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RENAL PHYSIOLOGY - LINKED TO DISEASE

First of all, thank you for reading this, and/or for attending this lecture. It seems to me that way too often general practitioners avoid anything entitled Physiology, hence the addition 'linked to disease' . However, through decent knowledge of normal physiology, comes better understanding of disease and treatment options. The main motivation for this lecture are the far too common errors seen in referral cases when confronted with azotemia and proteinuria. Both terms are linked with the renal system, and are factors in several diseases, but are explained differently.

The kidneys have several important roles, and the rest of this paragraph describes their basic physiology...: Besides the less considered role in the supply of EPO to promote genesis of red blood cells, the main "raison d'être" of the kidneys is to clean our blood as if they were a pair of washing machines. If you continue to draw this parallel, you should in fact consider there aren't two washing machines, yet about a million of them, with each nefron representing a single functional entity. The nefron is composed by a filter (glomerulus) and a tube system (tubules). The filters are large enough to allow dirt (ultrafiltrate) to be removed, yet small enough to avoid socks (albumin) being lost. Their efficiency is expressed as the amount of clothes that they can clean (glomerular filtration rate). They have a clothes supply (afferent glomerular arteriole) with an appropriate drain (efferent glomerular arteriole), and both the supply and the evacuation chain can be tailored individually, in order to place just the correct amount of pressure (glomerular pressure) on the washing machine and the filter in itself. There even is a feedback system that allows the nefron to adapt the workload of the machine by adapting the supply chain quite tightly, resulting in 'autoregulation of renal perfusion'. Moreover there also is control over the amount of water and the pressure in the general circulation (RAAS or renin-angiotensi-aldosterone system). The ultrafiltrate consists of water, electrolytes and other small molecules, including glucose and amino acids. The glucose and amino acids are subsequently actively being recovered in the proximal tubules. Afterwards the waste product is further finetuned by the addition or removals of electrolytes and protons and the final product is appropriately concentrated or if necessary diluted. This waste is then excreted into the sewer system, which consists of tubes that increase in size, until they end in a cesspool which is regularly emptied.

Sounds simple enough right? Now that you've taken the time to read the previous paragraph, I would kindly invite you to read it once more, and take a pause at the end of every sentence. Just consider what will happen if this part of the system fails, what are the repercussions on every other part of the system? How can we mend this, or can we help it in it's action? Don't you love physiology already?