

ACTIVE TRANSPORT

10/18/91,rvsd 10/21/92, 10/18/93, 10/14/94, 10/13/95, 16 Oct 00, 15 Oct 01, 20 Oct 03, 20 Oct 04, 17 Oct 05, 22Oct08, 21Oct09, 19Oct11
 BKH: 201-231, 5th: , 6th: 191-203, 7th:

ACTIVE TRANSPORT: Requires energy (coupled to energy-yielding reaction, usually ATP hydrolysis)

used for: uptake nutrients
 removal of waste, etc. (Na^+)
 optimal conc. of inorganic ions

intrinsically directional, though can facilitate reverse diffusion

Charged species transport changes voltage. Rate is affected by both V_m (memb potential) & conc.

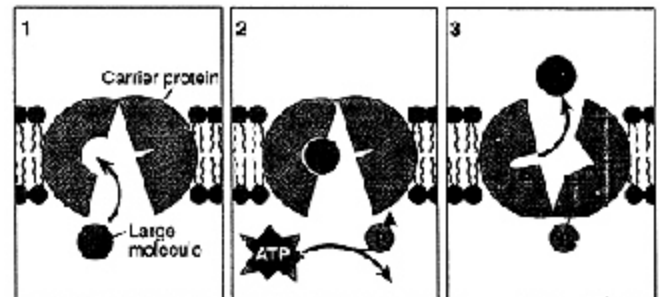
Inside cell is negative, therefore **cations move in easily, move out with difficulty.**

ACTIVE TRANSPORT MECHANISMS:

(See three classes: p 204, fig 8-7)

SIMPLE ACTIVE TRANSPORT:

Ca^{++} into sarcoplasmic reticulum
 (see muscle illustration: p 470)
 release triggers contraction, Ca pump, ATP driven recovers

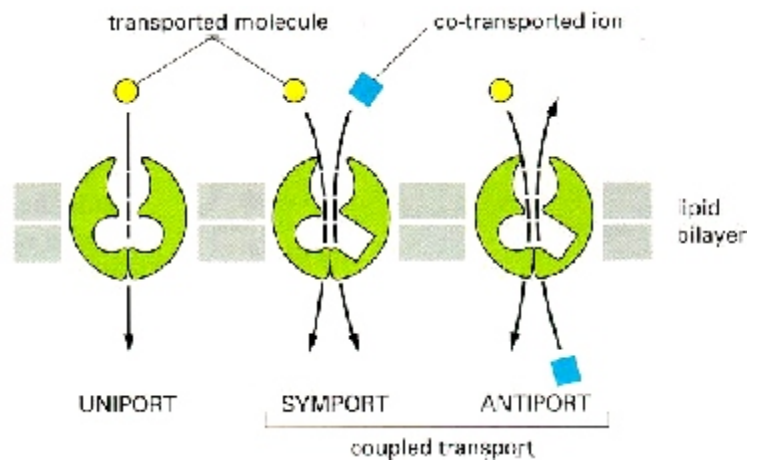


COTRANSPORT: Movement of two solutes is linked
 general: <http://www.youtube.com/watch?v=NewpaNwevFk>

ANTIORT: solutes transported opposite way:
 Na/K pump

EXAMPLE: Na/K Pump: (see page 214)

- 1) three Na^+ enter permease which is open to the interior of the cell (three small pockets)
- 2) Na^+ in permease make it subject to PO_4 ylation
- 3) PO_4 ylated permease alters configuration, opens to outside
- 4) Na^+ diffuses out
- 5) two K^+ enter permease
- 6) de PO_4 ylation occurs, alters configuration, K^+ diffuses into the cell.



Na/K pump video:

<http://www.youtube.com/watch?v=awz6l1ss3hQ>

<http://www.youtube.com/watch?v=iA-Gdkje6pg>

cardiotonic steroids (digitalis and ouabain) inhibit of Na/K pump

SYMPORT: solutes transported same way: Na^+ and sugars, amino acids
 (page 215)

ENERGY SOURCE, Driven by either ATP, PO_4 hydrolysis, or Na^+ or H^+

EXAMPLE: accumulation of glucose driven by Na^+ chemiosmosis.

Also:

Proton pump in bacteriorhodopsin:

- 1) light causes *trans* to *cis*, causing release of H^+ to outside cell causing reversion to *trans*.
- 2) *Trans* form picks up H^+ from inside cell making molecule susceptible to light transformation from *trans* to *cis*.

Cis to *trans* rhodopsin: <http://www.youtube.com/watch?v=r6v21W8zRIw>

