For reprint orders, please contact reprints@future-science.com

Overcoming cancer resistance

“The need for new cancer therapies to target pathways involved in the development of resistance is essential to improve further the outcomes for patients.”

Keywords: cancer • therapeutic resistance

Worldwide, cancer represents a major health concern with an estimated 28.8 million people diagnosed with cancer [1]. Within the USA, the lifetime risk of developing cancer in males is as high as 44% with 1:2 American men developing cancer. Over 1.5 million new cases of cancer are diagnosed in the USA, resulting in an average of approximately 583,000 annual cancer-related deaths [2]. Out of these cancer-related deaths, most result from progression to metastatic disease that no longer responds to current interventions. While advances in cancer treatments continue to alleviate some of the global cancer burden, the molecular and genetic plasticity of cancer cells frequently drives their adaptation to these interventions and underlies the emergence of drug resistance. The need for new cancer therapies to target pathways involved in the development of resistance is essential to improve further the outcomes for patients.

The work presented in this issue highlights some of the critical advances and challenges in targeting drug-resistant cancers. Following a review of the current status of endocrine resistance in breast cancer and the development of estrogen receptor targeting therapies, novel therapies that target the breast cancer resistance protein are considered. New therapies, developed to target key components of cell cycle regulation, notable the *cdk4/6* inhibitors, are discussed as a new approach

to target some drug-resistant breast cancers. Moreover, the unfolded protein response, autophagy and G-coupled proteins, which represent underexplored signaling pathways that are often found deregulated in drug-resistant cancers, are explored with an emphasis on new therapies that target these mechanisms. Finally, breakthrough nanoparticle approaches and molecular inhibitors of DNA repair, and their potential application in targeting therapeutic resistant cancers, are discussed. These approaches will become important in tailoring treatment to the individual according to cancer type and previous drug-resistant phenotypes. In summary, this exciting issue compiles current knowledge of new drug options and approaches to resensitize resistant tumors to therapy and highlights future directions in this important area of research.

Financial & competing interests disclosure

The authors have no relevant affiliations or financial involvement with any organization or entity with a financial interest in or financial conflict with the subject matter or materials discussed in the manuscript. This includes employment, consultancies, honoraria, stock ownership or options, expert testimony, grants or patents received or pending, or royalties.

No writing assistance was utilized in the production of this manuscript.

Katherine L Cook

Department of Oncology & Lombardi Comprehensive Cancer Center, Georgetown University Medical Center, Washington, DC 20057, USA
and
Department of Surgery, Hypertension & Vascular Research Center, Wake Forest University, Winston-Salem, NC 27157, USA

Robert Clarke

Author for correspondence:
Department of Oncology & Lombardi Comprehensive Cancer Center, Georgetown University Medical Center, Washington, DC 20057, USA
Tel.: +1 202 687 8991
Fax: +1 202 687 2085
clarker@georgetown.edu

References

- 1 Bray F, Ren JS, Masuyer E, Ferlay J. Global estimates of cancer prevalence for 27 sites in the adult population in 2008. *Int. J. Cancer* 132(5), 1133–1145 (2013).

- 2 Siegel R, Ma J, Zou Z, Jemal A. Cancer statistics, 2014. *CA Cancer J. Clin.* 64(1), 9–29 (2014).