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Asterisks preceding the title refer to studies in humans.


1845 Effect of Dose and Route of Bacillus Calmette-Guérin in Chemoimmunostimulation Therapy of a Mucine Leukemia. J. W. Pearson, S. D. Chaparas, and M. A. Chirigos.


1854 Serochemotherapy against a Moloney Virus-induced Leukemia. Gary R. Pearson, Lena W. Redmon, and John W. Pearson.

1858 Anemia Virus as a Distinct Component of the Murine Leukemia-Sarcoma Complex of Viruses. Richard Siegler, Ingrid Lane, Susan Moran, and Pearl Leavitt.

1862 Isolation and Purification of L-Methionine-α-deamino-γ-mercaptomethane-Lyase (L-Methioninase) from Clostridium sporogenes. Willi Kreis and Catherine Hession.

1866 Biological Effects of Enzymatic Deprivation of L-Methionine in Cell Culture and an Experimental Tumor. Willi Kreis and Catherine Hession.


1875 Xenotransplantation of Established Human Endometrial Cells into Newborn Hamsters. Takiji Arata, Yoshinori Tanaka, and Toshio Tanaka.

1878 The Effects of Tumor Bearing upon Changes in Cell Distribution and Membrane Antigen Characteristics in Murine Spleen and Thymus Cell Subpopulations. Susumu Konda and Richard T. Smith.


1931 Influence of Premirradiation of Lung on Development of Artificial Pulmonary Metastases of Fibrosarcoma in Mice. H. Rodney Withers and Luka Milas.

1937 K-Region and Non-K-Region Metabolism of Benzo(a)pyrene by Rat Liver Microsomes. Nadao Kinoshita, Barbara Shears, and Harry V. Gelboin.

Since the days of the pharaohs, the Egyptian fellaheen, wading in the waters of the Nile valley, have been afflicted with hematuria due to chronic cystitis.

In 1851 German parasitologist Theodor Maximilian Bilharz (1825–1862) recovered flatworms from the mesenteric veins of an Egyptian peasant. He demonstrated that this worm and its terminal-spined eggs, which were discharged in the urine, were the cause of hematuria. Schistosoma haematobium, the vesical fluke originally named after Bilharz, predominates in Africa, where it infects an estimated population of 10 to 25 million. Its reservoir is primarily man, who contaminates African waters with urine and feces. Eggs passed with excreta hatch into a free swimming stage (miracidium), which infects different species of the freshwater snail, Bulinus. Miracidia in the snail host give rise to many cercariae, which emerge from the snail, swim freely in water and, upon contact, penetrate the skin of man. Parasites, by way of the circulatory system, gain access to many parts of the body. S. haematobium has a tendency to reside in the vesical veins of man. The eggs are encysted in the bladder wall and are discharged through the urine to complete the life cycle.

Alexander Robert Ferguson (1870–1920), Scottish pathologist at the School of Medicine in Cairo, associated bilharziasis and carcinoma of the urinary bladder in 1911 on the basis of autopsy observations (J. Pathol. Bacteriol., 16: 76, 1911). This association was reported by previous pathologists (cf. R. Harrison, Lancet, 2: 163, 1889). Epidemiological studies in Egypt and West Africa substantiated the association (cf. J. Natl. Cancer Inst., 20: 825, 1958). Nevertheless, bilharziasis as a cause of bladder cancer was not universally accepted since the pathogenesis was obscure and the situation had not been replicated in animals under experimental conditions.

Robert E. Kuntz (b. 1916) and Betty June Myers (b. 1928), of the Southwest Foundation for Research and Education in San Antonio, Texas, and Allen W. Cheever (b. 1932), Laboratory of Parasitic Diseases, NIH, succeeded in infecting nonhuman primates with S. haematobium. Papillary transitional cell carcinomas of the urinary bladder were found in a talapoin monkey and a capuchin monkey, 21 and 53 weeks, respectively, after such infection. There were additional cases of proliferative epithelial lesions related to the presence of S. haematobium eggs in the lamina propria of the bladder (J. Natl. Cancer Inst., 48: 223, 1972).

The evidence appears complete that S. haematobium causes cancer of the urinary bladder; an experimental model has been found, and work can proceed on the elucidation of the pathogenesis.

Pictured around a chart of the life cycle of S. haematobium (prepared by Tao Cheng Huang of the Southwest Foundation) are: Bilharz (upper left), from the frontispiece of Ciba Foundation Symposium on Bilharziasis (Little, Brown and Co., Boston, 1962), Ferguson (upper right), from P. Mustacchi and L. Jassy, Cancer. 15: 215, 1962; Kuntz (lower left); Cheever (lower center). and Myers (lower right). We are indebted to Dr. Robert Kuntz for his assistance with the preparation of the legend and for the photographs of himself and Drs. Cheever and Myers. Reproduction permission has been supplied by The Ciba Foundation Symposium, Churchill Livingstone, Edinburgh, and The Ciba Foundation, London, for the photograph of Bilharz; and by J. B. Lippincott Company, Philadelphia, and the journal Cancer for that of Ferguson.
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