Editorial

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Apoptosis (derived from Greek, meaning 'falling off, e.g. of leaves) and programmed cell death (PCD) have not only become very fashionable subjects of basic research, especially in the field of immunology, but the results emanating from this work also seem to hold considerable practical potential, e.g. in the therapy of tumors. Screening the literature in a single data base (Medline), this fact is reflected by an impressive increase of papers published on this theme from 1980 to 1993 (fig. 1). In addition, many special sessions at scientific meetings on various subjects are being devoted to this topic. As a matter of fact, an increasing number of conferences that exclusively deal with apoptosis and PCD are being organized. These endeavours are complemented by the publication of numerous books centered on this issue. However, there still seems to be a lack of short, specific accounts for the busy reader who wants to obtain a condensed insight into this field of research.

When taking over the Editorship of International Archives of Allergy and Immunology, one of the original plans in restructuring our journal was, among other strategies, to publish 'Special Features' where the majority of papers in a single issue deal with a well-focussed, timely topic in the form of Mini-Reviews. This should be

done not too often, e.g. once a year, and the selection of topics should meet the needs and interests of our readership, i.e. providing new scientific data and interpretations thereof that are of interest both for allergologists and immunologists in theoretical research and clinical practice. We felt that an issue centered on apoptosis and PCD may be a good start in this respect, especially since the contributions not only come from experts in the field, but are all concise, short and cover selected aspects of apoptosis and PCD, e.g. methodology, basic biochemical and molecular biological aspects of DNA fragmentation, T-cell selection, death of tumor cells and treatment of disorders of the haematopoietic system.

One point that is worth reflection before reading this issue concerns the nomenclature of various forms of cell death. Attention to this problem has, e.g., been drawn by a statement of experts and pioneers in this field who urge authors of scientific papers and journal editors to appreciate the fact that the concept of apoptosis and the new research that is emerging internationally on this subject carries with it the need to continuously clarify nomenclature [1]. They propose that the initial steps to achieve this aim would include introduction of specific terms distinguishing different types of cell

death as well as the elimination of terms that may be misleading by unintentionally implying an inherent mechanism. Cell death occurring in an uncontrolled and unordered fashion due to severe perturbations of the cellular environment ('cellular accident') is termed necrosis. The historical aspects of the emergence of the concepts and terms of apoptosis and PCD are repeatedly addressed in the various contributions of the present issue. As a matter of fact, many scientists working in the field use these expressions interchangeably. There are, however, clearcut

differences between PCD and apoptosis. According to Lockshin and Zakeri [2], PCD is an operational definition of a functional relationship and development, whereas apoptosis is an originally morphological, but now biochemical description of a mode of cell death. It is quite possible that the final steps in both processes are coalescing, but apoptosis does not necessarily include programming. PCD is paradigmatically found in embryonic development and metamorphosis, while apoptosis occurs after external stimuli, e.g. via glucocorticoid hormones in the case of lymphocytes, mild toxins, etc. Accordingly, typical cells undergoing PCD are those of the interdigital tissues during limb formation, the embryonic neurones and the intersegmental muscles

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similar in cells undergoing PCD or apoptosis. There are, however, differences on the organelle level, such as early alterations of mitochondria in PCD, but not in apoptosis. The chromatin is condensed in PCD and marginated in apoptosis. In summary, PCD and apoptosis seem to be mechanisms leading to a rapid and controlled destruction of cells, thus preventing the persistence of unnecessary mutated or other damaged cells

(Motto: 'I'd rather be dead than faulty or useless').

I hope that our readers enjoy the contributions in this Special Feature as much as we did.

Fig.1. Publications on apoptosis and programmed cell death.

of insects. On the other hand, target cells for hormone-dependent apoptosis are glucocorticoid-exposed thymocytes and the cells of the prostate after castration. The first manifestation of PCD is a decrease in protein synthesis and a change in the cellular protein pattern, while activation of endonuclease is a hallmark of apoptosis. In the latter case, this leads to the characteristic internucleosomal DNA cleavage resulting in the electrophoretic laddering pattern, while this phenomenon may not always occur in PCD. Overall, cell morphology and the changes in membrane integrity are

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