Available online www.jocpr.com

Journal of Chemical and Pharmaceutical Research, 2023, 15(6):9-10

Perspective

ISSN : 0975-7384
CODEN(USA) : JCPRC5

Role of the Renin–Angiotensin System Components in Renal Cell Carcinoma

Edward Mayer*

Department of Pharmacy, University of Cambodia, Phnom Penh, Cambodia

Received: *26-May-2023, Manuscript No. JOCPR-23-104275;* ***Editor assigned:*** *29-May-2023, PreQC No. JOCPR-23-104275(PQ);* ***Reviewed:*** *12-Jun-2023, QC No. JOCPR-23-104275;* ***Revised:*** *21-Jun-2023, Manuscript No. JOCPR- 23-104275(R);* ***Published:*** *28-Jun-2023, DOI:10.37532/0975-7384.2023.15(6).031.*

DESCRIPTION

Renal Cell Carcinoma (RCC) is the most common type of kidney cancer, accounting for approximately 90% of cases. The development and progression of RCC involve complex molecular mechanisms, including the dysregulation of various signaling pathways. One such pathway is the Renin-Angiotensin System (RAS), which plays a crucial role in blood pressure regulation and fluid balance. Emerging evidence suggests that components of the RAS are also involved in the pathogenesis of RCC. In this article, we will explore the role of RAS components in RCC and their potential implications for therapeutic interventions. The RAS is a hormonal cascade that primarily regulates blood pressure and fluid-electrolyte balance. It consists of several key components, including renin, angiotensinogen, Angiotensin-Converting Enzyme (ACE), Angiotensin II (Ang II), and Angiotensin receptors (AT1 and AT2). Under normal physiological conditions, renin is released from the juxtaglomerular cells in the kidney in response to reduced blood pressure or low sodium levels.

Renin cleaves angiotensinogen, produced by the liver, to form Ang I, which is then converted to Ang II by ACE. Ang II binds to its receptors, primarily AT1, exerting various physiological effects, including vasoconstriction, sodium retention, and stimulation of aldosterone release. In RCC, dysregulation of RAS components has been observed, suggesting their involvement in tumor development and progression. One key component is ACE, which is overexpressed in RCC tissues compared to normal kidney tissues. ACE expression correlates with tumor stage, grade, and poor patient prognosis. The increased ACE expression in RCC may lead to elevated levels of Ang II, promoting angiogenesis, cell proliferation, and tumor growth through AT1 receptor activation. Moreover, Ang II can stimulate the secretion of growth factors such as Vascular Endothelial Growth Factor (VEGF).

AT1 receptor signaling pathways involve activation of mitogen-activated protein kinases (MAPKs), phosphoinositide 3-kinase (PI3K)/Akt, and nuclear factor-kappa B (NF-κB), which contribute to cellular proliferation and survival. In contrast, the AT2 receptor, which counteracts the effects of AT1 activation, exhibits decreased expression in RCC, suggesting a potential tumor-suppressive role. In addition to the classical RAS pathway, alternative pathways have also been implicated in RCC. One such pathway involves the enzyme ACE2, which converts Ang II to Ang-(1-7), exerting counter-regulatory effects on the classical RAS. ACE2 expression is reduced in RCC, potentially leading to decreased Ang-(1-7) levels and diminished tumor-suppressive effects. Furthermore, the ACE2/Ang-(1-7)/Mas receptor axis has been shown to inhibit angiogenesis, tumor growth, and invasion in preclinical studies, suggesting its therapeutic potential in RCC.

The involvement of RAS components in RCC, targeting the RAS pathway has gained attention as a potential therapeutic strategy. Several clinical trials have investigated the use of ACE inhibitors and angiotensin receptor blockers (ARBs), commonly used antihypertensive medications that block RAS activation. These trials have shown favourable results, suggesting that RAS inhibition may improve patient outcomes in RCC. Additionally, the use of specific AT1 receptor blockers, such as telmisartan, has demonstrated antitumor effects in preclinical studies, highlighting their potential as targeted therapies for RCC. The dysregulation of RAS components in RCC indicates their significant role in tumor development and progression. Increased expression of ACE, upregulated AT1 receptor, and altered ACE2/Ang-(1-7) axis contribute to angiogenesis, cell proliferation, and invasion in RCC. Targeting the RAS pathway, either through ACE inhibitors, ARBs, or specific AT1 receptor blockers, has potential as a therapeutic approach for RCC. Further research is needed to elucidate the precise molecular mechanisms and optimize the clinical use of RAS inhibitors in the management of RCC patients.