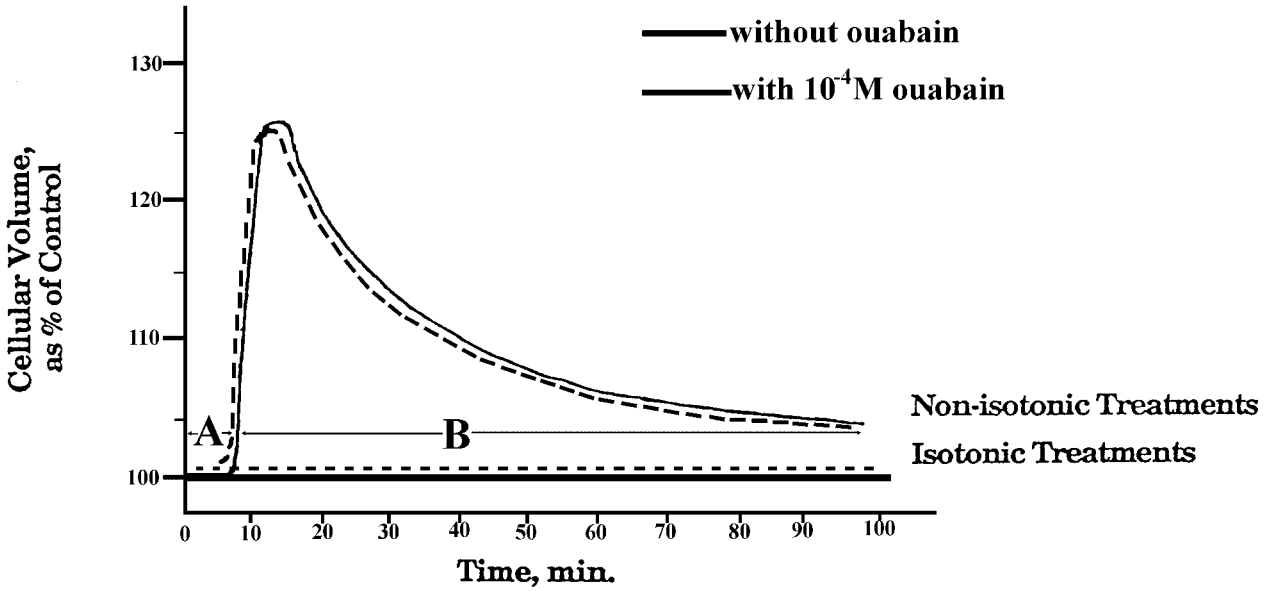
2. Like many other animal cells, erythrocytes change their shape and volume osmotically when placed in solutions that are not isotonic. For mammalian cells these changes are more or less permanent as long as the cells are kept in the non-isotonic media. Duck erythrocytes, however, gradually regain their original volume with prolonged incubation in many non-isotonic media. The following two-part experiment illustrates this behavior.

In part A, four populations of identical duck RBC's were suspended in an isotonic solution containing 130 mM NaCl, 10mM KCl, 10 mM hydrogen ion buffer and 5 mM glucose. The volumes of these cells were then monitored for 8 min. Then, the tonicities of two of the four suspensions were changed: the cellular volumes in those suspensions immediately increased about 25%, as illustrated below. (The media surrounding the other two populations were not changed.) At the same time, ouabain was added to one of the treated and to one of the untreated populations. In part B of the experiment, the volumes of all four populations were monitored for an additional 90 minutes, as illustrated below.



Given these results and your knowledge of osmosis and the membrane biology of mammalian erythrocytes, answer **all** of the following questions

A. (4 pts) What was probably done to change the tonicities of the two suspensions?

B. (4 pts) What is the probable osmotic basis of the cells' immediate response in "A" to the change in tonicity?

C. (4 pts) What is ouabain and what do the ouabain data indicate?

D. (8 pts) Describe explicitly **how** the treated cells gradually regain their normal volume. Postulate one possible mechanism and explain clearly how it would work.

E. (5 pts) Describe one additional experiment, and the expected results, that would test the validity of your hypothesis.