Plasma Exchange Therapy

International Symposium Wiesbaden 1980

Edited by H. Borberg & P. Reuther
Foreword by H. G. Mertens

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Foreword

In the past few years the complex organ blood has been treated with more radical as well as more sophisticated methods. Blood letting and in many cases, transfusions are replaced by more or less complete exchange or substitution of individual blood components. However, reliable influence on hemodynamic properties is still easier and quicker achieved by use of artificial plasma substitutes respectively diuretics.

Several diseases indicate the removal of a specific "pathogenic" blood fraction (either a cellular or a humoral component) whereas the conservation of other blood components is desirable. Separation of cells and plasma – the basic principle of plasma exchange therapy – can be obtained by two methods: centrifugation and filtration.

An International Symposium on Plasma Exchange Therapy took place during the 1980 convention of the German Society of Neurology in Wiesbaden, FRG. The proceedings present an assessment of the technological development and a survey on the widening field of therapeutical applications.

Autoimmune diseases have been the main area of plasma exchange therapy. The removal of circulating antibodies proved to be effective in the management of critical stages of some of these diseases, e.g. the depletion of anti ACh-receptor-antibodies in myasthenic crisis and of anti-basement-membrane antibodies in acute renal failure in Goodpasture's syndrome. In both diseases, however, the effect of plasma exchange treatment has to be stabilized by a sufficient long-term immunosuppressive therapy.

In Rh-incompatibility, plasma exchange of maternal blood seems to be able to assist, if not replace, fetal intrauterine transfusions. Positive therapeutic effects are reported also in some other autoimmune diseases, although a pathogenic plasma factor or the immune pathomechanism have not yet been identified. Further experiences with plasma exchange therapy may provide clues for the immuno-pathological processes. For some diseases more therapeutic experience is needed: polymyositis, polyradiculitis, rheumatoid arthritis, pemphigoid, immune thrombocytopenia, systemic lupus erythematosus.
These studies should be designed as controlled trials and go along with patient orientated immunological research in order to monitor the effects.

On the other hand, plasma exchange therapy is clearly indicated in those paraproteinemias that are complicated by the hyperviscosity syndrome and in familial hypercholesterolemia. In the latter, a long termed therapy is necessary with repeated plasma exchanges at regular intervals.

It has been shown that plasma exchange is also effective in the emergency treatment of exogenous intoxications with protein bound substances, e.g. digitalis, herbicides. In endogenous intoxications, e.g. thyrotoxic and hepatic coma, plasma exchange may be useful. However, toxic substance are not always clearly identified and they may be bound in the extravascular space. Therefore special problems of detoxication are encountered in these diseases. This holds true for other possibilities of plasma exchange treatment, for instance its application in cancer therapy or in the management of schizophrenia. Discussions along these lines have only recently been started.

Side effects of the treatment are to be expected despite the improved technical developments. Up to now plasma exchange therapy is an expensive and time consuming procedure. Future research looks for a more specific elimination of plasma fractions in order to avoid the substitution with large amounts of plasma derivates, since their worldwide supply is limited.

The German Society of Neurology conceived this symposium as a platform for researchers concerned with the immunological and technological problems of plasma exchange therapy and with the various fields of its clinical application. We thank the participants for their contributions. May their work serve as a basis for future research.

Würzburg, January 1981 H.G. MERTENS

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Chapter I

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INTRODUCTION

H. Borberg, Cologne

On behalf of Professor Mertens, president of the German Society of Neurology, who initiated and promoted the idea and the concept of this symposium, I would like to welcome all participants. My particular welcome is directed to our guests from abroad, who did not hesitate to carry the burden of a long trip to participate and to present or discuss developments, concepts and data.

Plasma exchange therapy is by far not a new way of treatment. It may reasonably be performed, using the conventional multi bag procedure. On the other hand, there is no doubt, that the introduction of blood cell separators has considerably contributed to the ease, the efficacy and the distribution of this treatment. The literature concerning plasma exchange is increasing exponentially, allowing for the conclusion, that the number of applications is also increasing. The development of applications at Cologne may be taken as an example for many centers: Though this therapy is available since 1970, it was not before 1977, that an essential numerical increase of applications was observed. Since then, a duplication each year can be seen, correlating with a decrease of the rate of side reactions. This rise appears to be more or less representative for all centers applying plasma exchange therapy. We do not know, if this development correlates with the distribution of knowledge, the augmentation of experience and new therapeutic applications or if it is due to the introduction of new technologies, as both, the discontinuous flow centrifugation and the second generation of continuous flow centrifuges may well have influenced the frequency of applications.
On the other hand, plasma exchange therapy is not without problems.

Different technologies compete for optimal cell-plasma separation. In spite of the high quality of centrifugal separation characterized from ease, safety, efficacy and economy, filtration, though by far not yet competitive, developed to a respectful standard. The following disadvantages of the filtration techniques need to be eliminated: decrease of efficacy with time, retention of high molecular proteins and circulating immune complexes, risky access to the circulation (shunts, central-venous catheters) to achieve high flow rates, hemolysis, unacceptable high costs.

Plasma exchange is unselective and unspecific, thus developments to further improve the specificity and to decrease the costs of fluid replacement are strongly supported.

The quality of performance depends on the fluid replacement, the volume and frequency and the safety.

Diagnostic procedures allowing for an extension of application, immediate monitoring are frequently missing and we are far from

understanding, what influence plasma exchange has on the pathophysiology of many diseases treated.

It should be the aim of this symposium to achieve both, an understanding of what is available and what can be achieved by using the current standard of development for the patient's sake and also to critically consider the limitations, to assure, that disadvantages due to an uncritical application can be avoided.