

PRINCIPLES AND PRACTICE OF
THERAPEUTIC APHERESIS

Essay

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Introduction:

The start of this century has brought medical advances that allow earlier disease detection and better, faster, and more-specific treatments. Advances in therapeutic apheresis are creating another set of medical options. Therapeutic apheresis is an extracorporeal blood purification method for the treatment of diseases in which pathological proteins or cells have to be eliminated (**Bosch, 2005**).

Technological advances and better disease understanding allow treatment of a broader disease spectrum with more specific removal of disease mediators. New systems are currently under investigation around the globe. This review presents recent advances and updates in the field of therapeutic apheresis, including rheopheresis, granulocyte and monocyte adsorption, endotoxin adsorption, autoantibody adsorption, and plasma exchange protocols for incompatible renal transplants (**Wehrli, 2005**).

The field of "therapeutic apheresis" encompasses a variety of blood processing techniques that improve the outcomes of susceptible clinical disorders. These techniques include, in part, therapeutic plasma exchange, therapeutic cyto-reduction or cell harvesting, in-line cellular immunomodulation, and in-line plasma treatment. Some of these applications are the primary therapy for certain disease processes, and many others are considered to be secondary or adjunctive therapy, but both categories of apheresis treatments are considered to be effective and beneficial. Therapeutic apheresis, as currently practiced, has evolved since the mid-1970s. Whereas early reports of efficacy in treating disease were based predominantly on uncontrolled or anecdotal clinical experiences, the current prevailing requirement for acceptance of new indications for therapeutic apheresis is the controlled

clinical trial. This has resulted in the recognition of new indications, the abandonment of some older ones, and in general, improved confidence in the true utility of therapeutic apheresis procedures (**Smith et al., 2003**).

In 2003 the American Association of Blood Banks and the American Society for Apheresis joined forces in a Hemapheresis Committee, which created a summary of current therapeutic apheresis indications (**Smith et al., 2003**). Diseases were assigned to indication categories: (I) for standard, primary therapy; (II) for supportive therapy; (III) for when the evidence of benefit is unclear; or (IV) for when there is no current evidence of benefit, or for research protocols (**Wehrli, 2005**).

The more advanced separation (adsorption) columns under investigation today provide the potential for numerous benefits. The direct removal of etiologic agents from whole blood eliminates the cell separation step. Removal of a specific etiologic agent eliminates the need for replacement fluid and associated risks such as transfusion reactions (**Linenberger et al., 2005**).

Therapeutic apheresis is a safe and effective procedure for the treatment of diseases refractory to drug therapy (**Bosch, 2005**).

Aim of the essay:

The aim of this review is to highlight the guidelines and recommendations for the use of apheresis therapy in different diseases.



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List of Abbreviations

5-ASA	Mesalamine
8-MOP	8-methoxy psoralen
ACD	Acid citrate dextrose
ACE	Angiotensin converting enzyme
AChR	acetylcholine receptor
ADP	Adenine diphosphate
ADAMTS13	Von Willebrand factor-cleaving metalloprotease,
AHR	Acute humoral rejection
ALG	Antilymphocyte globulin
ALL	Acute lymphoblastic leukemia
AMD	Age related macular degeneration
AML	Acute myeloid leukemia
ANCA _s	Antineutrophil cytoplasmic antibody
ARA	Angiotensin receptor-1 antagonists
ATIII	Antithrombin
ATP	Adenine triphosphate
BM	Bone marrow
C	Complement
CABG	Coronary artery bypass graft
CAD	Coronary artery disease
CBC	Complete blood count
CD	Cluster of differentiation
CFC	Continuous flow centrifugation
CML	Chronic myeloid leukemia
CMV	Cytomegalovirus
CPP	Cryoprecipitate plasma
CRP	C reactive protein



List of abbreviations

CSF	Colony stimulating factor
DALI	Direct adsorption of lipoprotein
DCM	Dilated cardiomyopathy
DFP	Double filtration plasmapheresis
DIC	Disseminated intravascular coagulopathy
DMARDS	Disease modifying antirheumatic drugs
DNA	Deoxyribonucleic acid
DSC	Dextran sulphate cellulose
EASY	Endotoxin adsorber system
EF	Ejection fraction
ET	endotoxin
FP	Frozen plasma
FFP	Fresh frozen plasma
FH	Familial hypercholesterolemia
FPSA	Fractionated plasma separation and adsorption
FSGS	Focal segmental glomerulosclerosis
G-CSF	Granulocyte colony stimulating factor
GvHD	Graft versus host disease
HbA	Haemoglobin
HDL	High density lipoproteins
HELP	Heparin induced extracorporeal lipoprotein plasmapheresis
HES	Hydroxy ethyl starch
HLA	Human leucocytic antigen
HSA	Human serum albumin
ICU	Intensive care unit
IFC	Intermittent flow centrifugation
Ig	Immunoglobulin
IL	Interleukin
IVIG	Intravenous immunoglobulin



List of abbreviations

IVUS	Intravascular ultrasound
kDa	Kilodalton
KT	Kidney transplantation
LCAP	Leucocyte apheresis
LDH	Lactate dehydrogenase
LDL	Low density lipoproteins
Lp	Lipoprotein
LPS	Lipopolysaccharide
LRS	Leucocyte reduction system
MARS	Molecular adsorbent recirculating system
MOF	Multiorgan failure
MS	Multiple sclerosis
NO	Nitric oxide
NSAIDs	Non steroidal anti-inflammatory drugs
PBPC	Peripheral blood progenitor cells
PBSCs	Peripheral blood stem cells
PLEX	Plasma exchange
PRP	Platelet-rich plasma
PT	Prothrombin time
PTT	Partial thromboplastin time
RBC	RED blood cell
Rh	Rhesus factor
SGOT	Serum glutamic oxaloacetic transaminase
SGPT	Serum glutamic pyruvic transaminase
SHL	Sudden hearing loss
SPA	Staphylococcal protein A
TH	T helper
TNF	Tumor necrosis factor
TPE	Therapeutic plasma exchange



List of abbreviations

TRALI	Transfusion related acute lung injury
TTP	Thrombotic thrombocytopenic purpura
UC	Ulcerative colitis
UV	Ultraviolet
VLDL	Very low density lipoproteins
WBC	White blood cell
XM	Cross matching



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