1964 #24

EFFECTS OF ULTRAVIOLET RADIATION ON TRITIATED THYMIDINE UPTAKE IN FERTILIZED EGGS OF Echinarachnius parma

A. F. Rieck, Marquette University, Milwaukee, Wis.

Unfertilized eggs of Echinarachnius parma exposed to ultraviolet and subsequently fertiliz have the same rate of H^3TDR uptake as non-radiated controls between fertilization and 31 min post-fertilization. The rate of incorporation becomes significantly more rapid after this point the radiated population, which however has a 24 min cleavage delay. If the zygotes are irradiat 65 min post-fertilization, the immediately following H^3TDR uptake peak (70 min) and cleavage (83 min) are not delayed. The following or second cleavage occurred at 154 min (radiated) and min (non-radiated) with the peak H^3TDR incorporation at 145 min and 125 min respectively. Th is a delay of 21 min for cleavage for 20 min for peak H^3TDR uptake, this latter being the synthe- sis for the third cleavage. In these experiments the DNA synthetic period in immediate prepara- tion for a subsequent cleavage was not delayed by the irradiation even though a delay in cleavag occurred. This suggests that the ultraviolet was not affecting the DNA synthesis directly but wa deleterious to other processes in preparation for the cell division. The increased rate of H^3TD uptake in eggs radiated pre-fertilization cannot be clarified at present.

The ultraviolet dose of 5.72×10^{-3} ergs/cm^2 from a polychromatic Hanovia high pressure mercury arc was such that recovery would occur spontaneously in the dark and the ensuing development was normal in all aspects. Photorecovery in these phenomena was not studied.

Supported by Grant GM-10293 from the U.S.P.H.S.

1964 #25

GAS EXCHANGE IN BIOLOGICAL SYSTEMS

E. D. Robin and H. V. Murdaugh, University of Pittsburgh, Pittsburgh, Pa., and University of Alabama, Birmingham, Ala.

There is a bimodal distribution of CO_2 tensions in biological forms. PCO_2s are generally less than 5 mmHg and $[HCO_3^-]$ less than 10 meq/L in aquatic gas exchangers. PCO_2s are generally greater than 15 mmHg and $[HCO_3^-]$ greater than 20 meq/L in terrestrial gas exchangers. This distribution may be explained by considering the quantitative relationship between O_2 and CO_2 tensions in body fluids in the steady state.

A general relationship may be derived for the relationship between PaO_2 and $PaCO_2$ as follows:

$$PaO_2 = P_{I_{O_2}} - K_1 - \left[\frac{\alpha_{CO_2}}{\alpha_{O_2}} \times \frac{1}{R}\left(PaCO_2 - P_{I_{CO_2}} - K_2\right)\right]$$

where PaO_2 : arterial O_2 tension

$P_{I_{O_2}}$: ambient O_2 tension