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EDITORIAL

Twenty years of ATP-binding cassette (ABC) transporters

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ATP-binding cassette (ABC) transporters constitute a large superfamily of primary active transport systems, which play a diversity of physiological roles, and are found in all cells of all kingdoms [3]. The year 2006 marks the 20th anniversary of the identification of this superfamily of proteins in 1986 [4]. It is also the 30th anniversary of the molecular identification of P-glycoprotein (MDR1, ABCB1) [5], which, when its gene was sequenced in 1986, turned out to be the first mammalian example of the ABC transporter family. It seems appropriate to celebrate these milestones in ABC transporter research with a special issue. It is the aim of this issue to give an overview on current knowledge and novel findings on mammalian ABC proteins, highlighting the many achievements of 30 years of research in the field. It complements a special issue on ABC transporters in *FEBS Letters*, which appeared earlier this year [2].

In mammals, seven families of ABC transporter genes have been defined, coding for 48 individual transporters. Although the number of mammalian ABC proteins is much smaller than found in prokaryotes many are of major clinical significance; currently, 18 human ABC genes have been associated with genetic diseases [1].

All ABC transporters consist of four core domains [4]: two transmembane domains, each normally consisting of, most frequently, six transmembrane alpha-helices (TMD1 and TMD2), and two nucleotide binding domains (NBD1 and NBD2). These four core domains form the minimal functional unit. However, there are many variations on this theme. For example, the four domains of mammalian ABC transporters may be fused together in a number of ways, either as a single polypeptide or as two half transporters each consisting of one TMD and one NBD. The MRP (ABCC1, ABCC2, ABCC3, ABCC6, ABCC8, ABCC9, and ABCC10) proteins have an additional transmembrane domain (TMD0) of unknown function. In addition, although the vast majority of ABC proteins are active transporters, there are exceptions where evolution has adapted the ATP-switch mechanism, which appears to have evolved to drive transport to other activities. Thus, one mammalian ABC protein is an ion channel (CFTR; ABCC7) and another is a regulator of ion channel activity (SUR; ABCC8 and ABCC9). Other ABC proteins couple ATP binding and hydrolysis to the control of translation or DNA repair. Those that are not transporters are not covered in this special issue.

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