sciences, University of the Punjab, Lahore.

## **RESEARCH WORK ABROAD**

- ***Visiting Scientist and International collaboration*** (July – August 2013 and 2015 respectively) with Dr PT Williamson at University of Southampton, UK on the structural elucidation of fibrils using insulin as a model protein.
- ***Post-doctoral experience abroad as a biological mass spectrometrist*** (Aug – Oct 2010, and Aug – Oct, 2011):

During my post-doctoral research I was offered a scholarship for the advanced training abroad on mass spectrometry funded by HEC for six months My research on glycoproteomics, in **Imperial College, London, UK**, under the supervision of **Prof. Anne Dell CBE FRS FmedSci**, was concerned with the finding of glycan modifications in various mutants of *Solfolobus acidocaldarius* and *Solfolobus solfataricus* by LC-MALDI MS MS and interpreting the offline and online-LC MS MS data for the N-glycosylation mapping of S-layer in these microorganisms.

## **GRANT AWARDED**

I have been awarded HEC grant of 1.0 million rupees in 2014 for the maintenance of the mass spectrometer Autoflex<sup>TM</sup> III MALDI TOF/TOF. (HEC ref no. 1-12 (07)/ MSE/ R & D/ HEC/ 2014) with reference to letter, dated 11<sup>th</sup> March, 2014).

## **INTERNATIONAL PUBLICATIONS**

1. Gharib, G., Rashid, N., Bashir, Q., **Gardner, Q. A.**, Akhtar, M. and Imanaka, T. **2016**. Pcal\_1699, an extremely thermostable malate dehydrogenase from hyperthermophilic archaeon *Pyrobaculum calidifontis*. *Extremophiles*. 20:57–67. **Impact factor 2.346**
2. Zain, H., Ahmad, M., **Gardner, Q. A.** and Akhtar, M. **2015**. Hierarchy of N-acylation sites in human insulin studied by RP-HPLC and mass Spectrometry. *JCSP*. 37 (6): 1260 - 1266. **Impact factor 0.35**
3. Arif, A., **Gardner, Q. A.**, Rashid, N. Akhtar, M. **2015**. Production of human interferon alpha-2b in *Escherichia coli* and removal of N-terminal methionine utilizing archaeal methionine aminopeptidase. *Biologia*. 70: 982–987. **Impact factor 0.83**
4. Ahsan, F., Arif, A., Mahmood, Nasir., **Gardner, Q. A.**, Rashid, N. and Akhtar, M., **2014**. Characterization and bioassay of post-translationally modified interferon alpha-2b expressed in *Escherichia coli*. *J Biotechnol.*, 184: 11 – 16. **Impact factor 2.871**
5. **Gardner, Q. A.**, Younas, H. and Akhtar, M., **2013**. Studies on the regioselectivity and kinetics of the action of trypsin on proinsulin and its derivatives using mass spectrometry. *Biochim Biophys Acta.*, 1834: 182-190. **Impact factor 3.016**
6. Aslam, F., **Gardner, Q. A.**, Zain, H., Nadeem, M. S., Ali, M., Rashid, N. and Akhtar, M., **2013**. Studies on the expression and processing of human proinsulin derivatives encoded by different DNA constructs. *Biochim Biophys Acta.*, 1834: 2116-2123. **Impact factor 3.016**
7. Nisar, M. A., Rashid, N., Bashir, Q., **Gardner, Q. A.**, Shafiq, M. H. and Akhtar, M., **2013**. TK1299, a highly thermostable NAD(P)H oxidase from *Thermococcus kodakaraensis* exhibiting higher enzymatic activity with NADPH. *J Biosci Bioeng.*, 116: 39-44. **Impact factor 1.884**
8. Nadeem, M. S., Rashid, N., Iqbal, M., **Gardner, Q. A.** and Akhtar, M., **2011**. First cloning and characterization of aspartate aminotransferase from river buffalo (*Bubalus bubalis*). *Biologia*, 66: 1202 -1210. **Impact factor 0.83**

9. Younas, H<sup>1</sup>., Gardner, Q. A<sup>1</sup>., Rashid, N., Wright, J. N. and Akhtar, M., 2011. Conformational transmission in proinsulin and its derivatives: A study using H/D exchange. *Int. J. Mass Spectrom.*, 302: 36-43. (<sup>1</sup> Both authors contributed equally). **Impact factor 2.183**
10. Jamil, F., Gardner, Q. A., Bashir, Q., Rashid, N. And Akhtar, M., 2010. Mechanistic and stereochemical studies of glycine oxidase from *Bacillus subtilis* strain R5. *Biochemistry*, 49: 7377-7383. **Impact factor 3.02**
11. Jamil, F., Rashid, N., Gardner, Q. A. and Akhtar. M., 2011. Gene cloning and characterization of glycine oxidase from newly isolated *Bacillus subtilis* strain R5. *Biologia*, 66:1-7. **Impact factor 0.83**
12. Gardner, Q. A., Younas, H., Rashid, N., Wright, J. N. and Akhtar, M., 2009. Inventory of 'slow exchanging' hydrogen atoms in human proinsulin and its derivatives: observations on the mass spectrometric analysis of deuterio-proteins in D(2)O. *Biochim Biophys Acta.*, 1794: 1224-1233. **Impact factor 3.016.**

### **Gene Sequences submitted in GENBANK**

1. Yaqoob, C., Akhtar, M. and Gardner, Q. A., 2014. *Bubalus bubalis* serum amyloid A precursor (saa-1) mRNA, complete cds. Accession No. KM016696. NCBI GenBank Resource, <http://www.ncbi.nlm.nih.gov/nuccore/671696195>
2. Aslam, F., Younis, H., Gardner, Q. A., Rashid, N. and Akhtar, M. 2012. *Bos taurus* proinsulin mRNA, partial cds. Accession No. JX041514. NCBI GenBank Resource, <http://www.ncbi.nlm.nih.gov/nuccore/397914146>
3. Gardner, Q. A., Younas, H., Rashid, N. and Akhtar, M., 2009. Synthetic construct hpi gene for human M-proinsulin, complete cds. Accession No. AB501190. NCBI GenBank Resource, <http://www.ncbi.nlm.nih.gov/nuccore/237679345>
4. Akhtar, M., Rashid, N., Younas, H., Gardner, Q. A. and Aslam, F., 2006. *Bubalus bubalis* bpi mRNA for proinsulin, partial cds. Accession No. AB234871. NCBI GenBank Resource, <http://www.ncbi.nlm.nih.gov/nuccore/89331177>

### **Publication in a non-impact factor journal**

**Gardner, Q. A.**, Mehmood, S., Younis, N., Aurangzeb, N. and Zaheer, F., 2003. Effect of pregnancy on thyroid profile reference ranges. *Pak J Biochem and Mol Bio.* (ISSN # 1681-4525), 36: 120 – 127.

## **STUDENTS SUPERVISED**

**MPhil COMPLETED:** Following students successfully completed their MPhil theses under my supervision:

- 1 **Hamayun Arshad 2016:** Comparative studies on the characterization of full-length and truncated bubaline serum amyloid-A derivatives.
- 2 **Chandni yaqoob 2014:** Cloning and expression of buffalo (*Bubalus bubalis*) serum amyloid A.
- 3 **Shakir Hafeez 2012:** Preparation of genetically engineered human proinsulin and its characterization.
- 4 **Muhammad Arif 2012:** *In vitro* refolding of recombinant human proinsulin using *Escherichia coli*, cytoplasmic system.

### **MPhil in progress**

1. **Ayesha Talib:** Expression, Purification and Characterization of bubaline SAA
2. **Sana Muqaddas:** Effect of site-directed mutagenesis in the formation of insulin fibrillation

### **PhD Students:**

- **PhD completed:**

**Munir Ahmad** (2015): Optimization of conditions for the folding and bioprocessing of different derivatives of human insulin.

- **PhD in progress:**

- 1 **Nadia Hassan:** Synopsis approved from advanced board of Studies, PU 2016). She is working on “**Studies on the genetically engineered derivatives of human insulin precursors**”.
- 2 **Hamayun Arshad:** Studies on serum amyloid-A derivatives and their importance in fibrillation.

## **MASS SPECTROMETRIC TRAINING COURSES**

- MALDI–TOF–MS MS Advanced training with the Bruker Daltonik GmbH Autoflex III TOF/TOF™ from 14<sup>th</sup> – 16<sup>th</sup> June, 2011 in Bremen, Germany, supported by Rays Technologies.

- Agilent LCMS Time-of-Flight training at NUS Singapore MIT Alliance for Research and Technology from 21<sup>st</sup> – 25<sup>th</sup> September, 2009, supported by School of Biological Sciences, University of the Punjab, Lahore.
- MALDI–TOF–MS Operator training course 'Proteomics' with the Bruker Daltonik GmbH Autoflex III TOF/TOF<sup>TM</sup> from 19<sup>th</sup> –21<sup>st</sup> May, 2008 in Bremen, Germany, supported by School of Biological Sciences, University of the Punjab, Lahore and Rays Technologies.
- Basic training course of MALDI–TOF (Voyager) organized in School of Biological Sciences by ABI Biosystems conducted by Alek Doley (Application engineer of ABI Biosystems) in Jan 2007.
- Attended a 2 days basic training course of Circular dichroism (ChiraScan, Applied photophysics) organized in School of Biological Sciences by Applied photophysics conducted by Kirty Solankey (Application Scientist) in Jan 2011

## CONFERENCE

- Active participation in the Conference organized by **The Pakistan Society of Nuclear Medicine, 2002 International Nuclear Medicine Conference Lahore** (April 3-4, 2002).
- Active participation and organization of 7<sup>th</sup> international conference of the Pakistan Society for Biochemistry and Molecular Biology "**Trends in Biochemistry and Molecular Biology**" held in Institute of Biochemistry and Biotechnology on April 2–5, 2003
- Participation as an active member of Organizing Committee of 18<sup>th</sup> Federation of Asian and Oceanian Biochemists and Molecular Biologists (FAOBMB) Symposium being held at Lahore on 20–23 November, 2005.

## SYMPOSIA

- Contributed as an active member of organizing committee of an international symposium on "**Nanochemistry of Enzymes**" held in School of Biological Sciences, University of the Punjab, Lahore on September 20–21, 2006.



- Symposium on "**Biomarker Measurements in Complex Matrices**" organized by Pakistan Society for Biochemistry and Molecular Biology at School of Biological Sciences, University of the Punjab, Lahore on 25–26 April, 2007.
  
- Contributed as an active member of organizing committee of an international symposium on "**Role of Glycoproteins in Health and Diseases**" held in School of Biological Sciences on May 27–29, 2008.
  
- Contributed as an active member in symposium on "**Working with Proteins in Post-Genomic Era**" held in School of Biological Sciences on **January 06, 2010**.