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Editorial

Bioelectrochemistry of red blood cells

It is the second time that selected scientific work presented as lectures or posters at a conference of the *European Association for Red Cell Research* (EARCR) is published in a special issue of *Bioelectrochemistry*. This conference, organised by one of us (S.T.), took place in Roscoff (France) in April this year and was already the 14th meeting of the EARCR. The main topics were (i) red cell shape and cell membrane, (ii) membrane transport systems, (iii) antigens, receptors, signalling, erythrocyte disorders, oxidative stress, and (iv) malaria (for further information see the web-page of the EARCR http://www.earcr.uni-saarland.de). The scientific outcome of the EARCR meetings, held every 2 years in another European country, clearly demonstrates that basic research on red blood cells and their membranes is of general importance for understanding processes in cell and membrane biology. In some respect, red blood cells not only in the past 100 years but still today serve as model systems for the discovery of general principles in physiology, biophysics, and bioelectrochemistry.

It is interesting to note that the Nobel Prize in Chemistry this year was awarded to two scientists who substantially contributed to our understanding of the mechanisms of processes occurring in biological membranes. Their scientific work can truly be considered as a breakthrough in research on regulation of transport. In 1988, Peter Agre described for the first time a protein in the red blood cell membrane that was later characterised by him as a water channel called aquaporin. Roderick MacKinnon was able to present in 1998 the first three-dimensional structure of a K^+ channel in a biological membrane. It is worth mentioning that already in 1956 Gardos published a paper giving first evidence for a Ca^{2+}-activated K^+ channel in red blood cell membranes. The channel was postulated on the basis of classical ion flux measurements (the patch-clamp technique was not yet invented) which clearly demonstrates how investigations of red blood cells can help to reveal general principles of biological membranes.

This special issue contains reports with new results on the regulation of ion channels and transporters, such as the K^+–Cl^- symporter, the $K^+(Na^+)/H^+$ antiporter, and the glucose transporter, in red blood cell membranes. Other contributions deal with shape transformation, cell aging, the mechanical behaviour of red blood cells, and the physical state of membrane lipids.

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