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Insight on Renal Cell Carcinoma Proteome

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Summary

Several efforts are today focused on studying the most wide form of tumor affecting human kidney, renal cell carcinoma (RCC), because of our inability to diagnose and treat this very aggressive neoplasia. Different complementary approaches based on genomic and proteomic tools are used to highlight its altered molecular processes, and new developed methods and techniques are implemented in the search of possible biomarkers. However, notwithstanding the great work done by several groups and the enormous amount of information present in literature, knowledge about its pathogenesis is still incomplete, and several markers of RCC are proposed but not yet validated.

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1. WHAT IS RENAL CELL CARCINOMA

Renal cell carcinoma (RCC) is the most common renal cancer affecting the kidney that accounts for 3% of all human adult tumors and represents about 90% of renal cancer (1,2).

A range of biological and clinical behaviors characterizes RCC. Owing to the absence of early clinical symptoms, kidney cancer is often diagnosed in advanced stages in patients with flank pain, hematuria, or a palpable abdominal mass. Approximately 25% of these patients have metastatic disease. At present, incidental tumor discovery during investigations for other disorders by diagnostic imaging techniques increases RCC diagnosis at the early stages (2,3). The onset of most RCC is sporadic, while the inherited form is less frequent.

Traditionally, radical nephrectomy is the treatment of choice for localized RCC. In the last years, a laparoscopic approach has been introduced for early stage disease, with evident benefits for patients in the postoperative period. Partial nephrectomy or nephron-sparing surgery is indicated in selected cases, including solitary kidney, bilateral RCC, renal failure, and hereditary forms of RCC (4). Although metastatic RCC has a poor prognosis, also due to chemotherapy and radiotherapy resistance, radical nephrectomy and surgical excision of isolated metastasis are also recommended (5). The presence of spontaneous regressions of RCC suggests the possibility to stimulate the immune system through cytokines. Currently, immunotherapy with interleukin 2 (IL-2) and interferon α is respectively approved in United States and in Europe for treatment in advanced RCC, but this therapeutic approach provides positive outcomes only in a minority of patients, due to dissimilar responses related to different tumor types (6).

RCC is a heterogeneous group of cancers, arising from epithelial cells of renal tubules, classified into specific carcinoma cell subtypes: clear cell (70% of all cases), papillary (10–15%), chromophobe (5%), and collecting duct (1%) (7). In addition, mixed subtypes in the same tumor are relatively frequent.

Conventional prognostic factors such as stage and grade, with sub-classifications according to the tumor location, lymph node involvement, and presence of metastases, are used in patient management. The most important prognostic factor for RCC is the tumor, node, and metastasis (TNM) staging system, modified in 1997...