

CELL BIOLOGY

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ABSTRACTS

Role of Lipids in Tumor Cell Sensitivity to Cell-mediated Lysis. MARINA ABRAHAM, LAURA JENSKI, and WILLIAM STILLWELL, Department of Biology, IUPUI, Indianapolis, IN 46223.—Lymphocyte-mediated cytolysis may be an important mechanism for immune defense against cancer. Because cytolysis begins at the surface membrane, changes in lipid content of the tumor cell membrane may affect cytolysis. We fed BALB/c mice basal diets supplemented with 20% menhaden oil (rich in omega-3 polyunsaturated fatty acids) or coconut oil (rich in saturated fatty acids). After 6 weeks, we inoculated the mice with a tumor cell line, T27A, and allowed the tumor cells to grow for one week. Subsequently, we tested the tumor cells' sensitivity to lymphocyte-mediated killing with a standard radiolabel release assay. In two of three experiments, tumor cells grown in mice fed menhaden oil were more sensitive to cytolysis than those grown in coconut oil-fed mice. We propose that increased levels of polyunsaturated fatty acids in the tumor cell membrane correlate with alterations in membrane fluidity and enhanced sensitivity to cytolysis. Currently, we are modifying tumor cells *in vitro* with purified polyunsaturated fatty acid (docosahexaenoic acid, C22:6) or saturated fatty acid (stearic acid, C18:0) to explore this relationship.

Effect of Betaine on the Fine Structure of Salt-treated *Escherichia Coli*. MOHINDER S. JARIAL and DUNCAN T. KENNEDY, Indiana University School of Medicine, Muncie Center for Medical Education, Ball State University, Muncie, IN 47306—*Escherichia coli* 1130B-2ATCC was grown on nutrient agar medium, ir medium + 0.8M NaCl, or medium + 0.8M NaCl + 0.001M betaine. Each dish was innoculated with 10^7 bacteria and allowed to grow 72 hours. Colonies were fixed in gluteraldehyde, osmic acid and phosphate buffer. Three times as many colonies grew in the presence of NaCl and betaine grown on normal medium and on NaCl-betaine medium appeared as single gram-negative rods. However, those grown on NaCl medium appeared as long strings. Under the EM, bacteria grown on normal medium exhibited mesosomes and trilaminar outer and inner membranes separated by a peptidoglycan containing periplasmic space. The electron dense cytoplasm contained various granules. Nuclear material appeared as fine filaments. Bacteria grown on NaCl medium displayed vesicles being pinched off from the outer membrane which at many sites was disrupted resulting in loss of cellular contents. Nuclear material appeared in dark clumps and the cytoplasm exhibited membranous whorls and an increase in dense particles. Aberrant mesosomes were observed and cell division seemed to be arrested. Bacteria grown on

NaCl betaine medium appeared as normal rods. Their outer and inner membranes were intact, cytoplasm was fairly condensed and nuclear material appeared as fine filaments. This study suggests that betaine acts as a strong osmoprotectant for *E. coli* against high NaCl concentrations by maintaining the integrity of its membranes and nuclear material.

Effect of Dietary Stearic and Linoleic Acids on Mammary Gland Development in Strain A/St Mice. M.I. LEE and A.S. BENNETT. Joliet Junior College, Joliet, IL 60436 and Ball State University, Muncie, IN 47306.—Promotion of murine mammary preneoplastic lesions and tumors are related to dietary fat intake. The effect of dietary stearic (SA) and linoleic acid (LA) on mammary ductile and alveolar development in mice that produce a high level of spontaneous mammary tumors was compared. Dietary polyunsaturated fats, specifically LA, promote tumor formation whereas stearic acid decreases tumorigenesis. Mammary glands were excised from 6 and 10 month old mice fed high fat (15%) LA rich or SA rich diets and from those fed low fat (5%) LA rich or stock diets. Inguinal glands were weighed and whole mounts were prepared for microscopic examination. Mammary glands of mice fed either high or low fat LA rich diets exhibited earlier development than those from mice fed high fat SA rich or stock diets and had poorly organized mammary ductile trees. These observed differences in early development may account for the reported SA inhibition and LA enhancement of the neoplastic progression.

ESR Determination of Cell Volumes. VALERIE J. SPITZER, F.W. KLEINHANS, PATTY VILLINES, K.E. COLVIN, and J.K. CRITSER, Dept. of Medical Research (FWK & VJS) and Ctr for Reproduction and Trans-plantation Immunology (PV, KEC, & JKC), Methodist Hospital Inc, of Indiana, Indianapolis, IN 46202 and Dept of Physics (FWK), IUPUI, Indpls, IN 46223.—Electron spin resonance (ESR) was used to determine the volume and osmotic properties of human red blood cells (RBC), for calibration, and spermatozoa. Cells volumes are determined by labeling a cell suspension with the aqueous label, tempone @ 2mM, and eliminating the extracellular signal via magnetic broadening using 35 to 50mM of membrane impermeable CrOx leaving an intracellular aqueous signal proportional to the volume of the cells. We obtain an ESR human RBC total volume of $97 \pm 10 \mu\text{m}^3$ which compares well with the accepted mean of $88 \mu\text{m}^3$. For human sperm we obtain a total volume of $49.6 \pm 8.9 \mu\text{m}^3$ which is significantly larger than the typically quoted volume of $17.4 \pm 1.46 \mu\text{m}^3$ based on Coulter Counter measurements. We believe the Coulter measurements suffer from the use of dead sperm and errors associated with the unusual shape of the sperm and their large size relative to the Coulter orifice.

A Cytological and Behavioral Study of Cord-Lesioned Axolotls. MARCY THOMAS, IAS Summer Fellow, Science Teacher at Trinity Lutheran, 8540 East 16th Street, Indianapolis, IN 46220 and Margaret W. Egar, Anatomy Department, Indiana University School of Medicine, 635 Barnhill Drive, Indianapolis, IN 46223.—In a remarkably short time, axolotls (*Ambystoma mexicanum*) will recover normal swimming behavior following a complete transverse lesion of the spinal cord. The present series of experiments involved making cord cuts at thoracic level T4-5 in 25 juveniles from different spawnings, aged 5 to 11 months. The recovery period was studied and individual behavioral patterns were recorded and compared to the age and size of the axolotl. Periodic samples were made for light microscopic study of the cord, including areas cranial and caudal to the

lesion site. Sections stained with H and E, Bodian's silver stain, and alcian blue were prepared and studied. Special attention was paid to the ependymal-like cells that infiltrate the lesion site as early as the beginning of the second post-operative week and to the marginal neurons that are situated in a column just deep to the pia at lateral edge of the cord. Behavioral observations were a good indication of regeneration of axons across the lesion.

