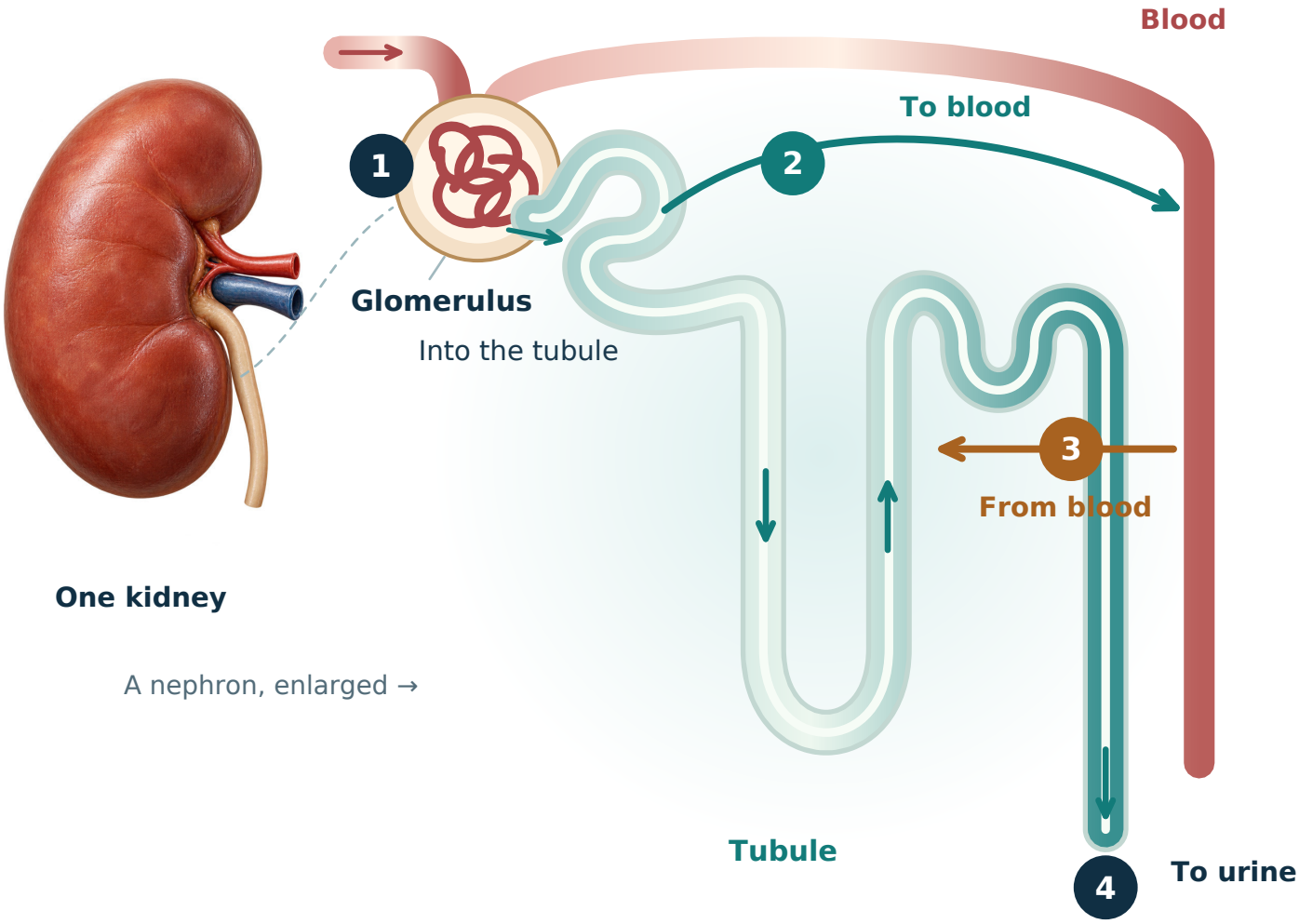
KIDNEY BALANCE / FOLLOW THE MATERIAL

Follow the substance. See the balance.

Substance X, tracked over one day in a simplified teaching model.



Functional schematic; transport arrows do not locate substance X in a specific segment.

1 FILTER

100

mg/day enters fluid

2 REABSORB

−70

mg/day returns to blood

3 SECRETE

+10

mg/day added from blood

4 EXCRETE

40

mg/day leaves in urine

Excretion = filtration − reabsorption + secretion

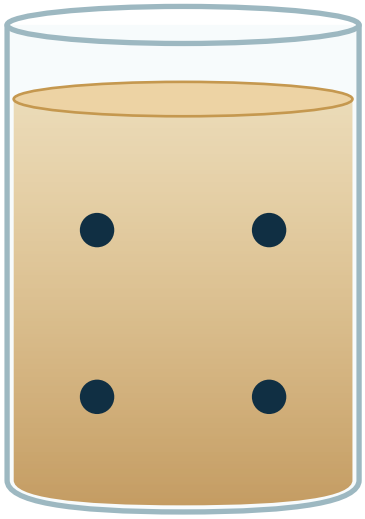
KIDNEY BALANCE / SOLVE THE CASE

Less water. The same mass.

Keep filtration, reabsorption and secretion fixed while urine volume changes.

2.0 L/day

COLLECTED PER DAY

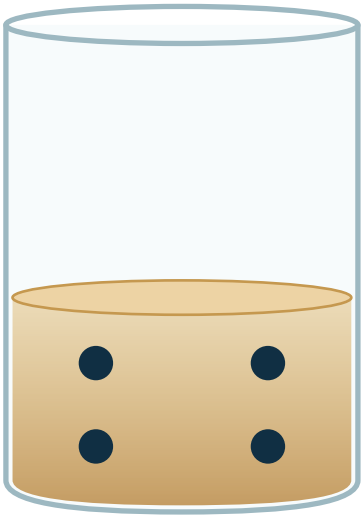


40 mg/day

20 mg/L

1.0 L/day

COLLECTED PER DAY



40 mg/day

40 mg/L

4 markers in each collection = the same 40 mg of X per day.

Markers represent mass, not individual molecules.

40 mg/day ÷ 2.0 L/day = 20 mg/L

40 mg/day ÷ 1.0 L/day = 40 mg/L

The day units cancel; the mass per day has not changed.

Concentration doubles. Excreted mass stays fixed.

Only under the stated fixed-rate assumption. Real transport rates can also change; a higher concentration alone does not prove greater excretion.