



In memory of Erich Eigenbrodt

Erich Eigenbrodt was born on March 28, 1949 in Asbach/Odenwald, Germany about 40 km south from Frankfurt. Born and raised on a working farm he studied Veterinary Medicine at the University of Giessen, Germany from 1967 – 1972 with the intention of becoming a rural veterinarian. His doctoral thesis introduced him to biochemistry and the pyruvate kinase isoenzymes. Subsequently, together with his former fellow student and pathologist Manfred Reinacher, Erich Eigenbrodt observed that the pyruvate kinase isoenzyme type M2 (abbreviations M2-PK, PKM2) is over expressed in tumors and correlates with malignancy. Intrigued by this result Eigenbrodt realized the potential of metabolism in general and M2-PK in particular for early detection of tumor diseases as well as for tumor therapy. His scientific curiosity prompted him to change his occupational plans and to

continue investigation of the *tumor metabolome* in the laboratory.

In the early 1980s he and his teams of cooperating scientists identified pp60-src v-kinase, the transforming principle of the Rous Sarcoma virus, as the first oncoprotein interacting with and inactivating PKM2. In the interim these results have been repeated for several new oncoproteins, however at that time the oncoprotein induced inactivation of M2-PK stood in surprising contradiction to Otto Warburg's finding of an increased conversion of glucose to lactate in tumor cells. Erich Eigenbrodt recognized the critical role of the inactive dimeric form of M2-PK in supplying tumor cells with precursors for the synthesis of cell building blocks which are absolutely necessary for cells with a high proliferation rate and tumor cells in particular.

Commercially, his work led to development of test systems for the detection of the dimeric form of M2-PK (Tumor M2-PK) within the plasma and stool of tumor patients for follow-up studies during tumor therapy and colorectal cancer screening. He was also involved in the development of a commercial test system for detection of specified risk material of brain and spinal cord in meat products during the BSE crisis.

In 1985 Erich Eigenbrodt was named Professor and Head of the Department of "Comparative Biochemistry of Animals" within the Department of Veterinary Medicine of Justus Liebig University in Giessen, Germany and became Managing Director of the Institute in 2003.

For his research he was honored by being awarded several scientific prizes including the Award of the President of the University of Giessen for the best veterinarian doctoral thesis in 1974/1975, the Award of the Justus-Liebig University of Giessen in 1980, the Vincenz-Czerny Award for Oncology of the German Society for Hematology and Oncology in 1983 as well as the Award of the Minister of Youth, Family and Health in Germany for his scientific studies to reduce or avoid animal experiments for pharmacological and toxicological tests of chemical substances in 1986.

In addition to his scientific work, service to the university and its students were very close to his heart. Among other posts he held he was member and board member of the University Council in Giessen, Dean of the Veterinary Faculty Giessen and supervisor of preclinical examinations of veterinary students.

As a university instructor he succeeded in combining his extraordinary knowledge and understanding of cellular

metabolism with his experiences as a veterinarian, always related in a humorous manner, making his lectures unique and unforgettable by generations of veterinary students.

For his students, colleagues, friends and family (he was married with three children) it was therefore all the more shocking and deeply saddening when he suddenly and unexpectedly passed away in June 2004 at the age of only 55 years. Those who knew him remember him as exacting and determined in his scientific work, always close to nature, humorous and fair minded.

Selected Papers of Erich Eigenbrodt:

E. Eigenbrodt, M. Reinacher, U. Scheefers-Borchel, H. Scheefers, and R. Friis: Double role for pyruvate kinase type M2 in the expansion of phosphometabolite pools found in tumor cells. (review) In: *Critical Reviews in Oncogenesis*, Vol. 3(1,2) (M. Perucho, ed.) CRC-Press, Boca Raton, Florida, (1992), pp. 91-115.

E. Eigenbrodt, U. Gerbracht, S. Mazurek, P. Presek, and R. Friis: Carbohydrate metabolism and neoplasia: New perspectives for diagnosis and therapy. (review) In: *Biochemical and Molecular Aspects of Selected Cancers* (T.G. Pretlow, T.P. Pretlow, eds.) Academic Press, Inc., 2 (1994), pp. 311-385.

W. Zwerschke, S. Mazurek, P. Massimi, L. Banks, E. Eigenbrodt, and P. Jansen-Dürr: Modulation of type M2 pyruvate kinase activity by the human papillomavirus type 16 E7 oncoprotein. *Proc. Natl. Acad. Sci. USA* 96 (1999) 1291-1296.

P.D.Hardt, S. Mazurek, M. Toepler, P. Schlierbach, R.G. Bretzel, E. Eigenbrodt, and H.U. Kloer: Faecal tumour M2 pyruvate kinase: A new, sensitive screening tool for colorectal cancer. *Br. J. Cancer* 91 (2004) 980-984.

By
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