

# METHODS IN MOLECULAR BIOLOGY

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# **Urothelial Carcinoma**

## **Methods and Protocols**

Edited by

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and Günter Niegisch**

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## Preface

Urothelial carcinoma is the major histological subtype of bladder cancer in most regions of the world, except where endemic schistosomiasis causes another subtype, squamous cell carcinoma. Outside the field of urology, the incidence and impact of urothelial carcinoma are often underestimated, but in fact, it is the fourth most common cancer in males in many countries, albeit with a lower incidence in women. One reason for this underestimate may be that a large fraction of urothelial carcinomas are papillary tumors with a low tendency toward progression to invasive and metastatic cancers. However, while rarely life-endangering, these tumors require surgery, may progress to higher stages, and, not least, have a nasty tendency to recur, thus necessitating long-term monitoring and treatment. Moreover, the 20–30% of urothelial carcinomas, which are invasive at first presentation or have progressed from papillary tumors, are as dangerous as any carcinoma in other tissues. Despite radical surgery and multimodal cytotoxic chemotherapy, only about half of the patients survive for more than 5 years. Worse, no major improvements have been achieved in the therapy of invasive urothelial carcinoma over the last two decades and in particular, none of the novel molecularly targeted drugs has yielded significant benefit in this cancer type and, accordingly, none has entered routine clinical practice.

Obviously, a better understanding of the biology of urothelial carcinoma is a fundamental prerequisite to develop more appropriate approaches for therapy. Another evident key issue for this heterogeneous disease is the development of biomarkers, especially for monitoring following initial therapy and for prognostication of its progression risk. For urothelial carcinoma, analysis of urine offers a unique access. A third important issue is prevention, which could be improved by further insights into the mechanisms of carcinogenesis. Prevention may be neglected in cancer research in general, but this would be particularly ironic in the case of urothelial carcinoma, where specific chemical carcinogens have been known to be involved for many years.

It has been felt by many that, like progress in its treatment, research on urothelial carcinoma was proceeding at a much too slow pace. Fortunately, now, it has reached a turning point. To some extent, this development owes to the outpour of data from large-scale high-throughput investigations, as in other tumor types. Nevertheless, large amounts of data obtained by generic approaches provide only the basis for investigations. In order to translate insights into pathomechanisms and application in diagnostics and therapy, further dedicated and specific analyses tailored to the particular disease are crucial. As documented by this volume, these are forthcoming in urothelial carcinoma. Based on these considerations, in addition to standard techniques for the characterization of urothelial carcinoma, methods to investigate mechanisms of carcinogenesis constitute one focus of this volume. Another main focus is on cellular and animal models for urothelial carcinoma and related diseases. The fourth major section comprises molecular analyses from body fluids, but especially from urine. New approaches to therapy constitute the final section.

We hope that the concepts and techniques described in this volume will contribute to the current upturn in research on urothelial carcinoma and to the application of its results in clinical practice. Moreover, we are confident that many techniques described here in the context of urothelial carcinoma may be valuable also for colleagues whose research aims at better understanding, prevention, diagnostics, and treatment of other cancers.

*Düsseldorf, Germany*

*Wolfgang A. Schulz  
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