ESM accompanying the original article “Acute renal effects of the GLP-1 receptor agonist exenatide in overweight type 2 diabetes patients: a randomised, double-blind, placebo-controlled trial” by Tonneijck L et al

Calculation of intrarenal haemodynamics The filtration pressure across the glomerular capillaries ($\Delta P_F$), is calculated by the following Gomez-formula [1], assuming the gross filtration coefficient ($K_{FG}$) to be 0.0551 ml sec$^{-1}$ mmHg$^{-1}$ (given a normal kidney physiology where GFR is 83 ml min$^{-1}$ 1.73 m$^{-2}$, i.e. mean GFR in the current population), $P_{GLO}$ 60 mmHg (given Winton’s indirect estimates in the dog that glomerular pressure is roughly two-thirds of MAP [2]), and normal glomerular oncotic pressure ($\pi_G$) 25 mmHg:

$$\Delta P_F = \frac{GFR \text{ (ml/sec)}}{K_{FG}}$$

$\pi_G$ (mmHg) is calculated from the plasma protein concentration within the glomerular capillaries ($C_M$). $C_M$ is calculated from the total protein concentration in g/dl (TP) and FF:

$$C_M = \frac{TP}{FF} \cdot \ln(1/1 - FF)$$

$$\pi_G = 5 \cdot (C_M - 2)$$

$P_{GLO}$ is calculated by using variables described above and given the assumption that the hydrostatic pressure in Bowman’s space ($P_{BOW}$) is 10 mmHg:

$$P_{GLO} = \Delta P_F + P_{BOW} + \pi_G$$

$$P_{GLO} = \left(\frac{GFR}{K_{FG}}\right) + 10 \text{ mmHg} + [5 \cdot (TP/FF \cdot \ln(1/1 - FF) - 2)]$$

In order to calculate $R_A$ and $R_E$, principles of Ohm’s law are used, and the factor 1328 to convert to dyn s cm$^{-5}$:

$$R_A = \left(\frac{MAP - P_{GLO}/RBF}{1328}\right)$$

$$R_E = \left[\frac{GFR}{K_{FG} \cdot (RBF - GFR)}\right] \cdot 1328$$

References