

RHEOPHERESIS: a treatment for peripheral arterial disease

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BACKGROUND

- Many patients suffer from peripheral occlusive arterial disease, resulting of atherosclerotic plate deposits
↳ *serious ulcerations, gangrene and/or amputation*
- Traditional treatment (trophic care, medecine and surgery) is not always effective
- Medical collegial discussion
- A new treatment: rheopheresis
- Since april 2015: Implantation in our haemodialysis and apheresis unit

OBJECTIVES

- According to Poiseuille law*, an elevation in blood viscosity increases its flux resistance and reduces blood flow, especially the micro circulatory level
- How to allow a better blood flow in periphery?
- Several possibilities
 - Medical: Iloprost® (vasodilatator substance)
 - Surgery: angioplasty, sympathectomy
 - Hyperbaric oxygen therapy
 - Rheopheresis (Double Filtration Plasmapheresis):

* which describes the laminar flow of viscous liquid in a cylindrical conduct)



DFFP OBJECTIVES

- Increase the venous perfusion
- Improve ematic viscosity (haemorheology)
- Decrease the plasma concentration
- Reduce high weight molecules:
 - alpha2 macroglobulin, fibrinogen and lipoproteins

DFPP INTEREST

- Improve tissue oxygenation
- Act on the evolution of lesions
- Facilitate healing
- Reduce the amplitude of amputation
- Decrease pain and thus reduce analgesic treatment

RHEOPHERISIS PROTOCOL

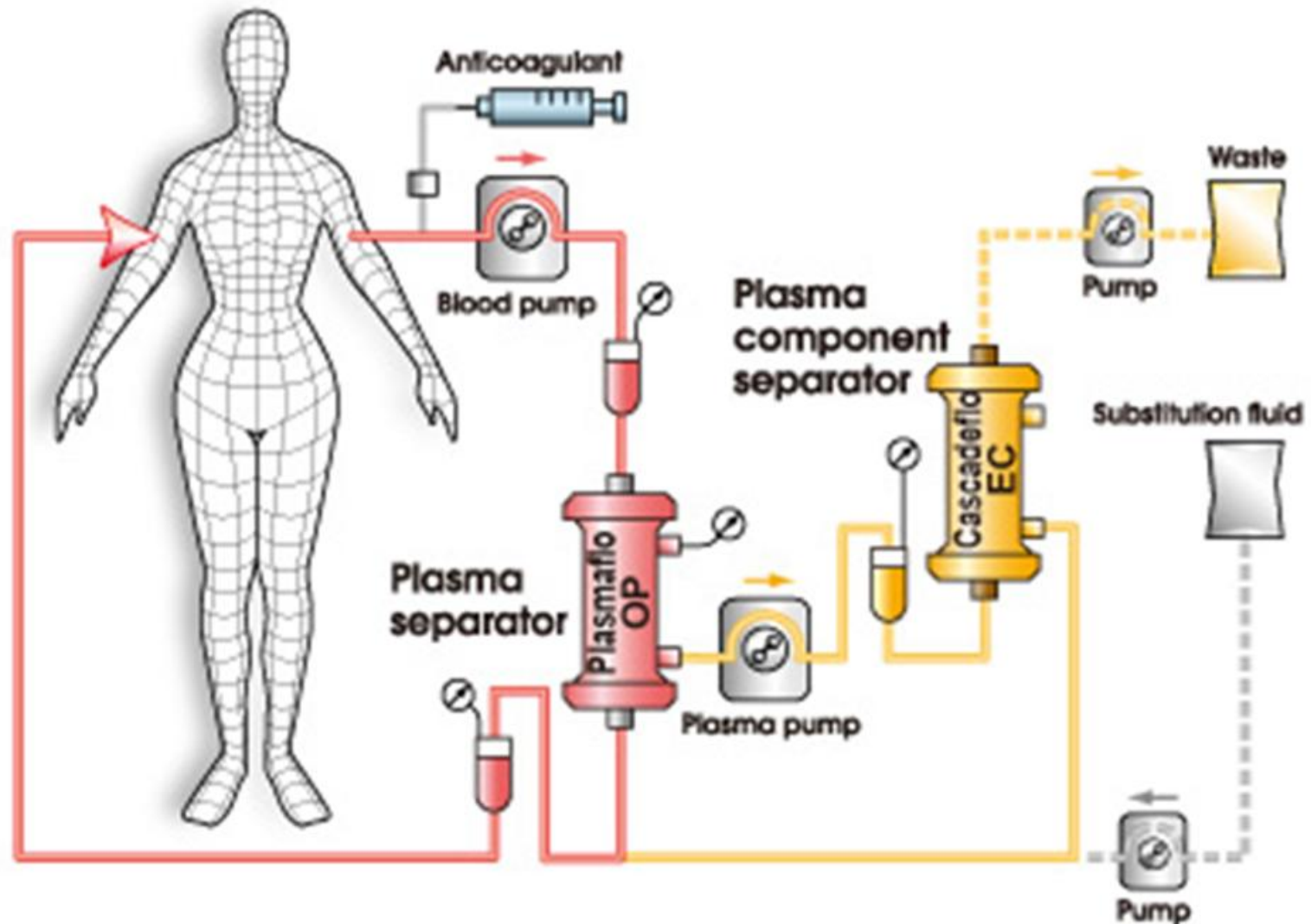
- 2 weeks : 3 sessions a week
- 2 weeks : 2 sessions a week
- 3 months : 1 session a week
- 3 months: 1 session every two weeks
- Blood tests pre and post at the beginning of each new cycle
- Coordination with healing center before, during and after treatment
- Photo kinetic

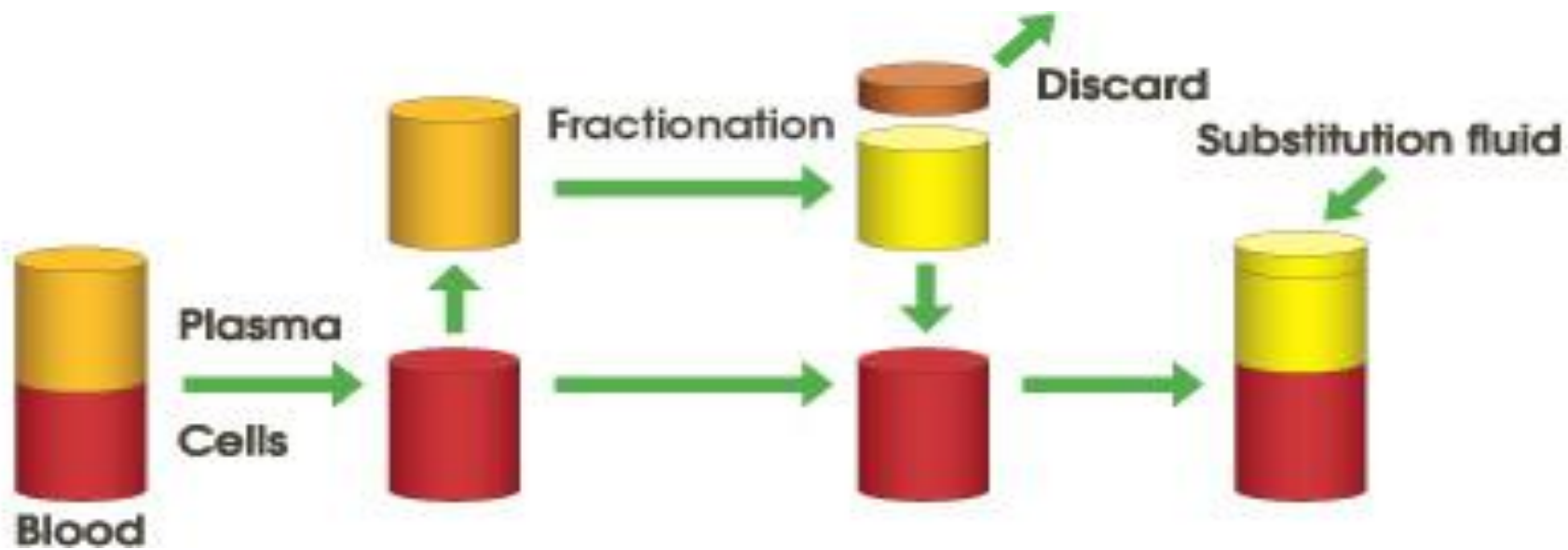
TECHNIQUE AND DEVICES

- Extracorporeal circulation
- Access: central venous catheter / arteriovenous fistula
- Equipment :
 - Plasma separator filter (Plasmaflo®)
 - Plasma treatment filter (ER-4000®)
 - Plasauto® Monitor: management of blood and plasmatic circuit
 - Disposable medical device
- Citrate anticoagulation on the draw
- Calcium chloride compensation on the venous return
- Plasma mass treated: 1,5
- Monitoring of clinical and laboratory parameters (blood results, TcPO₂)
- Albumin substitution: 20gr
- No coagulation factor compensation



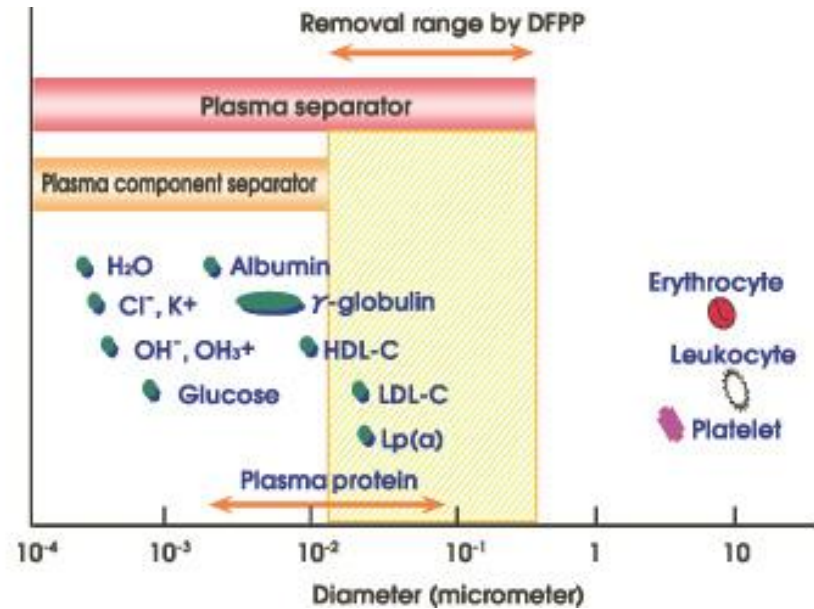
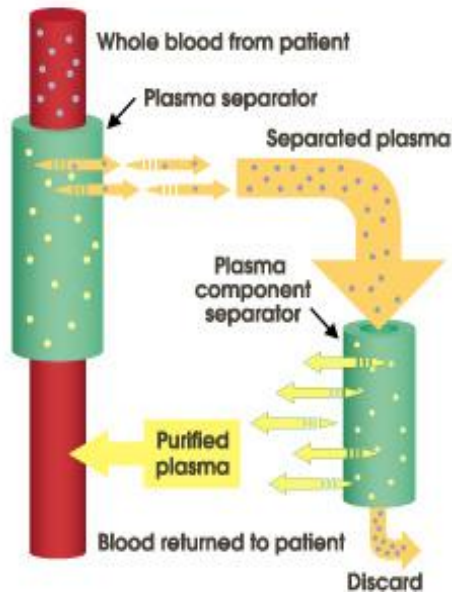
CIRCUIT DIAGRAM





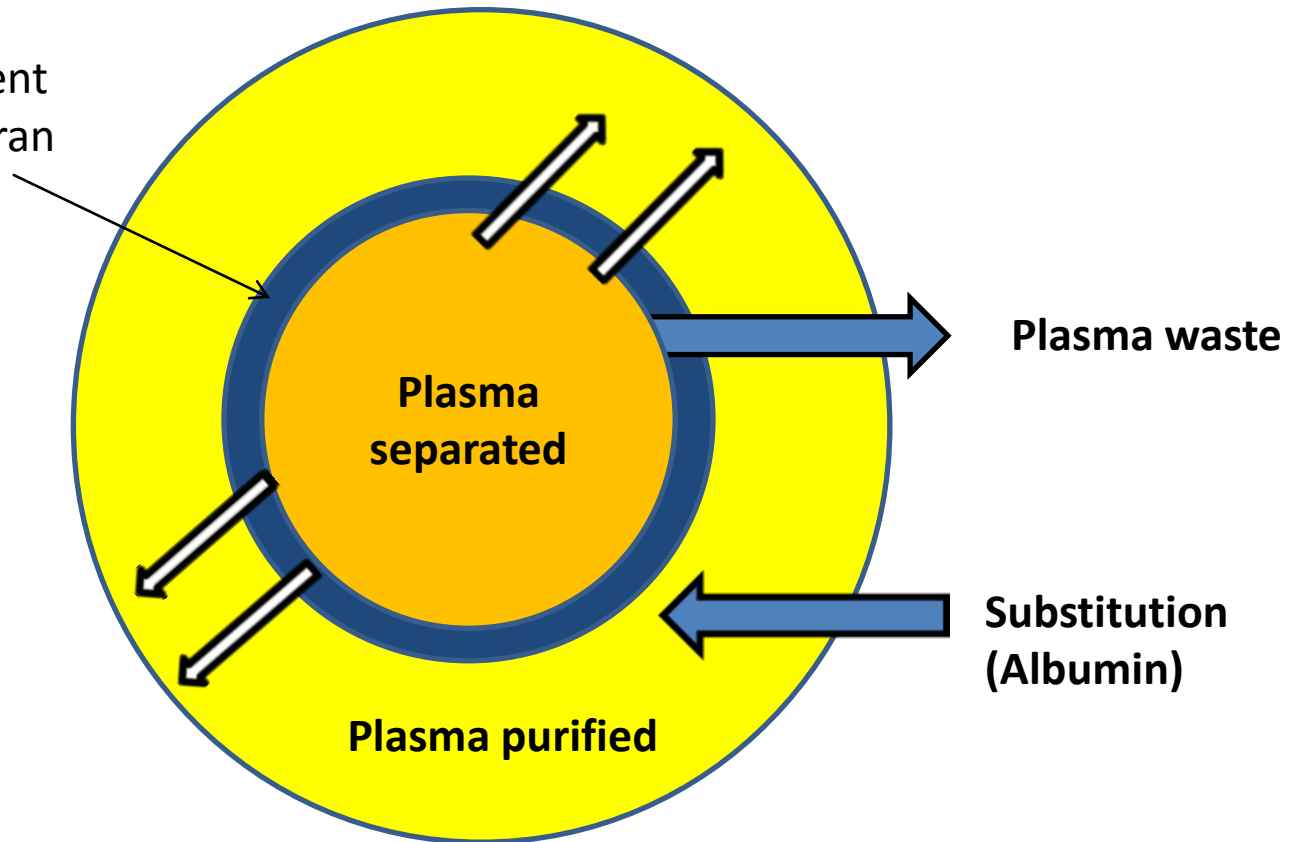
SEPARATION MECHANISM

Separation mechanism of DFPP



MEMBRANE EXCHANGE ER-4000®

Plasma component
separator membran



RHEOPHERESIS vs PLASMAPHERESIS

- **ADVANTAGES :**

- More selective than plasma exchange (PP)
- Purified plasma returns to the patient
- Minimal loss of patient's own desirable non-pathogenic substances
- Minimal albumin loss
- Minimal substitution fluid required
- Minimal risk of allergy from substitution fluids
- Price

- **DISADVANTAGES common to both techniques:**

- Semi-selective
- Some components, no pathogen, can also be lost because of their similar size and molecular weight → this lost is quite difficult to evaluate

5 PATIENTS INCLUDED

	Age	HD	Diab	Lesion	Infection	DFPP Session	Associate process
Mr D	67	X		Foot/ Hand	X	29	ATB Pain killers Amputation
Mrs G	47	X	X	Foot	X	7	ATB Pain killers
Mrs V	49	X	X	Toes	X	70	Ilosprost® Hyperbaric Tr. Pain killers
Mr L	65		X	Foot		16	Pain killers
Mr C	54	X		Toes	X	30	Pain killers

RESULTS OBSERVED

- **Pain:**

- Diminution after 10 sessions, gradually associated with the decrease in anti pain treatment (Paracetamol, Nefopam, Oxycodon);
- Stop medication for 2 patients after 6 weeks (12DFPP)

- **Healing:**

- Proven for 1 patient with stop treatment
- Improvement for 2 patients but still processing

- **Stop treatment:**

- 1 patient for serious sepsis
- 1 patient with infected central veinous access



Mr Cav...



CONCLUSION

- Rheopheris technique is very well tolerated by patients, it can be also coupled during an hemodialysis session.
- An improvement was seen on the reduction of pain and the good evolution of the healing, although we have included few patients
- A protocol is being developed in partnership with the various medical and surgical actors
- Should there be more early management of patients?

↪ Rheopheresis is a promising therapy for peripheral arterial disease. However, further studies are required to assess its efficacy.

DFPP Others Indications

- Remove all antibodies
- Remove all lipids
- Desensitization ABO-HLA
- Autoimmune antibody diseases
- Immuno-deficiencies
- AMD: Age Macular Degeneration

REFERENCES

- R Klingel, Therapeutic Apheresis and Dialysis Jul. 2003
- R Klingel, Therapeutic Apheresis and Dialysis Sep. 2005
- A Ramunni et al., Clin Res Cardio Suppl 2012 (vol 7)

ACKNOWLEDGMENTS

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Thank you for your attention



Pont Neuf, Toulouse. FRANCE