What is the rennin, angiotensin, aldosterone, system (RAAS)?

The simplest way of describing the rennin, angiotensin, aldosterone system (RAAS); is the body's way of maintaining blood pressure in an acute situation. Multiple organs and various organ systems are involved with the maintenance and control of blood pressure. The RAAS is the primary defense for the body to maintain some semblance of homeostasis after an insult to the circulatory system. Regardless of whether the injury or illness was a direct assault to the system such as a bullet or knife wound, or something less obvious such as dehydration; the RAAS is standing by ready to assist in fixing whatever may be broken.

What causes the RAAS?

The RAAS is triggered by a drop in blood pressure. More specifically a drop in the Glomerular filtration rate (GFR), is what starts the physiological snowball rolling. When cells in the kidney sense a decrease in pressure or flow of blood through the kidney. When this decrease is registered, the juxtaglomerular kidney cells (JG cells) begin to secrete rennin into the blood stream.

The process of the RAAS:

Rennin is secreted by the kidney. This renin is an enzyme that breaks down a protein produced by the liver called angiotensinogen. This chemical breakdown of angiotensinogen by rennin is what produces the second step of the cycle angiotensin 1. **Angiotensin 1** then travels via the blood stream to the lungs where it is converted by a hormone called **(ACE) angiotensin converting enzyme**. This hormone, as it's name suggests, converts angiotensin 1 into angiotensin 2. This newly formed hormone is the functional unit of the entire cycle. **Angiotensin 2** causes the release of **anti-diuretic hormone (ADH)** and aldosterone, as well as stimulating the Sympathetic Nervous System.

ADH which is produced in the hypothalamus is released by the posterior pituitary gland. This hormone is responsible for the reabsorption of free water in the renal system. Without ADH reabsorbing this free water, would be just filtered through the urinary system and excreted for a net loss of H2O. However this newly retained fluid can now be repurposed as plasma, to help bolster the losses elsewhere in the body.

Aldosterone has a similar effect of fluid reabsorption, although it uses a different process. Aldosterone causes a retention of Sodium. This sodium increase causes water to follow it back into central circulation, where it will be repurposed as plasma.

The Sympathetic Nervous System (S.N.S.) is always active and working to maintain homeostasis. But the effects of the S.N.S. are, among other things, an increase in heart rate and vasoconstriction which directly increase the blood pressure.