# Vasopressin

Arginine vasopressin known as antidiuretic hormone (ADH) has molecular weight of 1084 Dalton [http://www.prospecbio.com/Vasopressin\_7\_42/] and one international unit of ADH was measured to be 2.5 pg. ADH as a hypothalamic neurohormone is synthesized in the cell bodies of neurons in the hypothalamus and it is intracellulary transported to the lower side of these neurons in posterior pituitary. So the model accumulates the amount of this hormone in three places: in the cell bodies of hypothalamic neurons (Slow Mass), from where need to be transported to the posterior pituitary part of the cell; in the posterior pituitary side of neurons (Fast Mass), where ADH is prepared for secretion into blood; and finally in the whole body extracellular fluid (ECF). The normal amounts of ADH in these compartments are listed in table Tab1. The normal rate of synthesis, secretion and degradation is 3.2 ng/min [1], where the secretion is determined by osmoreceptory and pituitary activity.

|  |  |  |
| --- | --- | --- |
| Slow Mass | Fast Mass | ECF |
| 17 ug | 3.2 ug | 0.03 ug |
| 15.7 nmol | 2.95 nmol | 0.028 nmol |
| 6 800 000 IU | 1 280 000 IU | 12 000 IU |

# Renin

One Goldblatt unit (GU) of Renin is the same as one ng of AngiotensinI from one mg of Angiotensinogen pre one hour (1 ng AI/h). Because molar mass of Angiotensingen is 56.8 kDa and molar mass of Angiotensin 1 is 0.9 kDa [http://pubchem.ncbi.nlm.nih.gov/summary/summary.cgi?cid=123805], it can be solved that 3.24 ng AI/h = 1 umol AI/s. And from Michaelis-Menten coefficient kcat=0.4 s-1 and Km=2.6 umol/L [2]can be expressed the rennin activity unit to rennin molar concentration conversion coefficient 1.13 umol/GU.

[1] Thrasher TN, Chen H-G, Keil LC. Arterial baroreceptors control plasma vasopressin responses to graded hypotension in conscious dogs. American Journal of Physiology-Regulatory, Integrative and Comparative Physiology 2000;278:R469-R75.

[2] Streatfeild-James R, Williamson D, Pike RN, Tewksbury D, Carrell RW, Coughlin PB. Angiotensinogen cleavage by renin: importance of a structurally constrained N-terminus. FEBS letters 1998;436:267-70.