

## Renin–Angiotensin-Aldosterone System; A shrot review

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**ABSTRACT :-**The renin agiotensin aldosterone system is hormon system that adjust blood pressure and electrolyte balance and pressure homeostasis. Angiotensin II and aldosterone are the two mostly powerfull biologic active products of the RAAS, inclusive vasoconstriction sodium retention tissue remodeling and pro- inflammatory and pro-fibrotic effects. Angiotensin II has emerged in the past decennary as a multifunctional cytokinet that present many nonhemodynamic properties such as acting as a growth factor and profibrogenic cytokine ,and even having proinflammatory properties. ACE inhibitors and angiotensin receptor blockers outset a therapeutic strategy to treat hypertension.

**Keyword:** renin- angiotensin-aldosterone system (RAAS), hypertension angiotensin II, aldosterone, vesoconstriction, cytokine, profibrogenic,

### I. INTRODUCTION:-

(RAAS) Renin- angiotensin- aldosterone system is a hormone system for the regulation of blood pressure. This system is basically comprised of the three hormones **renin, angiotensine II** and **aldosterone**. This is regulated the rate of renal blood flow .

Renin:- In the 1940s renin was shows to be a protease enzyme which acted indirectly by producing a pressor principal form plasma protien. It is a juxtsglomerular cells in the kidney

are lush in an inactive precursor protien called prorenin which is constantly secreted .

Angiotensin:- angiotensin are vasoactive peptide with regulate smooth muscles .its control of homeostatic are blood pressure , renal conservation of h<sub>2</sub>o. Angiotensin is synthesized form angiotensinogen it is a precursor . angiotensinogen is synthesized in liver and convert into angiotensinI , angiotensinII , angiotensinIII , angiotensinIV.

Angiotensin I is convert to Angiotensin II by presence angiotensin-converting-enzyme.

Angiotensin-converting-enzyme (ACE) is present in a blood vessels, kidney, heart , brain, lungs.

Angiotensin I is after converted to angiotensin II by the angiotensin -converting -enzyme(ACE) establish on the surface of vascular endothelial cells , especially the lungs.

Angiotensin Iiis a powerful vasoconstrictive paptide that causes blood vessels to narrow resulting in increased blood pressure. Angiotensin II is also exciting the secretion of the hormone aldosterone form the adrenal cortex. And is involved in the retention of sodium in the kidney and other glands .

This conversion occurs mainly in the lungs where ACE is produced by vascular endothelial cells , although ACE is also generated in smaller quantities within the renal endothelium.

Location	Main action
Adrenal cortex	Stimulates Na+ reabsorption
Arterioles	Vasoconstriction
Hypothalamus	Increases thirst sensation and stimulates anti-diuretic hormone (ADH) release

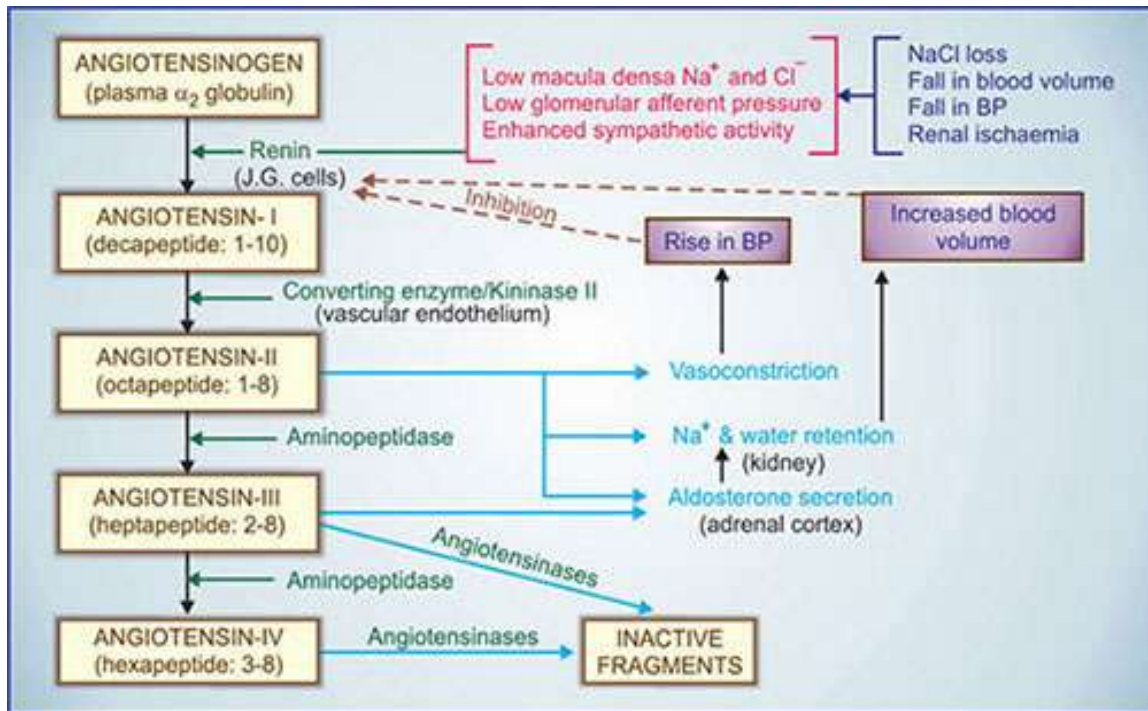


Fig.1

## II. MACHANISM OF ACTION ANGIOTENSIN RECEPTOR BLOCKERS:-

The angiotensin receptors is founded of genes, structural features of the encoded proteins and their pharmacological properties including the signal transduction mechanisms. Two types of receptor for the major renin- angiotensin receptor. Angiotensin II produce its action is  $\text{AT}_1$  and  $\text{AT}_2$  receptor.

$\text{AT}_1$  receptor is present in vascular and myocardial tissue, kidney, brain, adrenal glomerular cells.

Machanism of action at show in vascular smooth muscle cell is phospholipase-C  $\text{IP}_3/\text{DAG}$ .

$\text{IP}_3$  =Inositol triphosphate

DAG =diacylglycerol

$\text{AT}_1$  receptor pharmacological action is vasoconstriction growth hypertrophy of myocardium.

$\text{AT}_2$  receptor pharmacological action is opposit of  $\text{AT}_1$  receptor (brain, kidney, foetal tissue).

The angiotensin II receptor blockers example include:-

- Losartan
- Valsartan
- Telmisartan
- Lrbesartan
- Candesartan
- Eprosartan

- Olmesartan

The metamorphose of angiotensin I to angiotensin II is catalyzed by an enzyme called angiotensin converting enzyme (ACE). ACE is establish primarily in the vascular endothelium of the lungs and kidneys. After angiotensin I is varied to angiotensin II, it has dominance on the kidney, adrenal cortex, arterioles, and brain by binding to angiotensin II type I ( $\text{AT}_1$ ) and type II ( $\text{AT}_2$ ) receptors. The dominance discussed below are a result of binding to  $\text{AT}_1$  receptors. The role of  $\text{AT}_2$  receptors is still being investigated, but pertinently, they have been shown to cause vasodilation by nitric oxide generation. In the plasma, angiotensin II has a half-life of 1-2 minutes, at which point peptidases degrade it into angiotensin III and IV. Angiotensin III has been shown to have 100% of the aldosterone stimulating dominance of angiotensin II, but 40% of the pressor effects, while angiotensin IV has further decreased the systemic dominance.

## III. DOMINANCE OF ANGIOTENSIN II

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Angiotensin II action on the kidneys to produce a diversity of dominance, including afferentia and efferentia arteriole constriction and increased  $\text{Na}^+$  reabsorption in the proximal

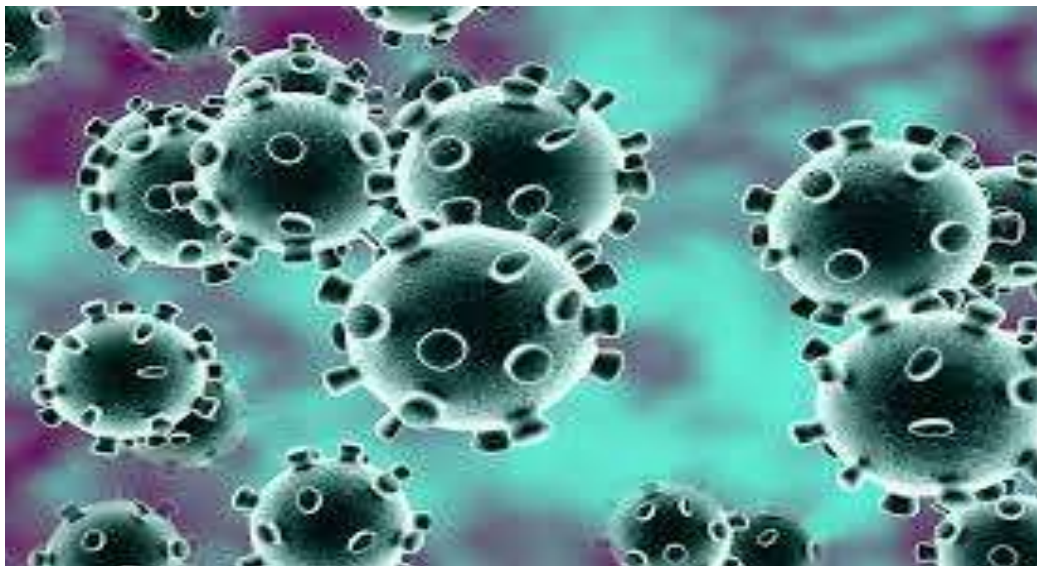
convoluted tubule. These dominance and their mechanisms are summarised in the table under.

Aim	Function	Mechanism
Renal artery and afferent arteriole	Vasoconstriction	Voltage-gated calcium channels open and allow an influx of calcium ions
Efferent arteriole	Vasoconstriction (greater than the afferent arteriole)	Activation of AT1 receptor
Mesangial cells	Contraction, leading to a decreased filtration area	Activation of Gq receptors and opening of voltage-gated calcium channels
Proximal convoluted tubule	Increased Na <sup>+</sup> reabsorption	Increased Na <sup>+</sup> /H <sup>+</sup> antiporter activity and adjustment of the Starling forces in peritubular capillaries to increase paracellular reabsorption

#### IV. THE RANIN –ANGIOTENSIN-ALDOSTERONE SYSTEM IS DOMINANCE IN COVID-19:-

The Coronavirus disease 2019 (COVID-19), or SARS-CoV-2, led to a global explosion that

affected nearly 200 million people worldwide as of July 2021.<sup>12</sup> The disease is associated with severe complications in people who have preceding cardiovascular diseases, such as hypertension and diabetes.



The renin-angiotensin system plays an important role in the COVID-19 infectious disease process.

The SARS-CoV-2 uses angiotensin-converting enzyme 2 (ACE 2) as a "receptor" and cellular entry point to infect a wide range of cells in the body. More specifically, ACE 2, which is embedded in the surfaces of cells, is recognized by spike proteins on the COVID-19 virus. This recognition leads to a lock-and-key relationship that opens the door for the virus to enter.

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