

PhD Opportunity

Prognostic Markers in Bladder Cancer

Supervisory team

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Research Group: [Worcester Biomedical Research Group \(WBRG\)](#)

The PhD Opportunity

Bladder cancer is the ninth most common malignant disease in the world (Ferlay *et al.*, 2015). Following removal of diseased tissue, cancer reoccurs in approximately 40% of patients and in 8% it metastasises into other tissues. Since lymph node metastases decrease the chances of long-term survival (Collà Ruvolo *et al.*, 2021), surgeons often elect to remove lymph nodes at the same time as the tumour. However, this procedure adds risk and recovery time for patients and there are no clear guidelines for surgeons regarding the circumstances in which this should be performed (Peyrottes *et al.*, 2022).

This research will involve the study of resected tissues from historic patient samples to identify possible molecular biomarkers to indicate which patients will or will not benefit from lymph node removal. The technique of RT-qPCR has been used successfully to identify genes associated with lymph node metastasis in gastric cancer patients (Kubota *et al.*, 2003). In the case of bladder cancer, cytokeratin 20 (CK20) and uroplakin 2 (UPK2) are highly diagnostic markers. (Kokkat *et al.*, 2013; Tian *et al.*, 2015).

This project is being run in collaboration with Mr Adel Makar, a senior urological oncology surgeon at Worcestershire Acute Hospitals NHS Trust. Histological samples removed from patients with bladder cancer over the past 20 years and complete patient histories are available for the study.

This project will involve RNA extraction and RT-qPCR. Applications from candidates with knowledge or previous experience in these techniques and a good understanding of statistics are encouraged to apply.

References

Collà Ruvolo, C. *et al.* (2021) 'Incidence and Survival Rates of Contemporary Patients with Invasive Upper Tract Urothelial Carcinoma', *European urology oncology*, 4(5), pp. 792–801. doi: 10.1016/j.euo.2020.11.005.

Ferlay, J. *et al.* (2015) 'Cancer incidence and mortality worldwide: Sources, methods and major patterns in GLOBOCAN 2012', *International Journal of Cancer*, 136(5), pp. E359–E386. doi: 10.1002/ijc.29210.

Kokkat, T. J. *et al.* (2013) 'Archived formalin-fixed paraffin-embedded (FFPE) blocks: A valuable underexploited resource for extraction of DNA, RNA, and protein', *Biopreservation and Biobanking*, 11(2), pp. 101–106. doi: 10.1089/bio.2012.0052.

Kubota, K. *et al.* (2003) 'Quantitative detection of micrometastases in the lymph nodes of gastric cancer patients with real-time RT-PCR: A comparative study with immunohistochemistry', *International Journal of Cancer*, 105(1), pp. 136–143. doi: 10.1002/ijc.11031.

Peyrottes, A. *et al.* (2022) 'Lymph Node Dissection During Radical Nephro-Ureterectomy for Upper Tract Urothelial Carcinoma: A Review', *Frontiers in Surgery*, 9(March), pp. 6–8. doi: 10.3389/fsurg.2022.852969.

Tian, W. *et al.* (2015) 'Utility of uroplakin II expression as a marker of urothelial carcinoma', *Human Pathology*, 46(1), pp. 58–64. doi: 10.1016/j.humpath.2014.09.007.

Additional costs

Given that this is a laboratory-based project, there are some additional costs for the procurement of reagents essential to delivering the research objectives. This will include reagents for RNA extraction and RT-qPCR. It is expected that these extra costs will not exceed £1500 per annum.

Application Process

To begin the application process please go to <https://www.worcester.ac.uk/courses/human-biology-mphilphd> and click on 'How to Apply' in the top menu. This PhD could be carried out on a part time or full time basis so please select the relevant application link. On the application form, please make it clear that you are applying for one of our advertised projects so we can direct it straight to the relevant people.

The Interview

All successful applicants will be offered an interview with the proposed Supervisory Team. You will be contacted by a member of the Research School Team to find a suitable date. Interviews can be conducted in person or over Microsoft Teams.

Funding your PhD

For information about Doctoral Loans please visit: <https://www.worc.ac.uk/study/fees-and-finance/doctoral-loans.aspx>

During your PhD you can access the Research Student Support Scheme to support dissemination costs associated with your research, up to £500 a year.

Research at the University of Worcester

Research is central to the University's mission to make a difference in everything that we do. We are committed to delivering excellent research which extends the boundaries of human knowledge but which also improves people's lives by enabling better health outcomes, improving food security, developing environmentally sustainable solutions for crop production and socially sustainable solutions to our ageing population, enhancing public knowledge and understanding of the past and present.

The University hence focuses its research around five high-level challenges facing society, locally, nationally and globally:

- [Human Health and Wellbeing](#)
- [Sustainable Futures](#)
- [Digital Innovation](#)
- [Culture, Identity and Social Exclusion](#)
- [Professional Education](#)

The success of our research is reflected in our continuous improvement in external research assessment processes. In the most recent Research Excellence Framework, REF 2021, the University saw a near 50% increase in the scale of its research and 12% increase in quality, building on its performance in REF 2014 when it was the UK's most improved university in terms of Research Power, a combination of scale and quality.

Research Degrees at Worcester

Our research students are central to our overall mission for research. They are working at the cutting edge of their disciplines and driving forward the quality of our research whilst enriching our research culture. We are looking to increase our research student numbers as a strategic imperative.

Our commitment to our students is reflected in the results of the Postgraduate Research Experience Survey 2023 in which we ranked 3rd for overall research student satisfaction nationally. Key to our success in this area is the Research School, a focal point for all our research students.

It provides:

- day-to-day support for our students, both administrative and practical, through our dedicated team
- a Research Student Study Space with both PCs and laptop docking station
- a comprehensive Researcher Development Programme for students and their supervisors
- a programme of student-led conferences and seminars

Worcester Biomedical Research Group

The Worcester Biomedical Research Group (WBRG) aims to promote multidisciplinary Biomedical Science research at the University of Worcester and fosters collaborations between staff (cross-institute), students and local health / industrial organisations.

Building sustainable societies through research into disease prevention, medical treatment and diagnostics, lies at the heart of the WBRG research ethos. We aim to achieve this goal through basic and translational Biomedical Research with particular focus on cancer, cardiovascular disease and neurodegeneration.

Widening Participation

As part of its mission statement the University is committed to widening participation for its higher degrees. Although most candidates will have an undergraduate and/or a Masters degree, the University is happy to accept applications from candidates with relevant professional qualifications and work related experience.

For further information or an informal discussion on this project, please contact Dr Amy Cherry (Director of Studies) via email at a.cherry@worc.ac.uk