Θεραπευτική Αφαίρεση
Πρωτόκολλα Θεραπείας (*): Έχουν σημασία;

(*)**GUIDELINES**

Π. Πατεινάκης
Νεφρολόγος, Δντής
Νεφρολογικό Τμήμα
ΓΝΘ «Παπαγεωργίου»

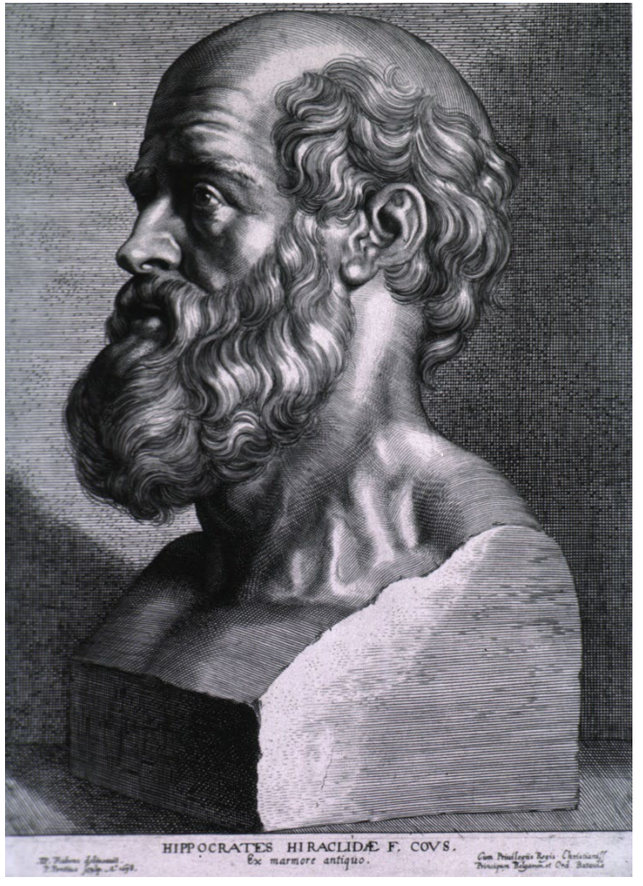
ΘΕΡΑΠΕΥΤΙΚΗ ΑΦΑΙΡΕΣΗ (ΘΑ)

WORLD KIDNEY FORUM

Thirty-six Hippocratic Aphorisms of Nephrologic Interest

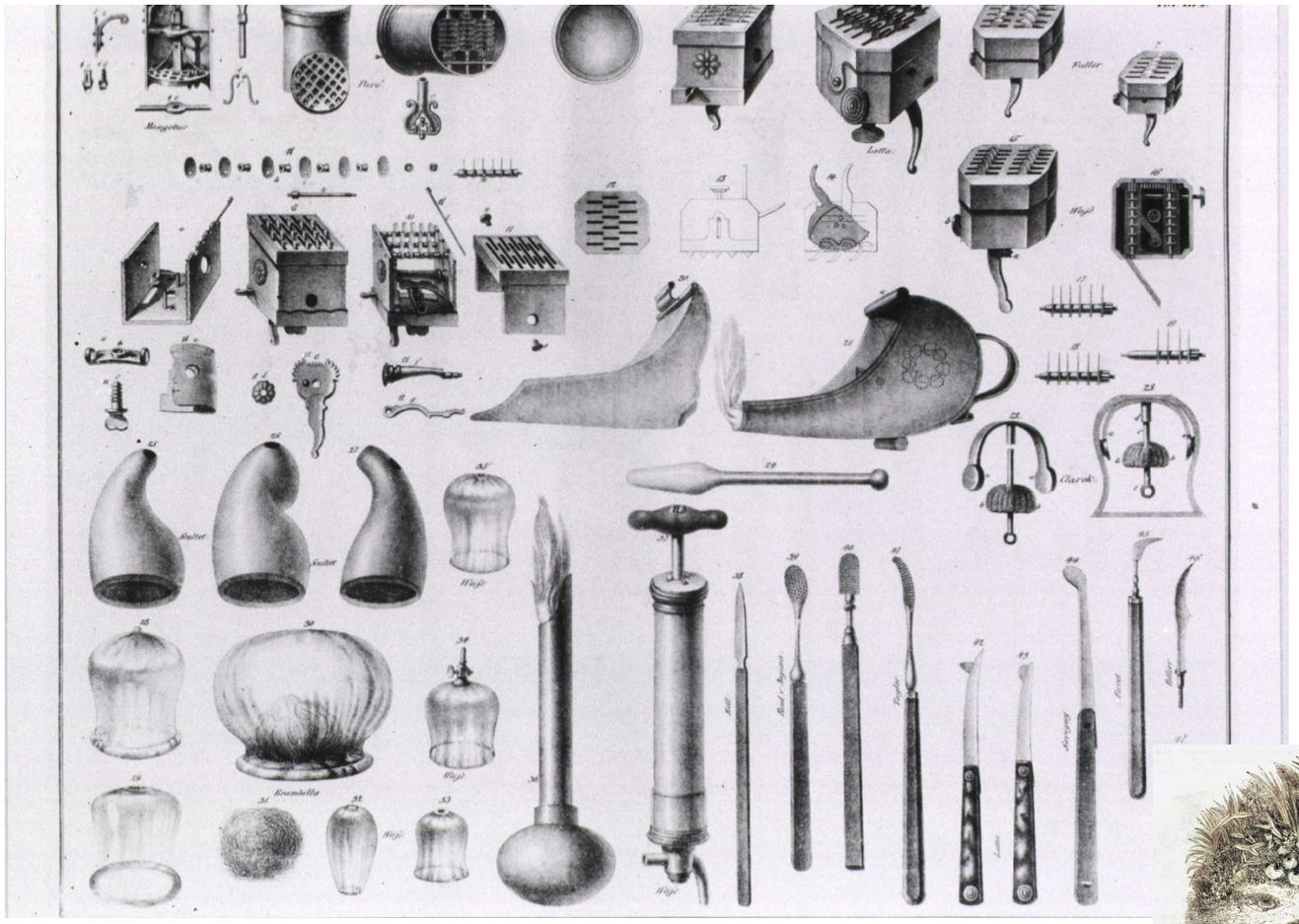
Athanasios Diamandopoulos, MD, PhD,[1] Pavlos Goudas, MD,[1] and Dimitrios Oreopoulos, MD, PhD[2]

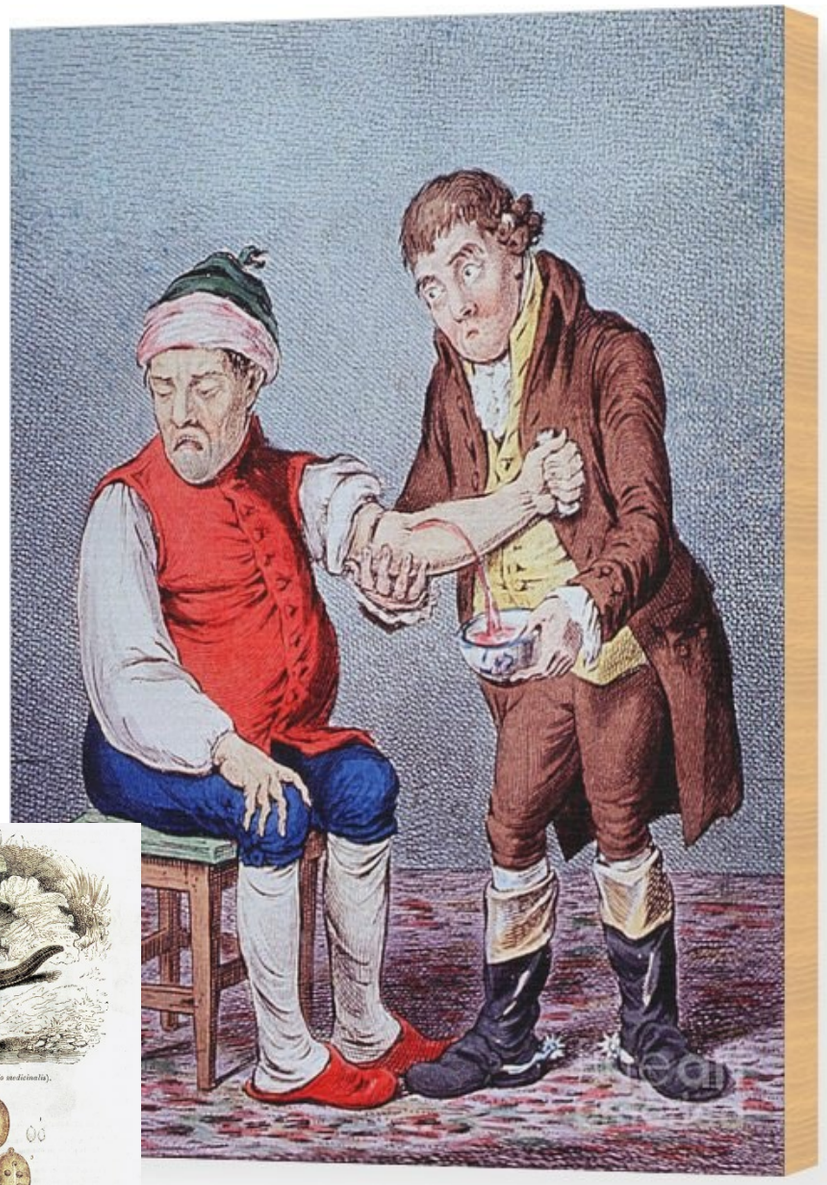
[6.36] *Venesection cures dysuria; open the internal veins of the arm.*



From the [1]Renal Department, St Andrew's State Hospital, Patras, Greece; and [2]University Health Network and University of Toronto, Toronto, Canada.

Am J Kidney Dis 54:143-153.





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The Symbolic barber pole evolved from bloodletting. White is for the bandages, red for blood and blue for veins.

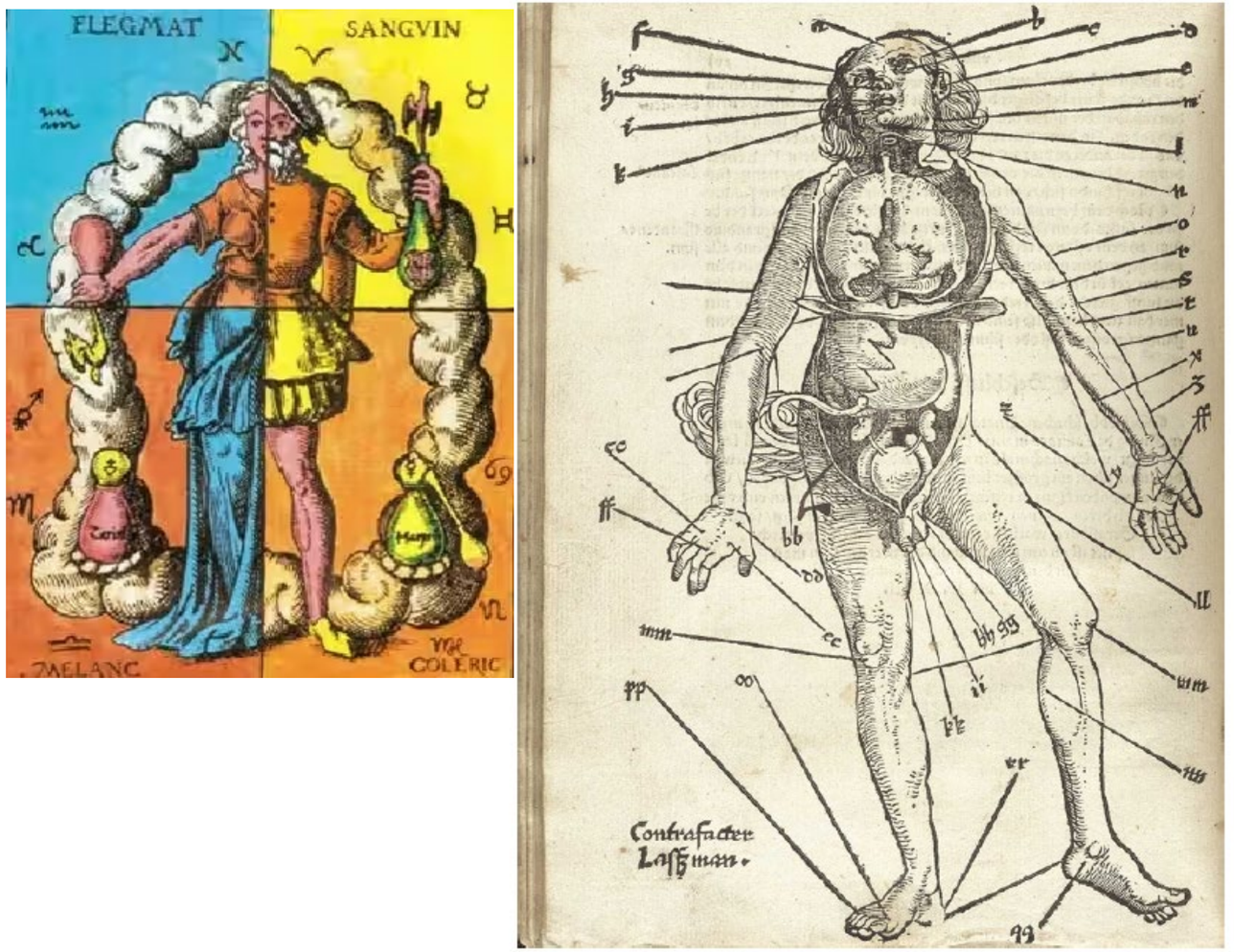
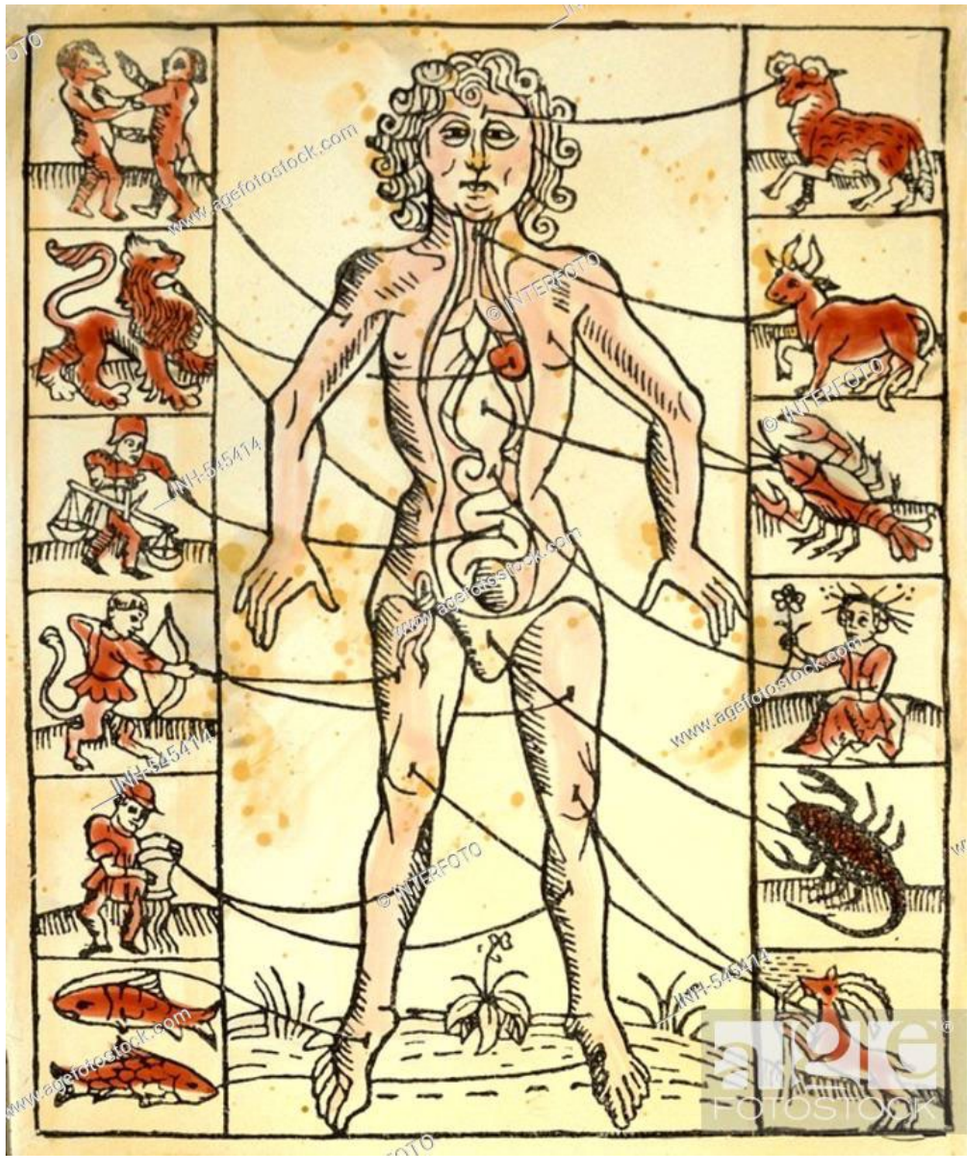


Figure 3. An illustration showing points for venesection that supposedly correlate with internal organ pathology. From a 1528 edition of Hans von Gersdorff's *Feldbůch der Wundartzney* [*Fieldbook of Surgery*], illustrator Johann Ulrich Wechtlin. Courtesy of the National Library of Medicine.[28]



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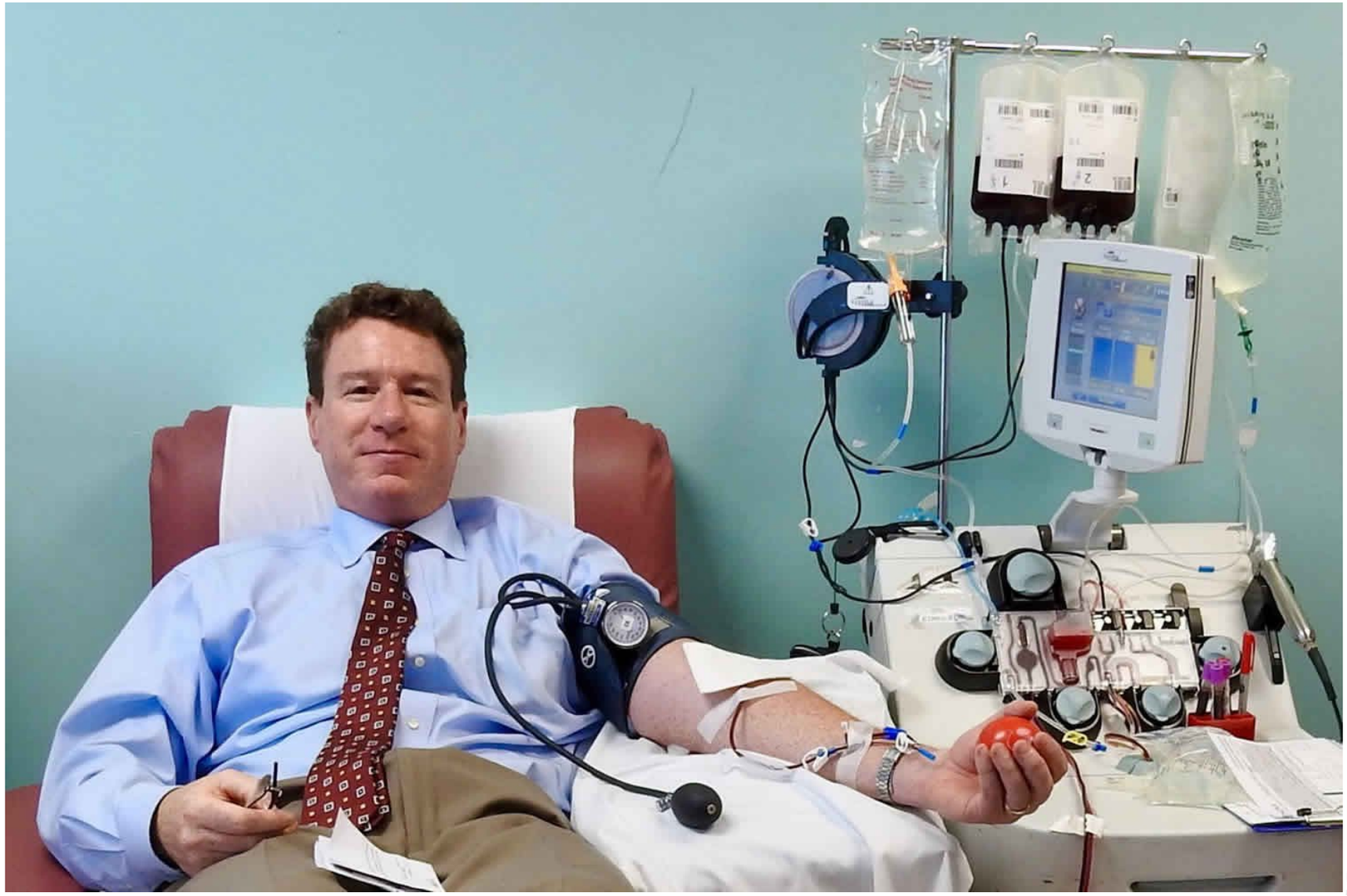
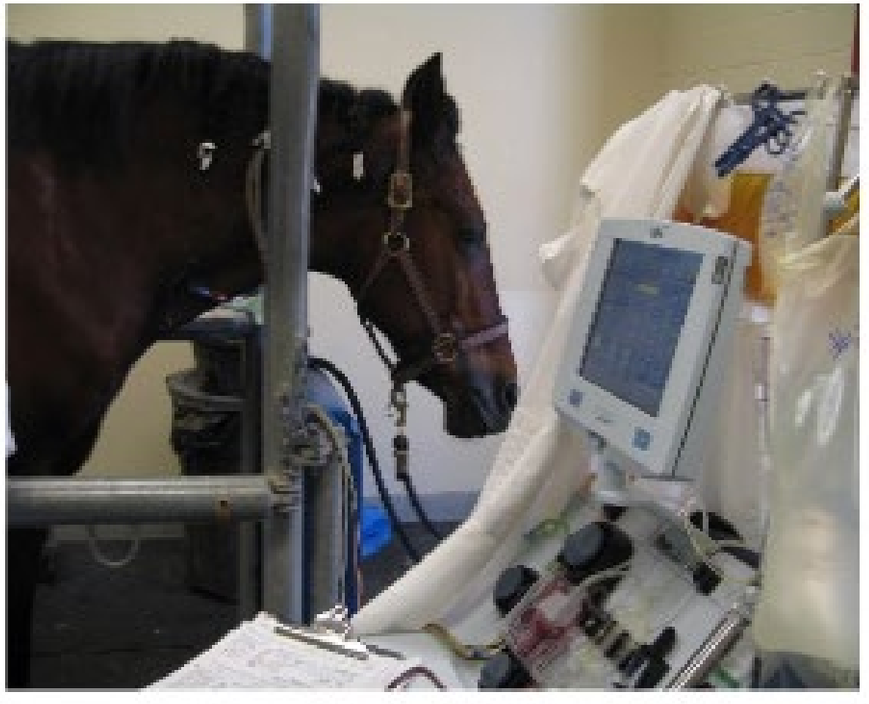
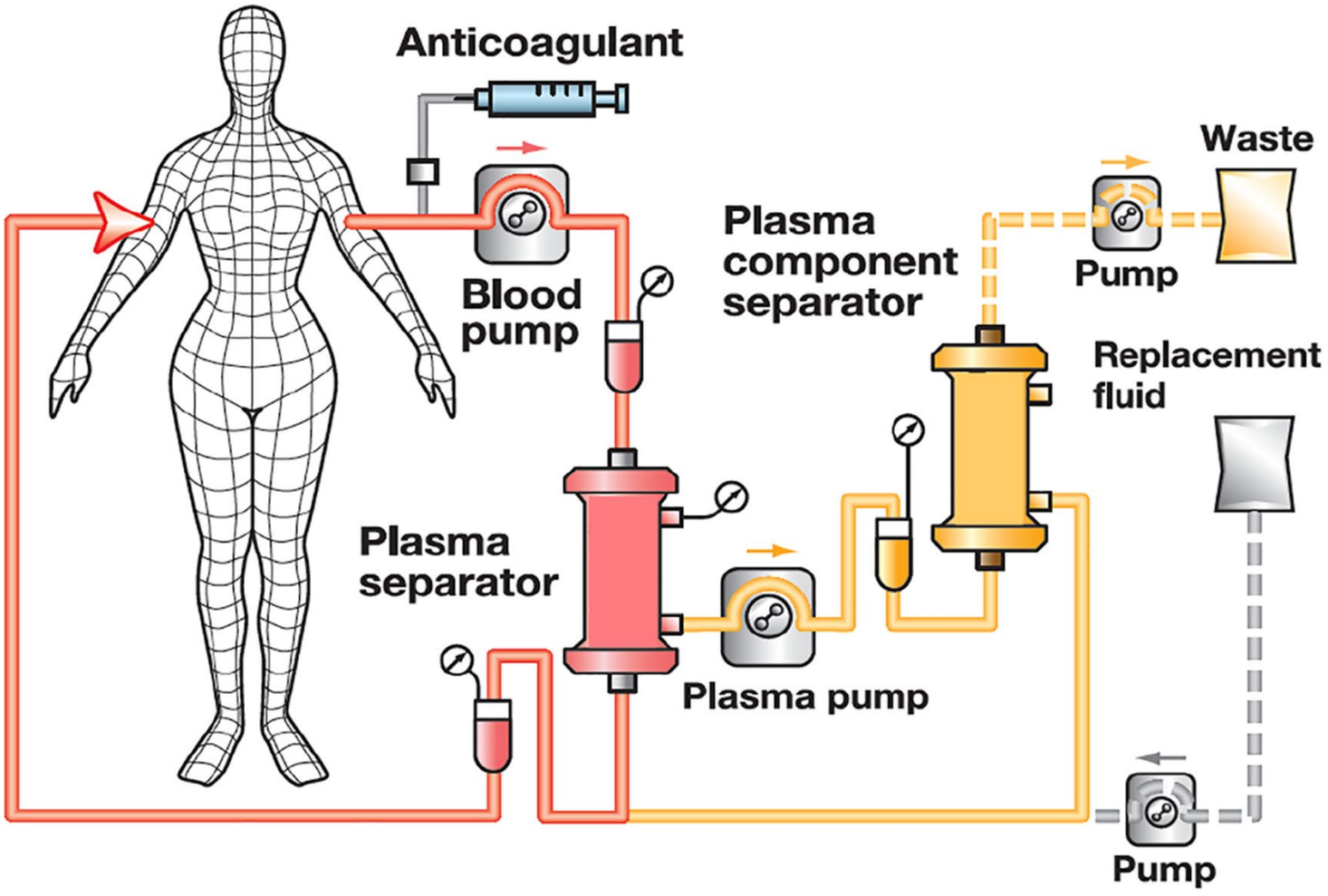




https://ucvmcsd.vetmed.ucdavis.edu/sites/g/files/dgvnsk4726/files/inline-files/therapeutic-apheresis-brochure_2.pdf


Anticoagulant
Blood pump
Plasma component separator
Waste
Pump
Replacement fluid
Plasma separator
Plasma pump
Pump

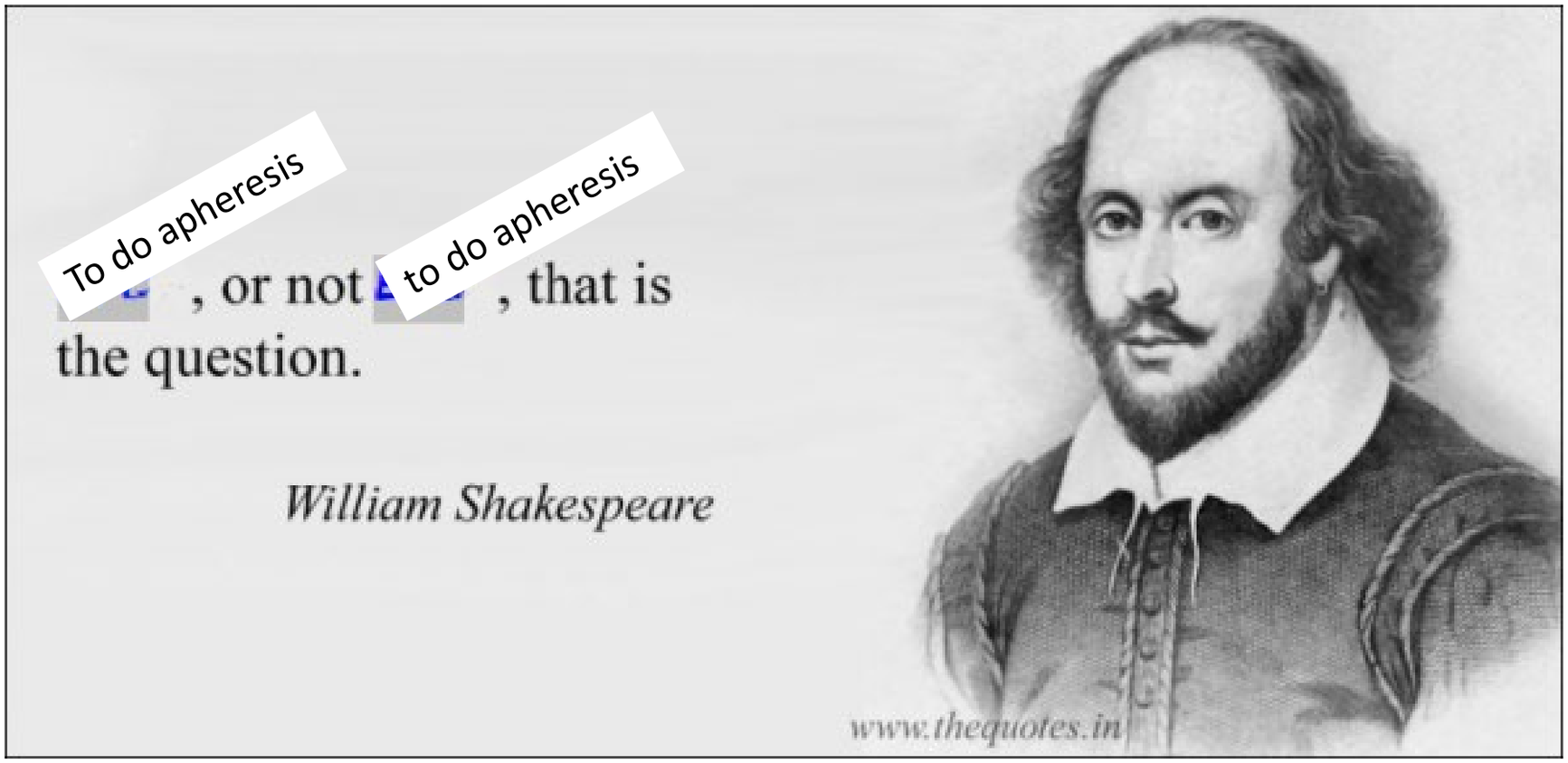
Είδη θεραπευτικής αφαίρεσης

Table 1. Apheresis Modalities

Procedure	Target Molecule
Adsorptive cytapheresis	Monocytes, granulocytes
$ß_2$-microglobulin column	$ß_2$-microglobulin
Double filtration plasmapheresis	Autoantibodies, immune complexes, lipoproteins
Erythrocytapheresis	Red blood cells
Extracorporeal photopheresis	Buffy coat (white blood cells and platelets)
Immunoadsorption	Immunoglobulins
Leukocytapheresis	White blood cells
Lipoprotein apheresis	Lipoprotein particles
Red blood cell exchange	Red blood cells (exchanged for replacement fluid)
Rheopheresis	High-molecular-weight plasma components (fibrinogen, α_2-macroglobulin, low-density lipoprotein cholesterol, and IgM)
Therapeutic plasma exchange	Plasma (exchanged for replacement fluid)
Thrombocytapheresis	Platelets

Abbreviation: IgM, immunoglobulin M.

Am J Kidney Dis. 2023, 81(4):475-492.


To do apheresis
to do apheresis
, or not , that is
the question.
William Shakespeare
www.thequotes.in

Κατευθυντήριες οδηγίες

Κατευθηντήριες οδηγίες στην Ιατρική

- Συνοψίζουν τις τρέχουσες ιατρικές γνώσεις,
- σταθμίζουν τα οφέλη και τους πιθανούς κινδύνους διαγνωστικών διαδικασιών και θεραπειών
- δίνουν συγκεκριμένες συστάσεις με βάση αυτές τις πληροφορίες.
- Βασίζονται σε επιστημονικά δεδομένα από μελέτες (evidence based medicine)
- Καμία ιατρική μελέτη δεν είναι τέλεια, και τα δεδομένα συχνά αλλάζουν
- Οι οδηγίες πρέπει να ανανεώνονται

https://www.ncbi.nlm.nih.gov/books/NBK390308/

Κατευθηντήριες οδηγίες στην Ιατρική
ΔΕΝ είναι κανόνες / νόμοι

Οι κατευθυντήριες οδηγίες **δεν είναι νομικά δεσμευτικές.**

Με άλλα λόγια, οι γιατροί δεν χρειάζεται να τις ακολουθούν εάν δεν πιστεύουν ότι είναι κατάλληλες για ορισμένους ασθενείς.

Αλλά οι αποκλίσεις από τις κατευθυντήριες γραμμές πρέπει να δικαιολογούνται.

https://www.ncbi.nlm.nih.gov/books/NBK390308/

Κατευθυντήριες οδηγίες στη θεραπευτική αφαίρεση

Guidelines

There are many indications to perform a therapeutic apheresis procedure. The ESFH is recommending to follow commonly accepted (national, international or regional) guidelines, and otherwise it is desirable to achieve IRB approval if apheresis treatment is undertaken.
Internationally recommended guidelines based on evidence based medicine are published on a regular basis by the American Society for Apheresis (www.apheresis.org) in the Journal of Clinical Apheresis. For the latest version see: **Schwartz J, et al. J Clin Apher 2016; 31: 149-338**
Link to PubMed http://www.ncbi.nlm.nih.gov/pubmed/27322218
Link to the Journal http://onlinelibrary.wiley.com/doi/10.1002/jca.v31.3/issuetoc

This information is interesting for all physicians and nurses active in the field: http://www.apheresis.org/page/QIA

WAA registry
http://www.waa-registry.org/Secure/Default.aspx

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Received: 3 September 2024 | Revised: 19 March 2025 | Accepted: 29 April 2025

DOI: 10.1111/tme.13144

TRANSFUSION MEDICINE WILEY

BSH GUIDELINE

Apheresis procedures for the treatment of patients and for the collection of cellular therapy products: A British Society for Haematology guideline

Catherine Howell[1] | Annelies Billen[2] | Therese Callaghan[3] | Kenneth Douglas[4,5] | James Griffin[6] | Davina Potok[3] | Tuula Rintala[7] | Sara Trompeter[8,9] | Robert Wynn[10] | Julia Wolf[11] | Susan Robinson[12]

The main indications for plasma exchange, with associated published evidence, are well set out in the **American Society for Apheresis (ASFA),**

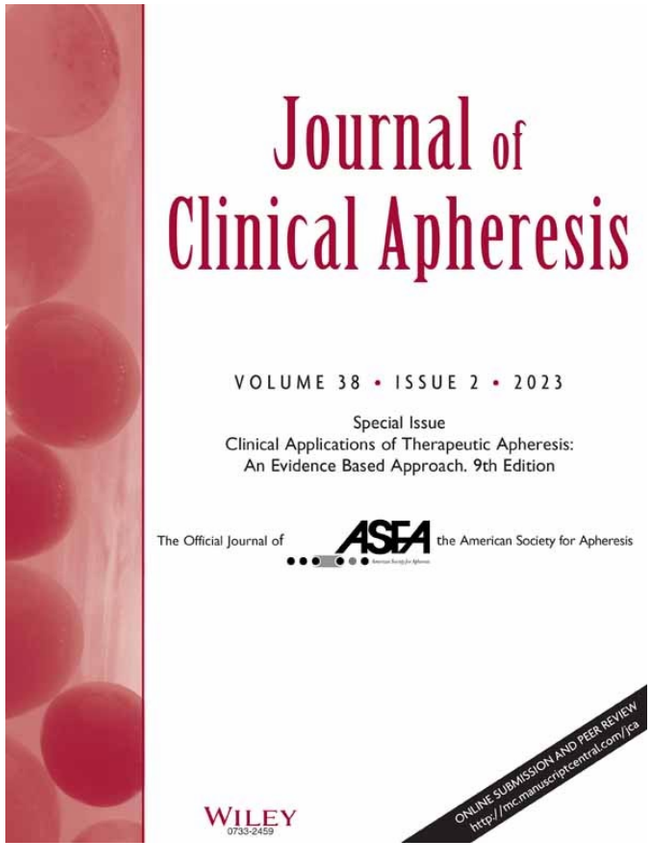
American Society for Nephrology, and Kidney Disease-Improving Global Outcomes guidelines,

5.1 | Plasma exchange

5.1.1 | Indications for plasma exchange

Plasma exchange is used to treat diseases caused by pathogenic antibodies or other macromolecules found in the plasma, or more rarely by albumin-bound small molecules (drugs or toxins) that remain predominantly intravascular. The use of plasma exchange should be evidence-based, while recognising the difficulty of conducting randomised controlled trials (RCTs) in apheresis medicine and the resultant lack of RCTs for many conditions. The main indications for plasma exchange, with associated published evidence, are well set out in the American Society for Apheresis (ASFA), American Society for Nephrology, and Kidney Disease-Improving Global Outcomes guidelines, and these indications are summarised in Table 1. The ASFA guidelines grade indications as Category I (strong evidence for first-line plasma exchange), Category II (strong evidence for second-line plasma exchange) or Category III (some evidence for second-line-plasma exchange).


ASFA
American Society for Apheresis



ASFA

American Society for Apheresis

https://www.apheresis.org/

Journal of Clinical Apheresis ASFA WILEY

Guidelines on the Use of Therapeutic Apheresis in Clinical Practice – Evidence-Based Approach from the Writing Committee of the American Society for Apheresis:

1986

1993

2000

2007

2010

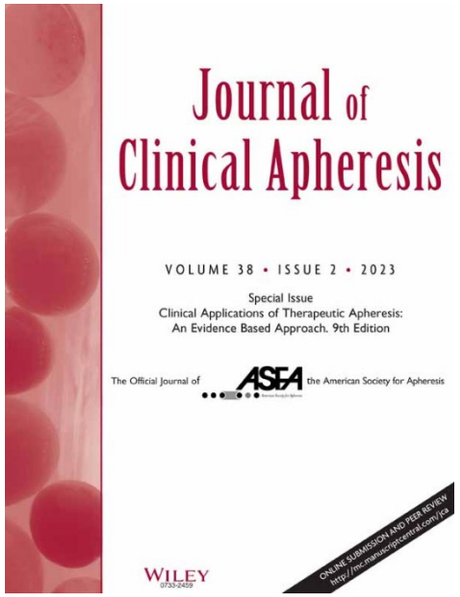
2013

2016

2019

2023

2026?



Received: 29 November 2022 | Revised: 25 January 2023 | Accepted: 27 January 2023

DOI: 10.1002/jca.22043

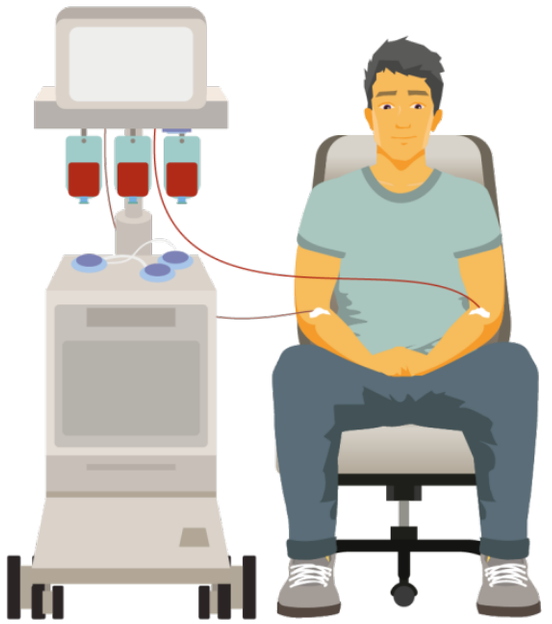
Journal of Clinical Apheresis ASFA WILEY

Guidelines on the Use of Therapeutic Apheresis in Clinical Practice – Evidence-Based Approach from the Writing Committee of the American Society for Apheresis: The Ninth Special Issue

J Clin Apher. 2023;38:77–278.

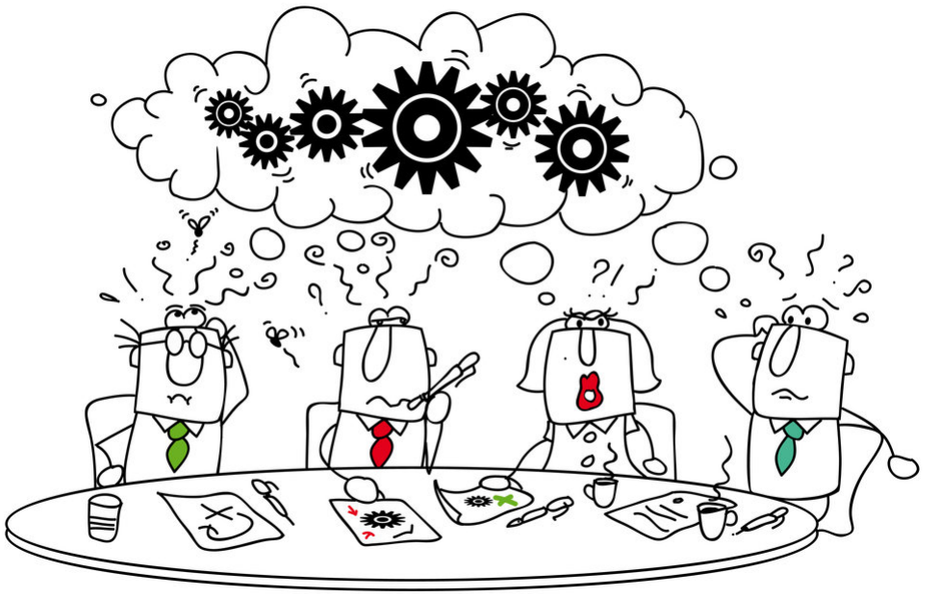
Αξιολόγηση ΘΑ σε υποψήφιο ασθενή

- Το σκεπτικό εφαρμογής (επιστημονικά δεδομένα) στη τρέχουσα διάγνωση και στο συγκεκριμένο ασθενή
- Η επίδραση της ΘΑ σε συννοσηρότητες και φαρμακευτικές αγωγές
- Τεχνικά ζητήματα (αντιπηξία, υποκατάστατο, όγκος ανταλλαγής, αγγειακή προσπέλαση)
- Αριθμός και συχνότητα συνεδριών
- Κριτήρια αξιολόγησης θεραπευτικής απόκρισης και διακοπής
- Χρόνος και τόπος εφαρμογής



J Clin Apher. 2023;38:77–278.

American Society for Apheresis (ASFA)
Journal of Clinical Apheresis (JCA)
Special Issue Writing Committee



- The current JCA Special Issue Writing Committee was formed by the co-chairs (and ratified by the ASFA board of directors) following a **formal application and selection process**.
- Members were selected to form a **geographically and clinically diverse group** with a mix of **senior, mid-level, and early-career** individuals.
- The committee includes representation of multiple medical subspecialties including **critical care, hematology/oncology, nephrology, pediatrics, and transfusion medicine** from locations across **Europe and North America.**

J Clin Apher. 2023;38:77–278.

American Society for Apheresis (ASFA)
Journal of Clinical Apheresis (JCA)

Practice – Evidence-Based Approach from the Writing Committee of the American Society for Apheresis: The Ninth Special Issue

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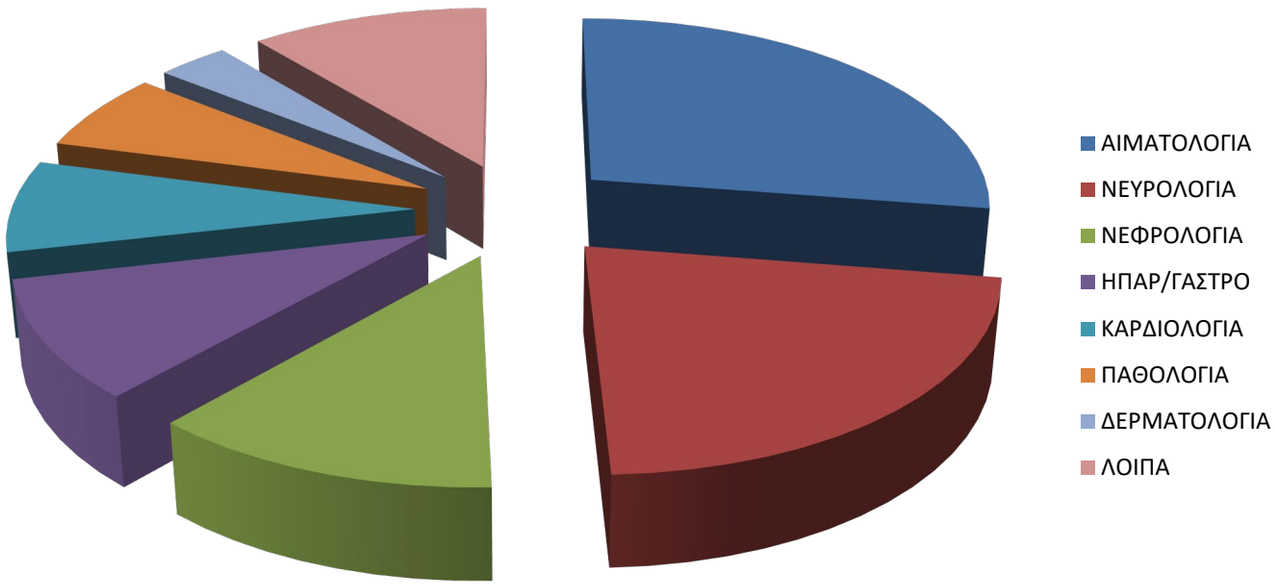

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J Clin Apher. 2023;38:77–278.

TABLE 1 Category and grade recommendations for therapeutic apheresis.

Disease/condition	Indication	Procedure	Category	Grade	Page
Acute disseminated encephalomyelitis	Steroid refractory	TPE	II	2C	95
Acute inflammatory demyelinating polyradiculoneuropathy	Primary treatment	TPE	I	1A	97
		IA	I	1B	
Acute liver failure	Acute liver failure	TPE-HV	I	1A	99
		TPE	III	2B	
	Acute fatty liver of pregnancy[a]	TPE	III	2B	
Acute toxins, venoms and poisons	Mushroom poisoning	TPE	II	2C	101
	Envenomation	TPE	III	2C	
	Other[a]	TPE/RBC exchange	III	2C	
Age related macular degeneration	Dry, high risk	DFPP	III	2B	103
Alzheimer's disease[a]	Mild or moderate	TPE	III	2A	105
Amyloidosis, systemic, dialysis related		β_2-microglobulin adsorption	II	2B	107
Anti-glomerular basement membrane disease	Diffuse alveolar hemorrhage	TPE	I	1C	109
	Dialysis-independence	TPE	I	1B	
	Dialysis-dependence, no diffuse alveolar hemorrhage	TPE	III	2B	
Atopic dermatitis, recalcitrant		ECP/IA/TPE/DFPP	III	2B	111
Autoimmune dysautonomia[a]		TPE	III	2C	113
Autoimmune hemolytic anemia, severe	Severe cold agglutinin disease	TPE	II	2C	115
	Severe warm autoimmune hemolytic anemia	TPE	III	2C	
Babesiosis	Severe	RBC exchange	III	2C	117
Burn shock resuscitation		TPE	III	2B	119
Cardiac neonatal lupus		TPE	III	2C	121
Catastrophic antiphospholipid syndrome		TPE	I	2C	123
Chronic acquired demyelinating polyneuropathies	IgG/IgA/IgM related	TPE	I	1B	125
	Anti-myelin-associated glycoprotein	TPE	III	1C	
	CANOMAD/CANDA[a]	TPE	III	2C	
Chronic focal encephalitis		TPE/IA	III	2C	127
Chronic inflammatory demyelinating polyradiculoneuropathy		TPE/IA	I	1B	129
Coagulation factor deficiency and inhibitors		IA	III	2B	131
		TPE	III	2C	
Complex regional pain syndrome	Chronic	TPE	III	2C	133
Cryoglobulinemia	Severe/symptomatic	TPE/DFPP	II	2A	135
		IA	II	2B	
Cutaneous T-cell lymphoma	Erythrodermic mycosis fungoides/ Sézary syndrome	ECP	I	1B	137
	Non-erythrodermic mycosis fungoides	ECP	III	2B	
Dilated cardiomyopathy, idiopathic	NYHA functional classification II-IV	IA	II	1B	139
		TPE	III	2C	
Erythrocytosis	Polycythemia vera	Erythrocytapheresis	I	1B	141
	Secondary erythrocytosis	Erythrocytapheresis	III	1C	
Erythropoietic protoporphyria, liver disease		TPE/RBC exchange	II	2C	143
Familial hypercholesterolemia	Homozygotes	LA	I	1A	145
	Heterozygotes	LA	II	1A	
	All patients	TPE	II	1B	
Focal segmental glomerulosclerosis	Recurrent in kidney transplant	TPE/IA	I	1B	147
	All types	LA	II	2C	
	Steroid resistant in native kidney	TPE	III	2C	
Graft-versus-host disease	Acute	ECP	II	1B	149
	Chronic	ECP	II	1B	
Hemophagocytic lymphohistiocytosis		TPE	III	2C	151
Heparin-induced thrombocytopenia and thrombosis	Pre-procedure	TPE/IA	III	2C	153
	Refractory or with thrombosis	TPE	III	2C	
Hereditary hemochromatosis		Erythrocytapheresis	I	1B	155
Hyperleukocytosis		Leukocytapheresis	III	2B	157
Hypertriglyceridemic pancreatitis	Severe	TPE/LA	III	1C	159
	Prevention of relapse	TPE/LA	III	2C	
Hyperviscosity in hypergammaglobulinemia	Symptomatic	TPE	I	1B	161
	Prophylaxis for rituximab	TPE	I	1C	
Idiopathic inflammatory myopathies[a]	Anti-synthetase-syndrome	TPE	III	2B	163
	Clinically amyopathic dermatomyositis	TPE	III	2B	
	Immune-mediated necrotizing myopathies	TPE	III	2B	
IgA nephropathy	Crescentic	TPE	III	2B	165
	Chronic progressive	TPE	III	2C	
Immune checkpoint inhibitors, immune-related adverse events[a]		TPE	III	2C	167
Immune thrombocytopenia	Refractory	TPE/IA	III	2C	169
Inflammatory bowel disease	Ulcerative colitis	Adsorptive cytapheresis	II	1B	171
	Crohn's disease	Adsorptive cytapheresis	III	1B	
		ECP	III	2C	
Lambert-Eaton myasthenic syndrome		TPE	II	2C	173
Lipoprotein(a) hyperlipoproteinemia	Progressive atherosclerotic cardiovascular disease	LA	II	1B	175
Malaria	Severe	RBC exchange	III	2B	177
Multiple sclerosis	Acute attack/relapse	TPE	II	1A	179
		IA	II	1B	
	Chronic primary or secondary progressive	TPE/IA	III	2B	
Myasthenia gravis	Acute, short-term treatment	TPE/DFPP/IA	I	1B	181
	Long-term treatment	TPE/DFPP/IA	II	2B	

(Continues)

TABLE 1 Category and grade recommendations for therapeutic apheresis.

Disease/condition	Indication	Procedure	Category	Grade	Page
Acute disseminated encephalomyelitis	Steroid refractory	TPE	II	2C	95

TABLE 2 Category definitions for therapeutic apheresis

Category	Description

Abbreviation: IRB, Institutional Review Board.

TABLE 2 Category definitions for therapeutic apheresis

Category	Description
I	Disorders for which apheresis is accepted as first-line therapy, either as a primary standalone treatment or in conjunction with other modes of treatment.

Abbreviation: IRB, Institutional Review Board.

TABLE 2 Category definitions for therapeutic apheresis

Category	Description
I	Disorders for which apheresis is accepted as first-line therapy, either as a primary standalone treatment or in conjunction with other modes of treatment.
II	Disorders for which apheresis is accepted as second-line therapy, either as a standalone treatment or in conjunction with other modes of treatment.

Abbreviation: IRB, Institutional Review Board.

TABLE 2 Category definitions for therapeutic apheresis

Category	Description
I	Disorders for which apheresis is accepted as first-line therapy, either as a primary standalone treatment or in conjunction with other modes of treatment.
II	Disorders for which apheresis is accepted as second-line therapy, either as a standalone treatment or in conjunction with other modes of treatment.
III	Optimum role of apheresis therapy is not established. Decision-making should be individualized.

Abbreviation: IRB, Institutional Review Board.

TABLE 2 Category definitions for therapeutic apheresis

Category	Description
I	Disorders for which apheresis is accepted as first-line therapy, either as a primary standalone treatment or in conjunction with other modes of treatment.
II	Disorders for which apheresis is accepted as second-line therapy, either as a standalone treatment or in conjunction with other modes of treatment.
III	Optimum role of apheresis therapy is not established. Decision-making should be individualized.
IV	Disorders in which published evidence demonstrates or suggests apheresis to be ineffective or harmful. IRB/Ethics Committee approval is desirable if apheresis treatment is undertaken in these circumstances.

Abbreviation: IRB, Institutional Review Board.

TABLE 1 Category and grade recommendations for therapeutic apheresis.

Disease/condition	Indication	Procedure	Category	Grade	Page
Acute disseminated encephalomyelitis	Steroid refractory	TPE	II	2C	95

TABLE 3 Grading recommendations, strength and quality of evidence

Recommendation	Description	Methodological quality of supporting evidence	Implications
Grade 1A	Strong recommendation, high-quality evidence	RCTs without important limitations or overwhelming evidence from observational studies	Strong recommendation, can apply to most patients in most circumstances without reservation
Grade 1B	Strong recommendation, moderate quality evidence	RCTs with important limitations (inconsistent results, methodological flaws, indirect, or imprecise) or exceptionally strong evidence from observational studies	Strong recommendation, can apply to most patients in most circumstances without reservation
Grade 1C	Strong recommendation, low-quality or very low-quality evidence	Observational studies or case series	Strong recommendation but may change when higher-quality evidence becomes available
Grade 2A	Weak recommendation, high-quality evidence	RCTs without important limitations or overwhelming evidence from observational studies	Weak recommendation, best action may differ depending on circumstances or patients' or societal values
Grade 2B	Weak recommendation, moderate-quality evidence	RCTs with important limitations (inconsistent results, methodological flaws, indirect, or imprecise) or exceptionally strong evidence from observational studies	Weak recommendation, best action may differ depending on circumstances or patients' or societal values
Grade 2C	Weak recommendation, low-quality or very low-quality evidence	Observational studies or case series	Very weak recommendations; other alternatives may be equally reasonable

Abbreviation: RCT, randomized controlled trial.

Source: Adopted from References 1 and 2.

ACUTE INFLAMMATORY DEMYELINATING POLYRADICULONEUROPATHY

Incidence: 1 to 2/100,000/year					
Indication	**Procedure**	**Category**		**Grade**	
Primary treatment	TPE	I		1A	
	IA	I		1B	
# reported patients: >300	**Procedure**	**RCT**	**CT**	**CS**	**CR**
	TPE	21 (1874)	0	NA	NA
	IA	0	1 (39)	6 (105)	NA

ACUTE INFLAMMATORY DEMYELINATING POLYRADICULONEUROPATHY

Incidence: 1 to 2/100,000/year					
Indication	**Procedure**	**Category**		**Grade**	
Primary treatment	TPE	I		1A	
	IA	I		1B	
# reported patients: >300	**Procedure**	**RCT**	**CT**	**CS**	**CR**
	TPE	21 (1874)	0	NA	NA
	IA	0	1 (39)	6 (105)	NA

CATASTROPHIC ANTIPHOSPHOLIPID SYNDROME

Incidence: ~5 cases per 10,000,000 persons per year; 584 patients in registry as of December 2021				
Procedure	**Category**		**Grade**	
TPE	I		2C	
# reported patients: 100 to 300	**RCT**	**CT**	**CS**	**CR**
	0	0	8 (254)*	NA

TPE 29%
NO TPE 75%

*Includes registry data, which includes cases reported directly to the registry and/or published CRs and CS through December 2021 (López-Benjume, 2022) and additional subsequent published CS

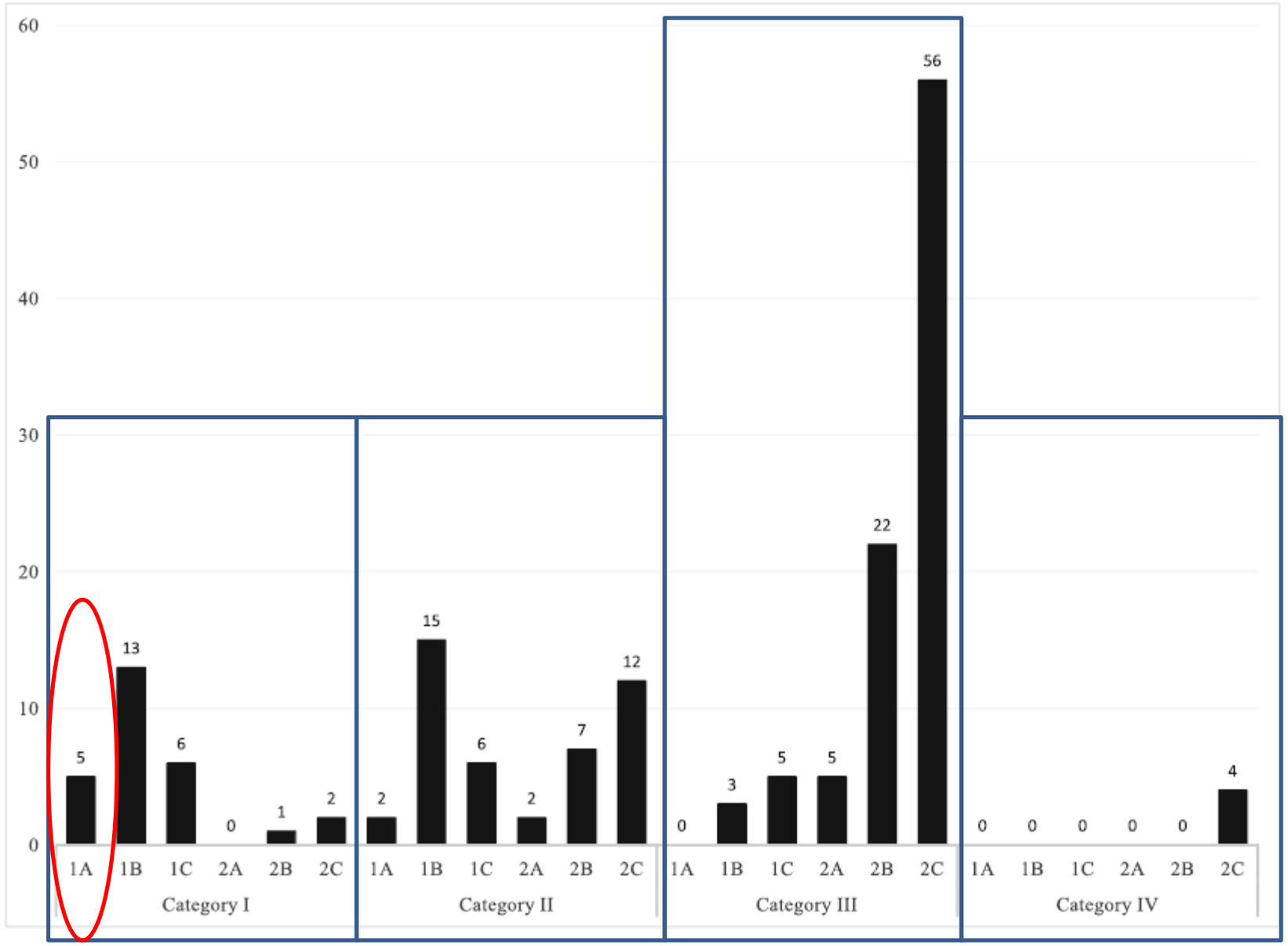


FIGURE 3 Category and grade distribution in the 2023 Special Issue.

Acute inflammatory demyelinating polyradiculoneuropathy (Guillain Barre syndrome)	Primary treatment	TPE	I	1A

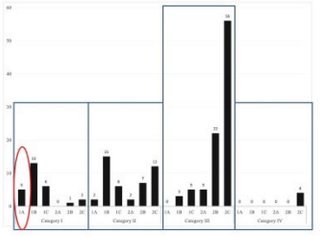


FIGURE 3 Category and grade distribution in the 2023 Special Issue.

Acute inflammatory demyelinating polyradiculoneuropathy (Guillain Barre syndrome)	Primary treatment	TPE	I	1A
Acute liver failure	Acute liver failure	TPE-HV	I	1A

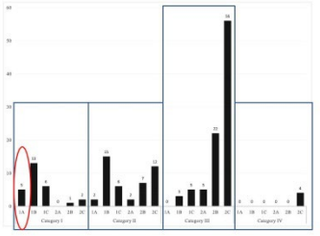
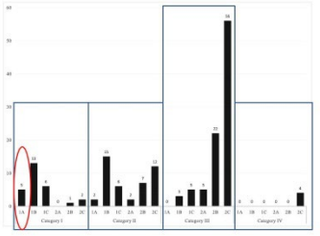


FIGURE 3 Category and grade distribution in the 2023 Special Issue.

Acute inflammatory demyelinating polyradiculoneuropathy (Guillain Barre syndrome)	Primary treatment	TPE	I	1A
Acute liver failure	Acute liver failure	TPE-HV	I	1A
Familial hypercholesterolemia	Homozygotes	LA	I	1A



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Acute inflammatory demyelinating polyradiculoneuropathy (Guillain Barre syndrome)	Primary treatment	TPE	I	1A
Acute liver failure	Acute liver failure	TPE-HV	I	1A
Familial hypercholesterolemia	Homozygotes	LA	I	1A
Sickle cell disease, non-acute	Stroke prophylaxis	RBC exchange	I	1A

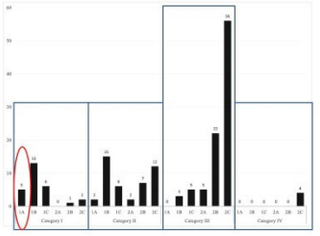


FIGURE 3 Category and grade distribution in the 2023 Special Issue.

Acute inflammatory demyelinating polyradiculoneuropathy	Primary treatment	TPE	I	1A
Acute liver failure	Acute liver failure	TPE-HV	I	1A
Familial hypercholesterolemia	Homozygotes	LA	I	1A
Sickle cell disease, non-acute	Stroke prophylaxis	RBC exchange	I	1A
Thrombotic microangiopathy, thrombotic thrombocytopenic purpura		TPE	I	1A

(Guillain Barre syndrome)

ADAMTS13 related

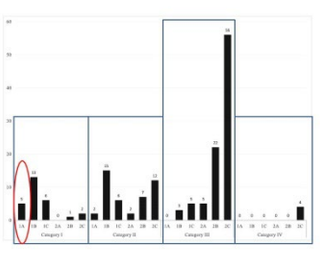
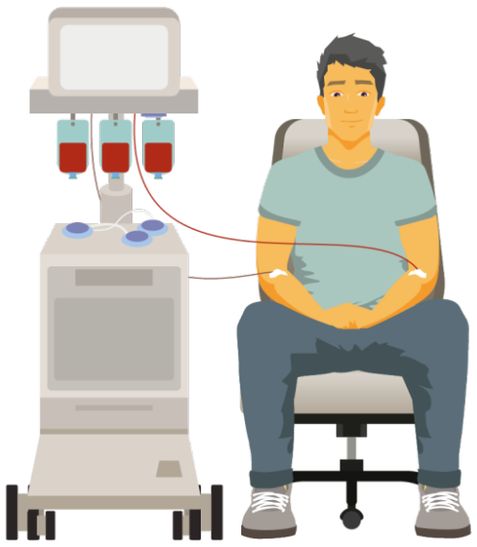
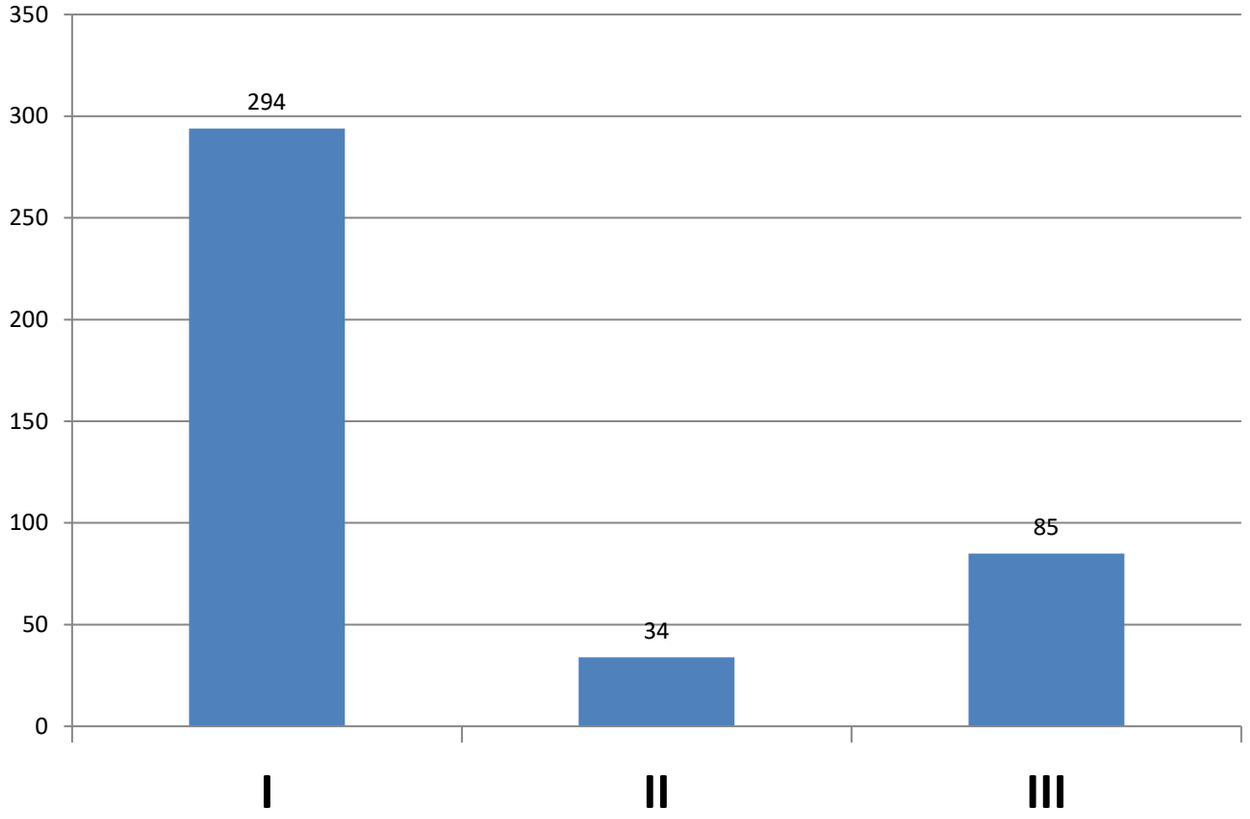
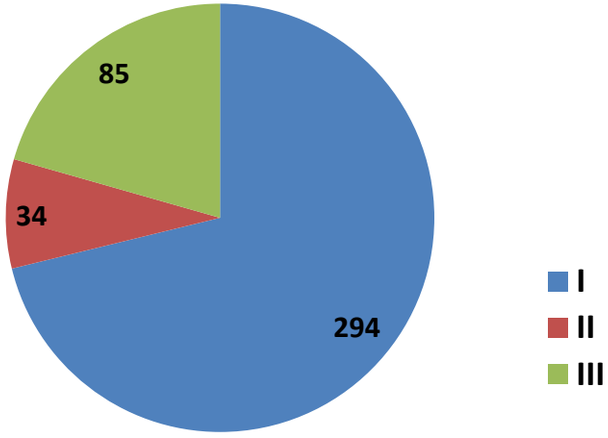


FIGURE 3 Category and grade distribution in the 2023 Special Issue.

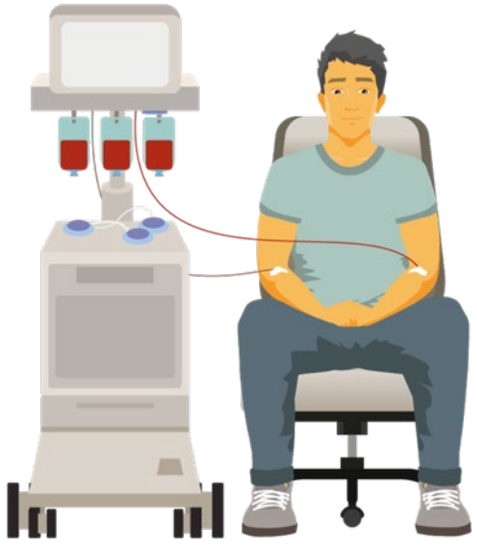
2003 – 2023
413 ΕΝΕΔΕΙΞΕΙΣ ΘΑ



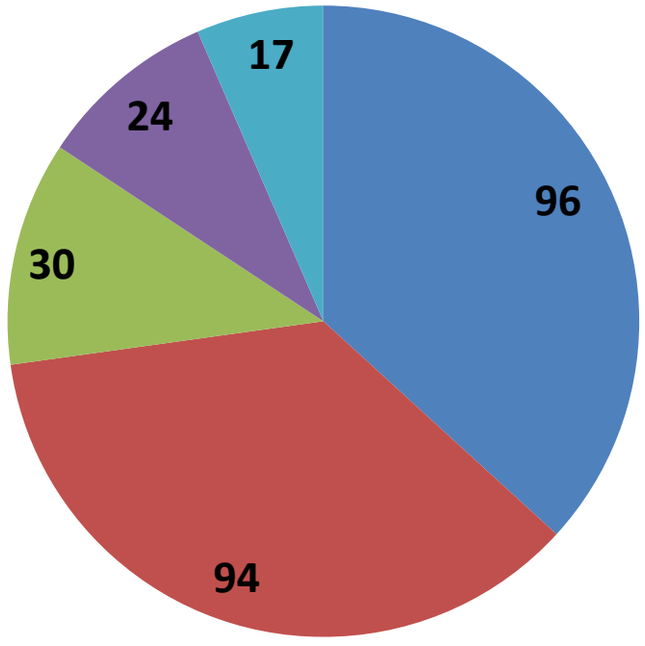




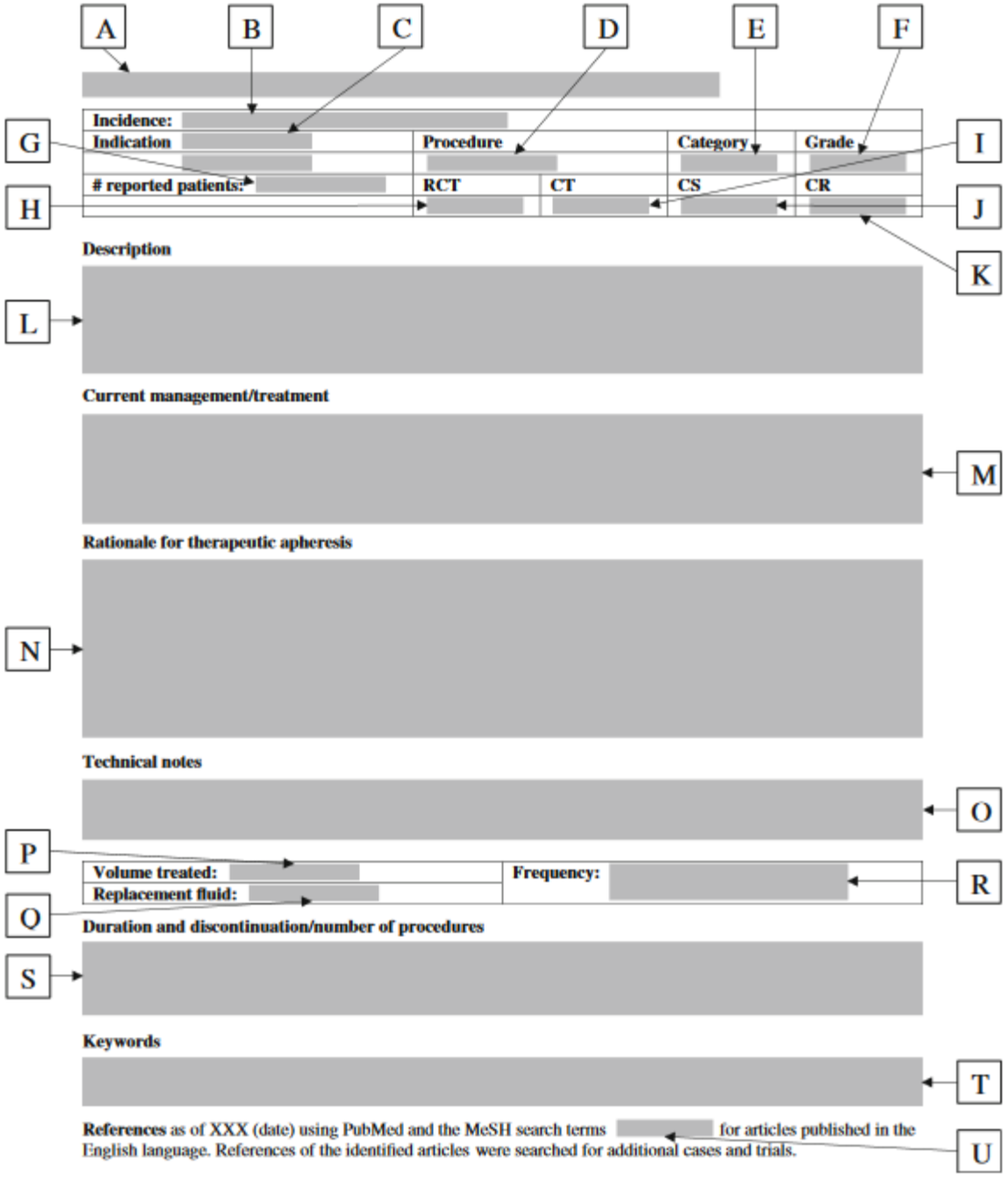
2003 – 2023
413 ΕΝΕΔΕΙΞΕΙΣ ΘΑ



Οι 5 συχνότερες διαγνώσεις



- Guillain Barre syndrome
- TTP
- Myasthenia Gravis
- Hypervicosity syndrome
- Neuromyelitis optica


A
B
C
D
E
F
Incidence:
Indication
Procedure
Category
Grade
reported patients:
RCT
CT
CS
CR
G
H
I
J
K
Description
L
Current management/treatment
M
Rationale for therapeutic apheresis
N
Technical notes
O
P
Volume treated:
Replacement fluid:
Frequency:
R
O
Duration and discontinuation/number of procedures
S
Keywords
T
References as of XXX (date) using PubMed and the MeSH search terms for articles published in the English language. References of the identified articles were searched for additional cases and trials.
U

Συμπερασματικά

- Οι κατευθυντήριες οδηγίες για την πλασμαφαίρεση **έχουν σημασία** επειδή:

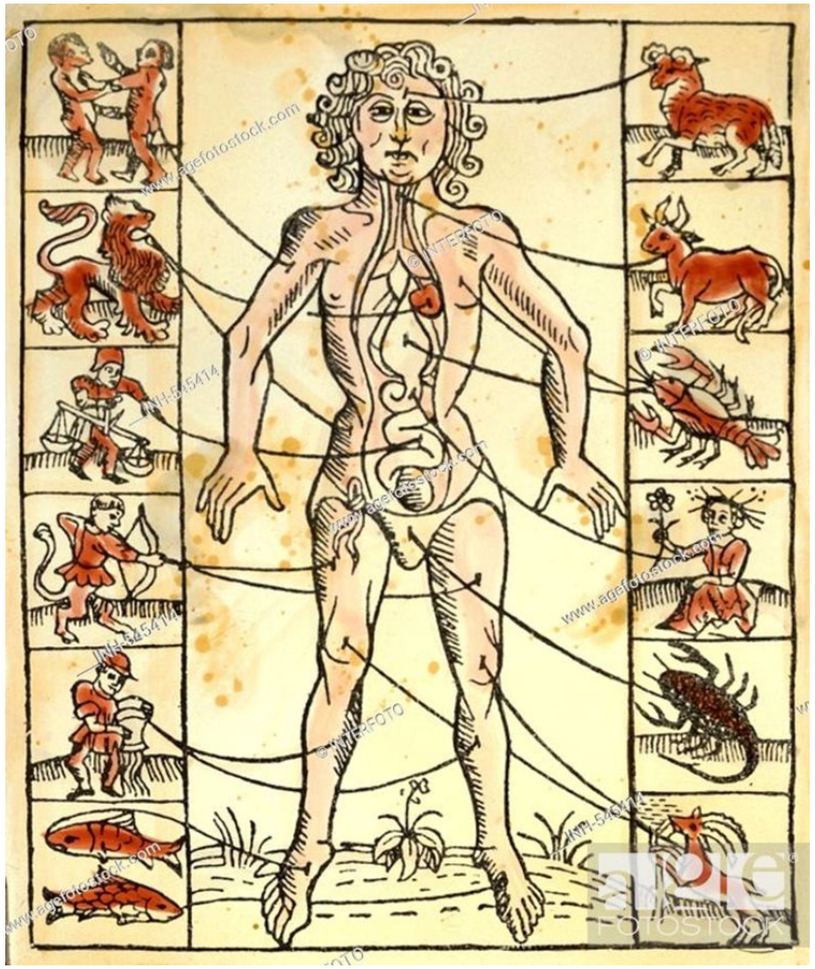
- διασφαλίζουν την **κατά το δυνατόν και σύμφωνα με την τρέχουσα γνώση** ασφαλή, αποτελεσματική και σωστή εκτέλεση της διαδικασίας.
- Βοηθούν στην καθιέρωση προτύπων για
  - την επιλογή κατάλληλων ασθενών,
  - τη στιγμή και τον τρόπο και **τη διάρκεια** διεξαγωγής της πλασμαφαίρεσης,
  - καθώς και της διαχείρισης τυχόν επιπλοκών.
- Επιπλέον, προάγουν την ομοιομορφία στη φροντίδα και διασφαλίζουν ότι η διαδικασία πραγματοποιείται σύμφωνα με την τρέχουσα επιστημονική γνώση και τις βέλτιστες πρακτικές, προς όφελος των ασθενών.

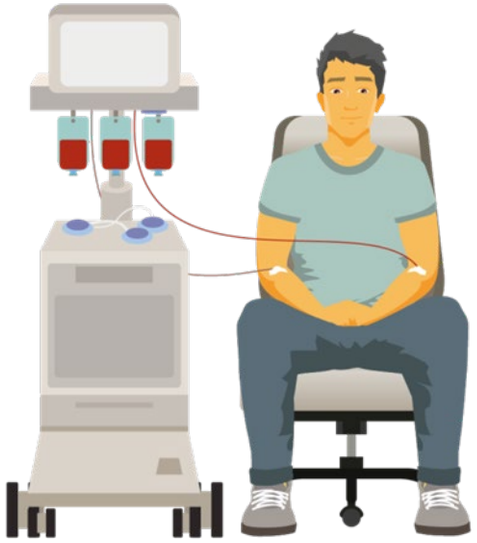
BUSINESS INSIDER

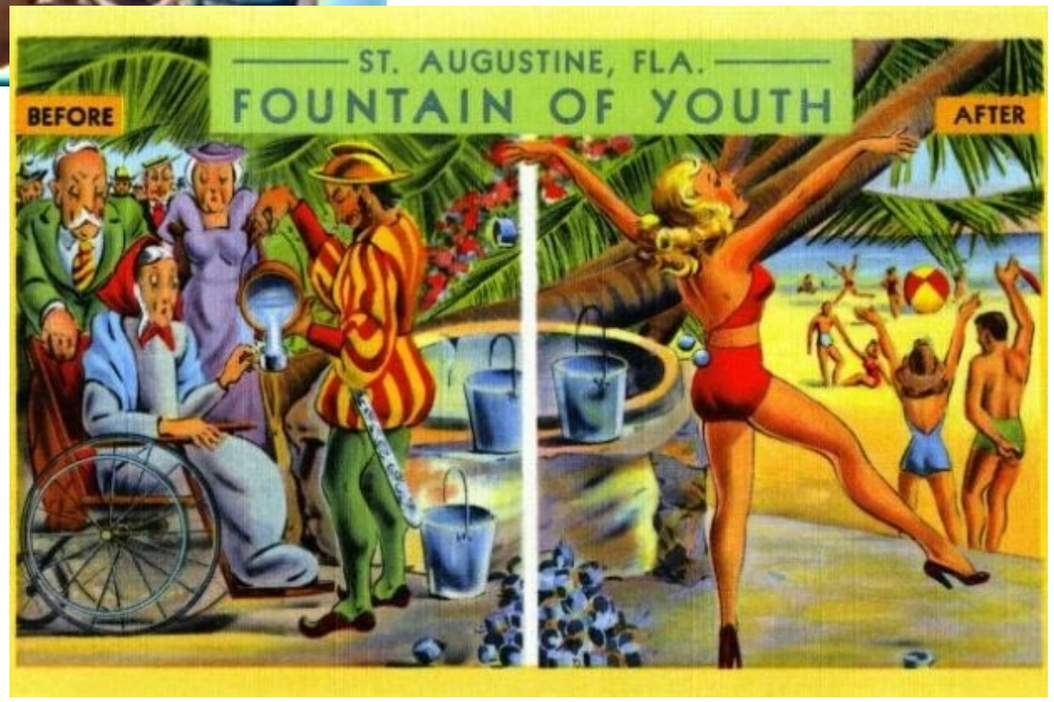
HEALTH

The hot new longevity treatment for aging athletes and CEOs is a plasma exchange

By Gabby Landsverk + Follow







ΕΥΧΑΡΙΣΤΩ ΓΙΑ ΤΗΝ ΠΡΟΣΟΧΗ ΣΑΣ