

Solutions to eAJKD's [Test Your Knowledge: GFR Estimation](#)**1. D. Both A and B**

As described by [Levey et al](#), the high GFR observed in humans (180 L/day) is a result of the large number of glomeruli (1 million per kidney), high rate of renal blood flow, an extensive total glomerular capillary surface area, high glomerular capillary pressure, and the hydraulic permeability of the glomerular capillary wall. These unique hemodynamic and hydraulic attributes of the glomerular capillary network are integral to how the kidney is able to achieve such a dramatic glomerular filtration rate.

2. B. Overestimate GFR

The MDRD study population consisted of patients aged 18-70 years old. It has been noted to overestimate GFR in older patients (65 yrs old) with lower creatinine values. [However, the equation tends to underestimate](#) GFR in all other age ranges.

3. D. None of the above

Each of the estimating equations for GFR has shown inconsistencies in accurately determining GFR (either under- or over-estimating GFR). For instance, [Friedman et al](#) demonstrated that neither creatinine- nor cystatin C–based equations (Cockcroft Gault or MDRD equations) correlated with GFR as measured by iohexol in 44 obese individuals with “normal” kidney function, with both equations overestimating GFR. Similarly, [Verhave et al](#) demonstrated that both the MDRD and Cockcroft Gault equations were not accurate in estimating GFR in subjects with BMI >30 kg/m². Lastly, [Bouquegneau et al](#) showed that the CKD-EPI (creatinine based) did not outperform MDRD equation in 366 patients with a mean BMI >36 kg/m².

4. E. All of the above

All of the mentioned factors have been associated with alterations in cystatin C production. [Manetti et al](#) showed that cystatin C concentrations were increased in overt hyperthyroidism and decreased in mild hypothyroidism. [Rule et al](#) demonstrated that patients on chronic steroids had higher measured GFR by 19% as compared to patients off steroids with the same cystatin C level. [Lastly, cystatin C](#) has been demonstrated to increase with advanced age.