

Physiology 8

- send answer to iClicker Question 27A now.
- Neurotoxins

Excretion

- goals
- osmosis
- consequences & adaptations
- iClicker Question 27B

• Due in lab **this** week: **NOTHING** (Animal Lab Practical Exam)

Exam 3 Monday 4/26 - details in Ecology I

- Last names A - G in McCormack Cafe
- Last names H - Z here (1 bonus point for going to correct place!)

Neurotoxins

① tetrodotoxin - from fugu fish liver

Blocks voltage-gated Na^+ channels \rightarrow can't open

\therefore no action potentials

* in small doses \rightarrow tingling (partial numbness) in limbs
since sensory neurons can't fire

* in large doses \rightarrow diaphragm muscle can't contract
paralyzed & limp \Rightarrow death

② nicotine - binds to AChR & opens it \therefore Na^+ always goes in
paralysis? Yes & rigid \leftarrow \therefore muscle always contracted

numbness? AChR is in muscle only
 \therefore regular nerves unaffected \therefore No

Excretory Systems (animals only)

- Goals
- ① get rid of unused monomers, toxins, etc.
 - ② maintain proper internal salt, etc concentrations

why? ④ enzymes, etc need constant salt, H_2O , etc concentrations to work properly

⑤ osmosis - maintain cell size & shape

key principle: H_2O can cross membrane freely

but polar or charged molecules ("stuff") can't

∴ H_2O will go across membrane from hi H_2O → lo H_2O

⇒ lo "stuff" $\xrightarrow{H_2O}$ hi "stuff"

* need units for measuring "amount of stuff" in H_2O

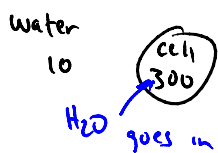
- individual ions, molecules, etc in millimoles per liter mM

- combined effect of "stuff" in milliosmoles per liter mOsm

fluid	major "stuff" molecule	overall "stuff"	% H_2O
pure H_2O	-	-	100%
fresh water	5 mM NaCl	10 mOsm	99.9%
human blood & cytoplasm	150 mM NaCl	300 mOsm	99.6%
seawater	500 mM NaCl	1000 mOsm	98.9%

⇒ 3 scenarios ex human cell in: (mOsm)

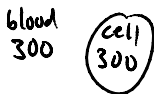
① fresh water



∴ cell swells & bursts

hypotonic

② blood

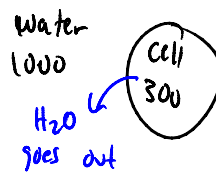


no net movement of H_2O : "happy"

cell is AOK

isotonic

③ seawater



cell shrinks & dies

hypertonic

consequences for animals

ex ① in fresh H_2O problem = too much H_2O coming in

• could have impermeable skin - but then you couldn't breathe

∴ H_2O comes in thru gills

solution: excrete H_2O in urine

& actively pump in salts (ATP) thru gills

② in salt water problem = too much H_2O going out

Several solutions

⑥ be iso-osmotic - internal fluids have same $mOsm$ as seawater

not necessarily the same molecules

but the same amount of stuff

- squid: "blood" hi salt
 - cytoplasm: hi amino acids
- } same $mOsm$ as seawater
- fish: excrete very salty urine
 - requires powerful kidneys