PANEL I: GENETIC EXPRESSION AND DEVELOPMENTAL GENETICS

Reporter - MORTON DAVID

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DR. SILVERS:

Pigment formation in rodents has been used as a model for the study of phenotypic effect of specific genes. In the agouti mouse, genes with the agouti locus determine cost color as black or yellow or black and yellow. This phenotypic effect is either the effect of a genetic locus at the level of the pigment cell or the effect within the tissue environment in which these pigment cells behave. By studying the behaviour of pigment cells of one genetic locus constitution when placed into the environment of a different genetic locus constitution, it has been shown that the alleles at the agouti locus act within the local follicular millieu in which these cells elaborate melanin and not autonomously within the pigment cell.

DR. SMITHIES:

Using the study of gene control of Hb synthesis, Dr. Smithies demonstrated the fact that the turning off and on of genes in mammal may not be the switching on and off of single genes, but other switching on and off whole sets of genes. These sets may control, the life cycle of the cell and switching off are set and turning on another would change the cell life cycle.

DR. MARKERT:

Dr. Markert talked about LDH (lactic dehydrogenase). There are five isozymes each of which are found in different concentrations in different tissues.

This enzyme is a tetramere with four polypeptide chains. At least two different genes are involved in the synthesis of these chains.

Another kind of LDH is found only in sperm. Here there must be a different kind of control of gene function during development. The gene which must be present in all of the body cells is turned off in all the tissues except this one. Even here it is active only at the time spermatogonia becomes primary spermatocytes. This is borne out by the fact that in the prepubertal testis where the spermatogonia are present this enzyme is not found.

The kinetic properties of the different isozymes vary. LDH1 is the principal isozyme of cardiac muscle while LDH5 is the one found primarily in skeletal muscle. In skeletal muscle when oxygen is greatly reduced as a result of vigorious exercise the muscle can become paralyzed due to accumulation of lactic acid. This cannot happen in the heart because the lactic acid builds up it depresses the catalytic activity of LDH so no more lactic acid is formed.