

Inulin is a **starch** that is given by mouth. Inulin is **freely filtered, but not reabsorbed or secreted** by the renal tubules. The clearance of inulin is used to measure **glomerular filtration rate (GFR)**, as shown in the following equation:

$$\text{GFR} = \frac{[U]_{\text{inulin}} V}{[P]_{\text{inulin}}}$$

Where: GFR = glomerular filtration rate (ml/min or ml/24hr)
 $[U]_{\text{inulin}}$ = urine concentration of inulin (mg/ml)
 V = urine flow rate (ml/min or ml/24hr)
 $[P]_{\text{inulin}}$ = plasma concentration of inulin (mg/ml)

Note: The driving force for glomerular filtration is the **net ultrafiltration pressure** across the glomerular capillaries. **Filtration is always favored** in glomerular capillaries because the net ultrafiltration pressure always favors the movement of fluid out of the capillary.

Important: If the clearance of a substance that is freely filtered is **less than** that of inulin, then there is a **net reabsorption** of the substance. If the clearance of a substance that is freely filtered is **greater than** that of inulin, then there is a **net secretion** of the substance. If the clearance of a freely filtered substance is **equal to that of inulin**, then (1) it is **neither** secreted nor absorbed or (2) it is **both** secreted and absorbed in equal amounts.



1. **Para-aminohippuric acid (PAH)** is **filtered and secreted** by the renal tubules.
2. The clearance of PAH is used to measure **renal plasma flow (RPF)**.
3. **Renal blood flow (RBF)** is 25% of the cardiac output. Autoregulation of RBF is accomplished by **changing renal vascular resistance**.
4. Both **blood urea nitrogen (BUN)** and **plasma [creatinine]** increase when GFR decreases. **GFR decreases with age**, although plasma [creatinine] remains constant because of decreased muscle mass.
5. If the amount of a substance excreted in the urine is **less than the amount filtered**, then the substance is **reabsorbed**.
6. **Glucose** and **sodium chloride** are **filtered and subsequently reabsorbed**.