

KIDNEY RESPONSE in ADRENALIN STRESS TYPES

NORMAL BP SCENARIO

Sympathetic adrenergic dominance results in constriction of renal artery, and afferent and efferent arterioles in each nephron



As the effect of constriction on efferent arteriole is greater than on afferent, pressure in glomerulus is greater. BP is monitored by renin-secreting cells in afferent, back-pressure induces sense of slightly higher BP, renin levels unaffected, but aldosterone is slightly elevated (pituitary)



Increased glomerular pressure results in increased volume of filtrate in tubule.

Reabsorption of filtrate in the proximal tubule back into blood is normal (80%+)

Adrenergic stress increases the levels of ADH from pituitary.



ADH increases distal tubule absorption of water, aldosterone increases sodium retention, less urine exits into kidney pelvis



Kidneys control blood volume with renins, they are slightly elevated, CVS response slightly exaggerated, pressure elevates, ADH lessens, pressure stays within normal limits or may be slightly reactive and elevated in some individuals.



Kidneys tend to make less urine during the stress hours, accommodates afterwards by increasing urine volume, often at night.



Water and sodium retention during day, slightly elevated BP, reversing at night, all-exaggerated in women premenstrually.

LOW BP SCENARIO

Sympathetic adrenergic dominance results in constriction of renal artery, and afferent and efferent arterioles in each nephron



As the effect of constriction on efferent arteriole is greater than on afferent, pressure in glomerulus is greater. BP is monitored by renin-secreting cells in afferent, back-pressure induces sense of higher BP, renin unaffected (should be elevated), aldosterone stays same, should be elevated (low anabolic energy)



Increased pressure, with slightly low blood protein results in greater volume of filtrate

Reabsorption of filtrate in the proximal tubule back into blood is normal (80%+)

Vascular excitability in the brain lessens the ADH reflex by pituitary.



Less ADH lessens distal tubule absorption of water, aldosterone is not elevated, larger amount of dilute urine exits, higher in both water and sodium.



Kidneys can normally control blood volume imbalance automatically with renins, but they are lower than they should be. Kidneys can control its own imbalances with prostaglandins, but, with impaired lipid metabolism in general, particularly GLA, their synthesis is impaired..



Kidneys' ability to moderate imbalance is impaired a bit, maintained blood volume is lower than ideal, vascular accommodation is less efficient.



THIS RESULTS IN:

Slight sodium deficit body-wide, local sodium and water conservation in skin and mucosa, slightly lowered blood volume and blood pressure, high volume urine, day and night, vessels more reactive locally, with flushing, hot and cold, etc. Poor accommodation to temperature changes, orthostatic hypotension, water and salt cravings.

KIDNEY RESPONSE IN ADRENOCORTICAL STRESS TYPES

GIVEN THE FOLLOWING:

Moderately elevated gonad hormones and
adrenocortical androgens and minerocorticoids

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Normal or slightly lowered aldosterone (adjusted for HBP)

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Elevated ADH (from thick blood)

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Normal or slightly lowered renins (adjusted for HBP)

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Filtrate volume from glomerulus is normal



Proximal tubular filtrate reabsorption is normal



Increased water absorption in distal tubule from elevated ADH



Increased sodium reabsorption in distal tubule, greater than
appropriate, since aldosterone is normal or low but the EFFECT
is increased in the presence of higher levels of
gonad steroids and cortical steroids



Waste products secreted into distal tubule remains same,
volume of filtrate still remaining to carry out the waste products
as urine is smaller, so urine is less, contains more waste products
than normal in the same volume, is denser, and more acidic.

THIS RESULTS IN:

There is a constant moderately excess loss of potassium,
bicarbonate and phosphorus (due to urine concentration)
slow buildup of sodium and water in the blood and interstitial
fluids, resulting in moderate, non-labile high blood pressure,
increased blood volume, and locally induced increased
sodium and water excretion in skin and mucosa