Glycoproteomics assays for prostate cancer biomarker discovery

Wang, W.

Curriculum vitae

Ms. Wei Wang is an accomplished researcher in the field of glycoscience, biomarker discovery for human disease, and analytical science. She was born on 20 September 1992 in Shandong, China. Ms. Wang's passion for glycobiology and analytical chemistry was ignited during her time at university. She obtained her Bachelor of Science (Shandong Agricultural University, Shandong, China) and Master of Science (Nanjing Agricultural University, Nanjing, China) both in Food Science and Engineering in 2014 and 2017, respectively. During her master she had her first encounter with glycan analysis, where she studied the N-glycome of humans and bovine milk as well as their anti-pathogenic activities for potential improvement of infant formula under the guidance and supervision of Li Liu. In pursuit of further academic excellence, Ms. Wang embarked on her PhD project at the Center for Proteomics and Metabolomics (CPM) of the Leiden University Medical Center in 2017. Her doctoral research, documented in this thesis, centered around the development of mass spectrometry-based methods for high-throughput or high-sensitivity glycoproteomic analysis. Additionally, she applied these methods to identify glycosylation markers for the early diagnosis of prostate cancer. Specifically, she investigated the glycosylation patterns of prostate-specific antigen (PSA) and prostatic acid phosphatase (PAP) derived from different specimens. Notably, Ms. Wang's discovery of ketodeoxynononic acid, an uncommon sialic acid in mammals, on human PSA and PAP N-glycans is of particular interest as it sheds light on a previously unexplored aspect of the human glycome.

List of publications

1. **In-depth Glycoproteomic Assay of Urinary Prostatic Acid Phosphatase**

   Wei Wang, Carmen R. de Nier, Manfred Wuhrer, Guinevere S.M. Lageveen-Kammeijer

   ACS Measurement Science Au, accepted (***Chapter 2***).

2. **High-throughput glycopeptide profiling of prostate-specific antigen from seminal plasma by MALDI-MS**

   Wei Wang*, Anna Kałuża*, Jan Nouta, Simone Nicolardi, Mirosława Ferens-Sieczkowska, Manfred Wuhrer, Guinevere S.M. Lageveen-Kammeijer#, Noortje de Haan#

   * Equal contribution

   # Equal contribution

   Talanta, 2021, 222, 121495 (***Chapter 3***).

3. **Human Prostate-Specific Antigen Carries *N*-glycans with Ketodeoxynononic Acid**

   Wei Wang, Tao Zhang, Jan Nouta, Peter A. van Veelen, Noortje de Haan, Theo M. de Reijke, Manfred Wuhrer, Guinevere S.M. Lageveen-Kammeijer

   Engineering, 2023, 26, 119-131 (***Chapter 4***).

4. **Highly sensitive glycoproteomics of plasma PSA using TMT labeling and RP-LC-MS/MS**

   Wei Wang, Jan Nouta, Arnoud de Ru, Peter van Veelen, Manfred Wuhrer, Noortje de Haan*, Guinevere S.M. Lageveen-Kammeijer*

   * Equal contribution

   In preparation (***Chapter 5***).

Book chapters:

1. **CE–MS Approaches for Glyco(proteo)mic Analysis**
   Wei Wang, Wenjun Wang, Guinevere S.M. Lageveen-Kammeijer
   Capillary Electrophoresis-Mass Spectrometry for Proteomics and Metabolomics: Principles and Applications, 2022, 335-375.

2. **High-Sensitivity Glycoproteomic Analysis of Biological Samples by CZE-ESI-MS**

   Wei Wang, Guinevere S.M. Lageveen-Kammeijer

   Capillary Electrophoresis-Mass Spectrometry: Methods and Protocols, 2022,2531, 143-162.

PhD portfolio

PhD training

Mandatory courses

- PhD Introductory Meeting (2018)
- Basic Methods and Reasoning in Biostatistics (2019)
- Basic Course Regulations and Organization for Clinical Researchers (BROK; 2020)

Disciplinary courses

- 12th Mass Spectrometry in Biotechnology & Medicine Summer School (MSBM)
- Glycobiology and Glycochemistry e-learning course (2018)
- R course for beginners (MSACL, 2019)
- Data integration course (R and Cytoscape; CPM, 2019)
- LC-MSMS course 201 (MSACL, 2020)
- Computation and Statistics for Mass Spectrometry and Proteomics (May Institute, 2022)

Supervision

- Carmen R. de Nier (MSc internship, April 2021 to January 2022, thesis title: Glycoprotein Urinary Assay for the Early Detection of Prostate Cancer)

Grants

- MSACL Young Investigator Educational Grant (2019)

Scientific contributions in conferences

Poster presentations

- Sialic acid linkage-specific glycosylation analysis of prostate-specific antigen by MALDI-TOF-MS. 29th Joint Glycobiology meeting, 2018, Gent, Belgium.
- Sialic acid linkage-specific glycosylation analysis of prostate-specific antigen by MALDI-TOF-MS. 12th Mass Spectrometry in Biotechnology & Medicine Summer School (MSBM), 2018, Dubrovnik, Croatia.
- Site-specific *N*-Linked glycosylation analysis of prostatic acid phosphatase. Global CESI-MS Symposium, 2018, Leiden, the Netherlands.
- High-throughput glycopeptide analysis of prostate-specific antigen by MALDI-FTICR-MS, The Dutch Society for Mass Spectrometry (NVMS),

2019, Leiden, the Netherlands.

- The development of serum PSA glycosylation analysis method with RP-LC-MS, MSACL, 2021, online.
- Glycoproteomic analysis assay of isobaric labeled plasma PSA by RP-LC-MS. New Frontiers symposium on Translational Glycoscience, 2021, Online.
- Glycoproteomics analysis of isobaric labeled plasma PSA by RP-LC-MS. The 38th International Symposium on Microscale Separations and Bioanalysis (MSB), 2022, Liège, Belgium.
- Glycoproteomics analysis of isobaric labeled plasma PSA by RP-LC-MS. The 2022 International Mass Spectrometry Conference (IMSC), 2022, Maastricht, the Netherlands.

Oral presentations

- Novel glycopeptide analysis strategy for prostate-specific antigen in seminal plasma of infertile men. MSACL 2019 EU, 2019, Salzburg, Austria.
- Glycoproteomic analysis assay of isobaric labeled plasma PSA by RP-LC-MS. FAST Coast, 2021, Amersfoort, the Netherlands.
- Human Prostate-Specific Antigen Carries *N*-glycans with Ketodeoxynononic Acid. GlycoScience NL symposium, 2023, Utrecht, Netherlands.

Acknowledgments

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At CPM, I had the privilege of having two excellent scientists, Guinevere and Noortje, as my co-promotors. Guinevere you are an amazing supervisor, a warm friend and a real role model for me, who introduced me to the fantastic world of CE-MS, to the topic of PCa biomarker discovery and guide me throughout my entire PhD journey. Your enthusiasm for science and willingness to share knowledge are admirable. Noortje you are an awesome supervisor, a great teacher and a caring friend, who taught me how to perform my very first experiment, introduced me to MALDI-MS and guide me through my PhD journey. Your passion in and attitude to science inspired me immensely.

Special thanks to my lovely paranymphs, Christoph and Yue, for the hard work and the efforts. Christoph, you are a great planner who have strong executive force. I cannot remember how many of our activities were organized by you that we all enjoyed very much. Thank you for being a great friend over the years. Yue, you are a cute, not quiet not shy girl. You brought new things and thoughts to me. It's always a joy to talk with you. I am more aware of myself and when I talk to you, I feel being an interesting person.

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