Enhanced understanding of tumor biology has led to the identification of molecular pathways that are susceptible to pharmacologic targeting. Since 1990, this paradigm has changed the face of cancer therapy. For example, the recognition of HER2 as a driver of breast cancer proliferation triggered the development of the monoclonal antibody trastuzumab (Slamon et al., 1987, 2001; Slamon, Leyland-Jones, & Shak, 1998). In renal cell carcinoma (RCC), modulation of the von Hippel-Lindau gene leads to overproduction of vascular endothelial growth factor (VEGF), which in turn triggers aberrant angiogenesis (blood vessel growth and formation) (Kim & Kaelin, 2004). To date, four drugs targeting VEGF-mediated signaling have been approved for the treatment of metastatic RCC on the basis of randomized, phase III studies: bevacizumab, sorafenib, sunitinib, and pazopanib (Escudier et al., 2007, 2010; Motzer et al., 2009; Rini et al., 2010; Sternberg et al., 2010).

The availability of multiple agents for RCC represents a unique clinical dilemma, as treatment with one agent may cause patients to develop resistance to the others because of the similar mechanism of action. Prior to VEGF-directed therapies, immunotherapy (e.g., interleukin-2, interferon-α) represented the mainstay of treatment for RCC. To date, patients and clinicians must decide among a variety of targeted agents. For instance, the National Comprehensive Cancer Network (2011) guidelines for the content of the article. Pal participated on the speakers bureaus for GlaxoSmithKline, Pfizer, and Novartis and is a consultant for Novartis and Genentech. The content of this article has been reviewed by independent peer reviewers to ensure that it is balanced, objective, and free from commercial bias. No financial relationships relevant to the content of this article have been disclosed by the independent peer reviewers or editorial staff. (Submitted December 2010. Revision submitted January 2011. Accepted for publication January 24, 2011.)

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