Work on bacterial survival has shown that the visible light reduces the UV effect to where it would be at a lower dose of UV (dose reduction factor, DRF). It was felt that cleavage delay might also show a constant DRF. From the limited successful experiments, this does appear to be the case.

Different combinations of cells treated with UV, VL and short pulses of tritiated thymidine ($TdRH^3$) and normal cells were collected to study 1) the normal mitotic schedule, 2) the phase of mitosis most affected by UV, and 3) the effect of UV on the incorporation of $TdRH^3$.

The Mechanism Of Diamox Effect On Acid-Base Relations

Eugene D. Robin, Gerald P. Rodnan and Margaret H. Andrus
University of Pittsburgh Medical School

Maren and co-workers have demonstrated that carbonic anhydrase inhibition leads to the development of extracellular respiratory acidosis. The rise in bicarbonate concentration seen under these circumstances is a compensatory mechanism. To what extent the uncatalyzed reaction is capable of permitting normal cellular gas exchange generally is not established. Maren holds that the carbonic anhydrase catalyzed reaction is only decisive in certain special areas (gill, kidneys). If this hypothesis is correct, then Diamox administration should lead to parallel changes in extracellular and intracellular pH. Whereas if the catalyzed reaction is critical in most cells, administration of Diamox should lead to relative intracellular acidosis as compared with pH changes occurring in extracellular fluid.

To test this hypothesis, simultaneous measurements of extracellular and mean whole body intracellular pH were performed in the dogfish under control circumstances and following the intravascular injection of 100 mg. of Diamox.

Following Diamox administration in five experiments, plasma pH fell from 7.59 to 7.36 with a $\triangle$pH of -0.38. Intracellular pH fell from 6.98 to 6.63 with a $\triangle$pH of -0.32. Since Diamox does not produce relative intracellular acidosis, it appears that generally cellular gas exchange is relatively independent of carbonic anhydrase.

This work was supported by a research grant (H-5059) from The National Heart Institute of the National Institutes of Health, Public Health Service.

Hydrogen Ion Metabolism In The Dogfish

Eugene D. Robin, Gerald P. Rodnan and Margaret H. Andrus
University of Pittsburgh Medical School

It has been shown that urinary pH in the dogfish is essentially independent of extracellular pH. This suggests that renal mechanisms are relatively unimportant in the regulation of acid-base balance in this animal.

Hodler et. al. have demonstrated that the probable site of bicarbonate regulation in the dogfish is the gill membranes. It seemed of interest to perform parallel studies with respect to H^+ metabolism Intravascular infusion of HCl leads to no significant change in urinary pH which remains fixed at a value of approximately 5.6 suggesting that renal regulations is not involved. Arterial pH falls from approximately 7.6 to approximately 6.9 following the intravascular infusion of 10 meq. of HCl. Within 60-120 minutes after infusion, arterial pH and bicarbonate concentrations return to control values suggesting either excretion of H^+, buffering of H^+ or both processes. Measurements of mean whole body pH after H^+ infusion demonstrate that the major amount of H^+ infused is not buffered intracellularly. This finding raises the possibility of direct excretion of H^+ by the gill membrane. Attempts to directly measure gill excretion of H^+ by the divided box technique were not successful and will require further investigation by more refined techniques.

Because definite H^+ transfer from blood to sea water could not be demonstrated, an attempt was made to demonstrate H^+ transfer in the reverse direction. 0.1 N HCl was added to sea water in the anterior compartment of a divided box. Under these conditions, arterial pH fell sharply, but this decrease was caused by an increase in plasma CO_2 tension. Paradoxically fish placed in this type of acid environment developed significant increases in plasma bicarbonate in response to respiratory acidosis! Similar experiments in which HCO_3^- was added to anterior compartment sea water also produced severe respiratory *acidosis.* Apparently significant changes in external pH interfere with normal CO_2 exchange across the gills. The mechanism of this interference remains to be elucidated.

This work was supported by a research grant (H-5059) from The National Heart Institute of the National Institutes of Health, Public Health Service.

Mean Whole Body Intracellular pH in the Dogfish

Eugene D. Robin, Gerald P. Rodnan and Margaret H. Andrus
University of Pittsburgh Medical School

Following a suggestion originally made by Waddell and Butler, a technique has been developed for the determination of mean whole body intracellular pH. This technique uses the weak acid 5, 5-dimethyl-2, 4-oxazolidinedione (DMO) as a pH indicator system. Assuming equal activities of the non-ionized HDMO in intra- and extracellular water at equilibrium and equal Kas in both fluids then

$$\frac{(H^+)e}{(H^+)i} = \frac{(DMO^-)}{(DMO^-)e}$$

Simultaneous measurements of total body water, extracellular fluid volume, arterial plasma pH and extracellular HDMO-DMO^- concentrations permit the calculation of mean whole body intracellular pH. Intracellular pH was measured in ten dogfish. Mean extracellular pH averaged 7.46 units while