Adrenal gland

About 60 arterioles reach adrenal gland, they start to anastomose either in the capsule or under the capsule, so we have two sets of vessels; one of them is directed toward the medulla and the other into the cortex in the **zona glomerulosa** forming capillaries which also give another capillaries directed longitudinally toward **zona fasciculata** then toward **zona reticularis,** from zona reticularis ; re-branching of these capillaries occurs again to give capillaries which are present at the junction between the cortex and medulla.

So, medulla has dual blood supply; the first is sub-capsular arterioles directly supply medulla (arterial blood) and the other is arising from the capillaries in zona reticularis of cortex (venous blood) which supply the upper part of adrenal medulla.

Cells of adrenal gland were built according to **their blood supply**; at the beginning the capillaries in zona glomerulosa came before the cells of adrenal gland in this region and these capillaries had rounded distribution , then the cells came and acquire the shape of the capillaries which is rounded, and the cells of zona fasciculata have longitudinal shape; because the capillaries from zona glomerulosa directed longitudinally toward zona fasciculate and when the cells came at this region, they acquire the shape of the capillaries, the same concept is applied on zona reticularis ; since the capillaries in this region were re-branched forming reticular-shaped network.

Notice that you can not make a straight demarcated line separating the three zones from each other ; for example the cells of zona fasciculata may be pushed upward (toward glomerulosa) or downward (toward reticularis) so, this line must penetrate the other zones (up or down) to make the zones separated. As a result of that ; some regions in the cortex secretes more than one product not

because the cell can secrete more than one secretory product but because in this region we find more than one type of cells ; one is from glomerulosa and the other is from fasciculata for example.

(The cell in adrenal gland can secrete one type of secretory products).

The cells of zona fasciculata occupy 60% to 80% of the cortex and are filled with lipid droplets and appear vacuolated in routine histological preparations, whereas the cells in zona reticularis are usually more **heavily stained** than those of the other zones because they contain fewer lipid droplets.

As the activity of cells (cells of three zones) increases, the lipid droplets increases and blood supply also increases and this is well-demonstrated in zona fasciculata.

With regard to medulla, under the light microscope we can not differentiate between adrenaline (epinephrine) – secreting cells and nor-adrenaline (norepinephrine)-secreting cells because the number of granules is subjected to variations between cells, while under electron microscope ; **light granules** appear in adrenaline-secreting cells and **dark granules** appear in noradrenaline-secreting cells.

In the middle of medulla, a vein collecting all the capillaries ; at the right side the right suprarenal vein immediately enter inferior vena cava while in the left side the left suprarenal vein terminates the left renal vein then inferior vena cava.

Embryologically, the segment of inferior vena cava equals the left renal vein and its tributaries, so the embryo actually has two inferior vena cava; the left disappeared and became the left renal vein, left gonadal vein and left suprarenal vein , while the right became the definite inferior vena cava.

Left gonadal vein and left suprarenal vein open opposite to each other in the left renal vein (left gonadal open in the lower opening and left suprarenal open in upper opening ; two openings which are opposite to each other), this is one of the causes that make varicocele in the left side of testis is more common than in right side because the column of blood is high at the left side relatively and the secretory products of adrenal gland such as cortisol that causes dilatation of vessels comes down vertically in the left testis.

Adrenal medulla is a modified sympathetic ganglion and post-ganglionic fibers are very short since the ganglion is present in medulla itself not like other ganglions which are present far away to the organ making the post-ganglionic fibers longer.

Hint: this part of adrenal gland was written according to section 1; first 13 minutes of last record for Dr.darweesh.