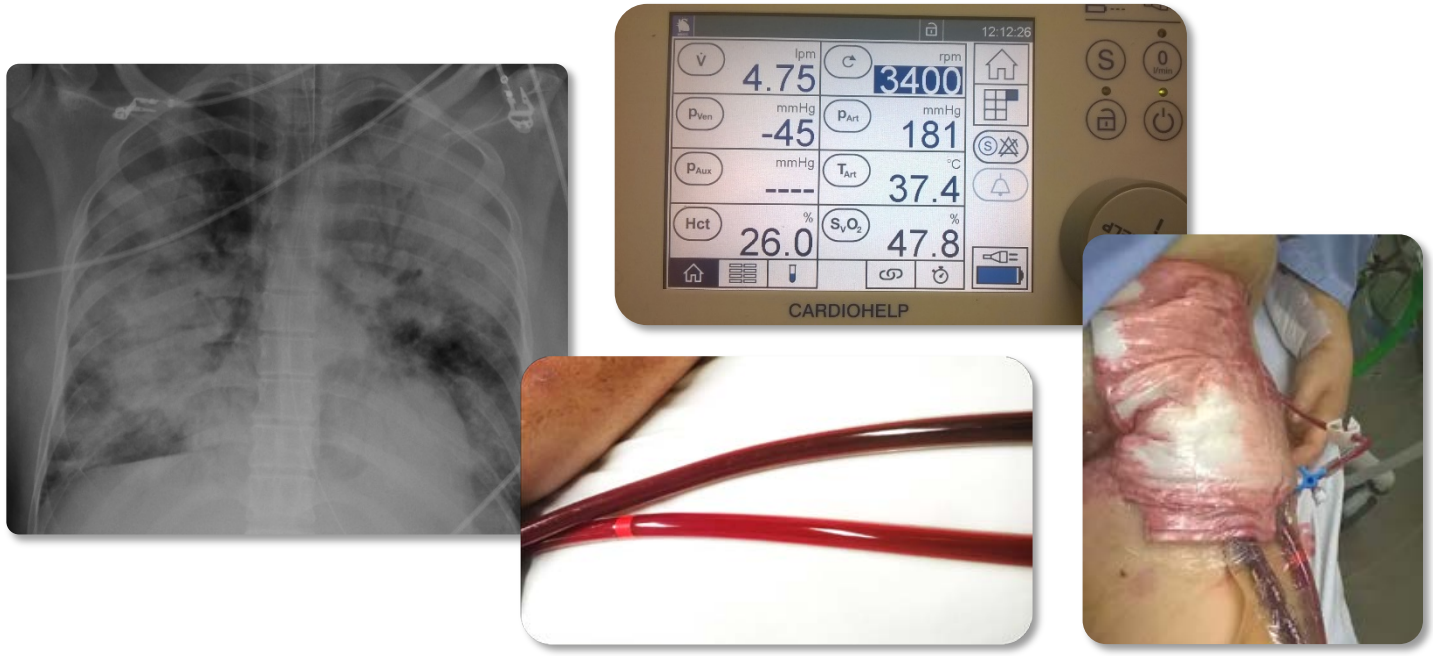
L’ECMO veino-veineuse

En pratique



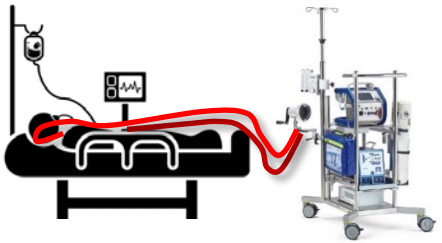
Hadrien Winiszewski, Réanimation médicale, hwiniszewski@chu-besancon.fr

Mes conflits d'intérêt

Pas de conflit d'intérêt

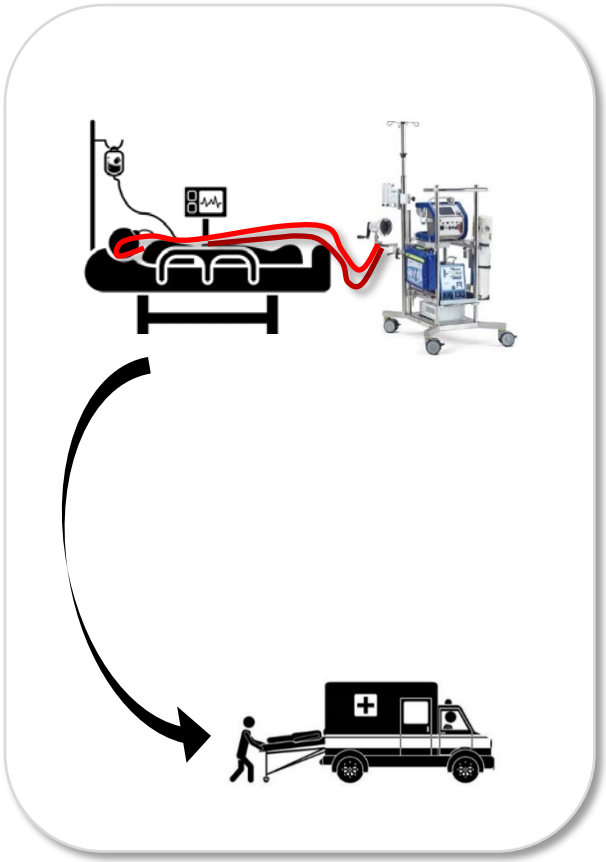
Avez-vous déjà eu affaire à un patient sous ECMO VV ?

Avez-vous déjà eu affaire à un patient sous ECMO VV ?



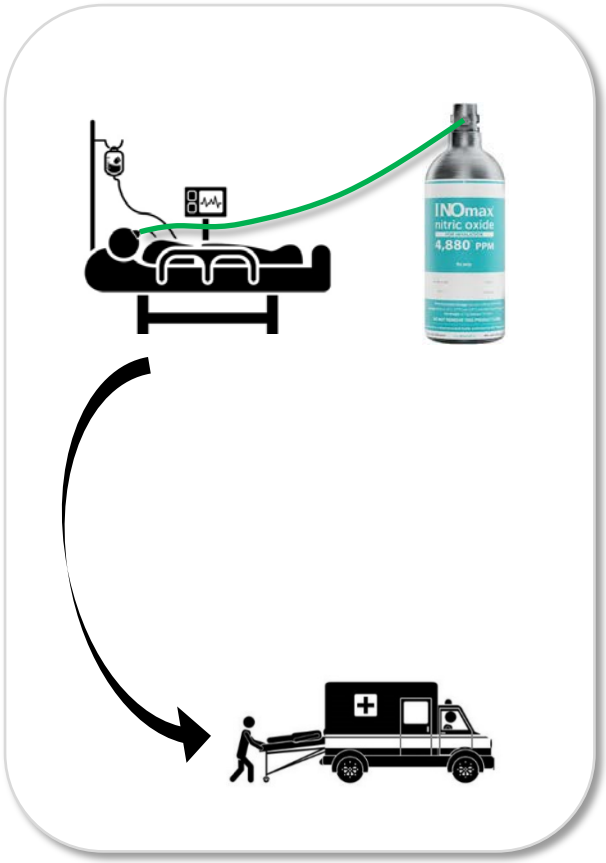
ECMO puis soins dans le service

Avez-vous déjà eu affaire à un patient sous ECMO VV ?



ECMO puis transfert

Avez-vous déjà eu affaire à un patient sous ECMO VV ?



Transfert pour ECMO

Les 4 points abordés

Physiopathologie de l’hypoxémie dans le SDRA

Indication de l’ECMO VV & mise en place

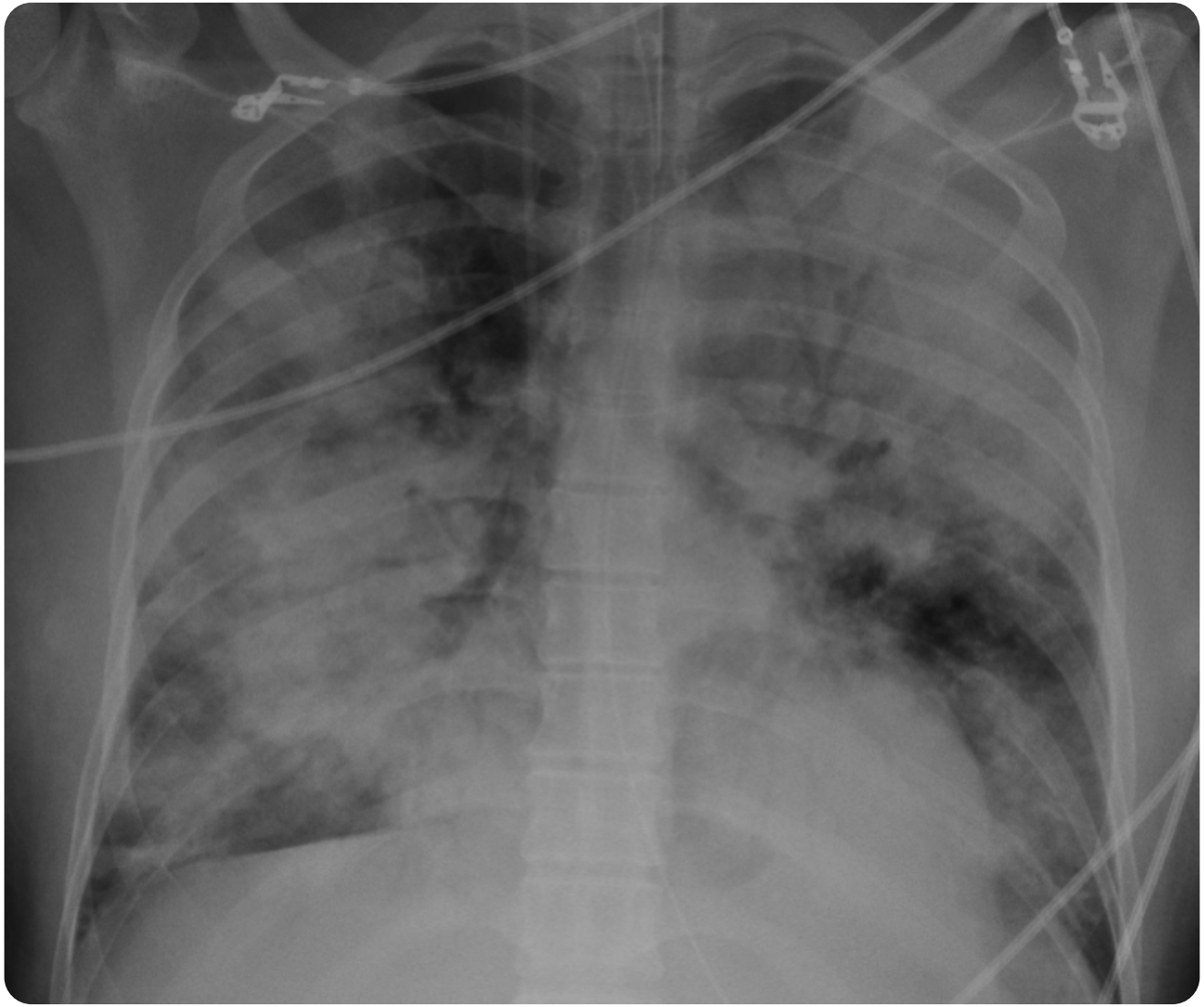
3 problèmes fréquents

Le quotidien : quelques particularités

Mr S. 45 ans
AgU pneumocoque +

VAC 460.30
FiO_2 100%
PEP 12 Pplat 34
pH 7.27
$PaCO_2$ 60 mmHg
PaO_2 66 mmHg

NAD 4 mg/h
RV 3L, marbré
Lactate 6 mmol/L



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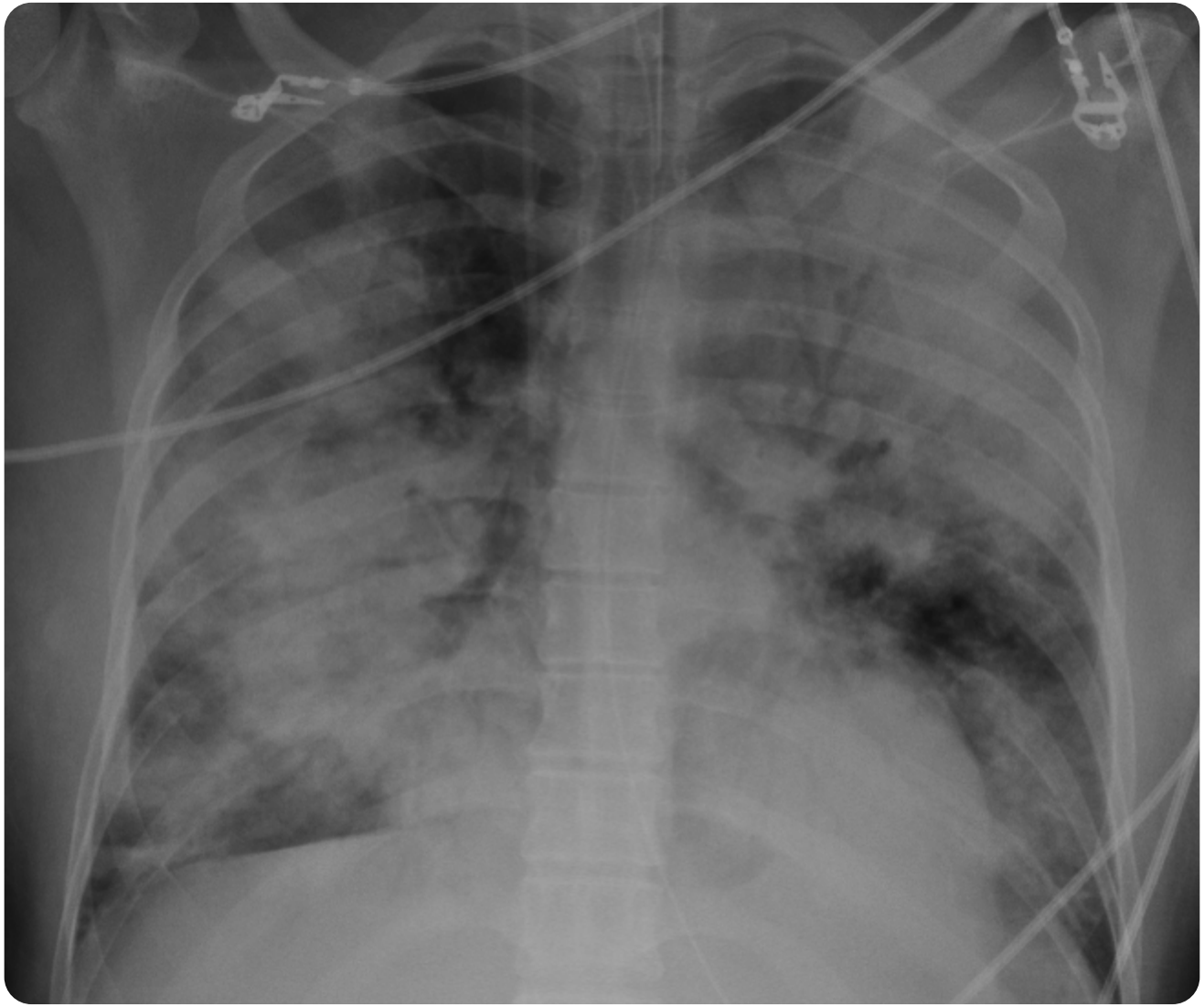

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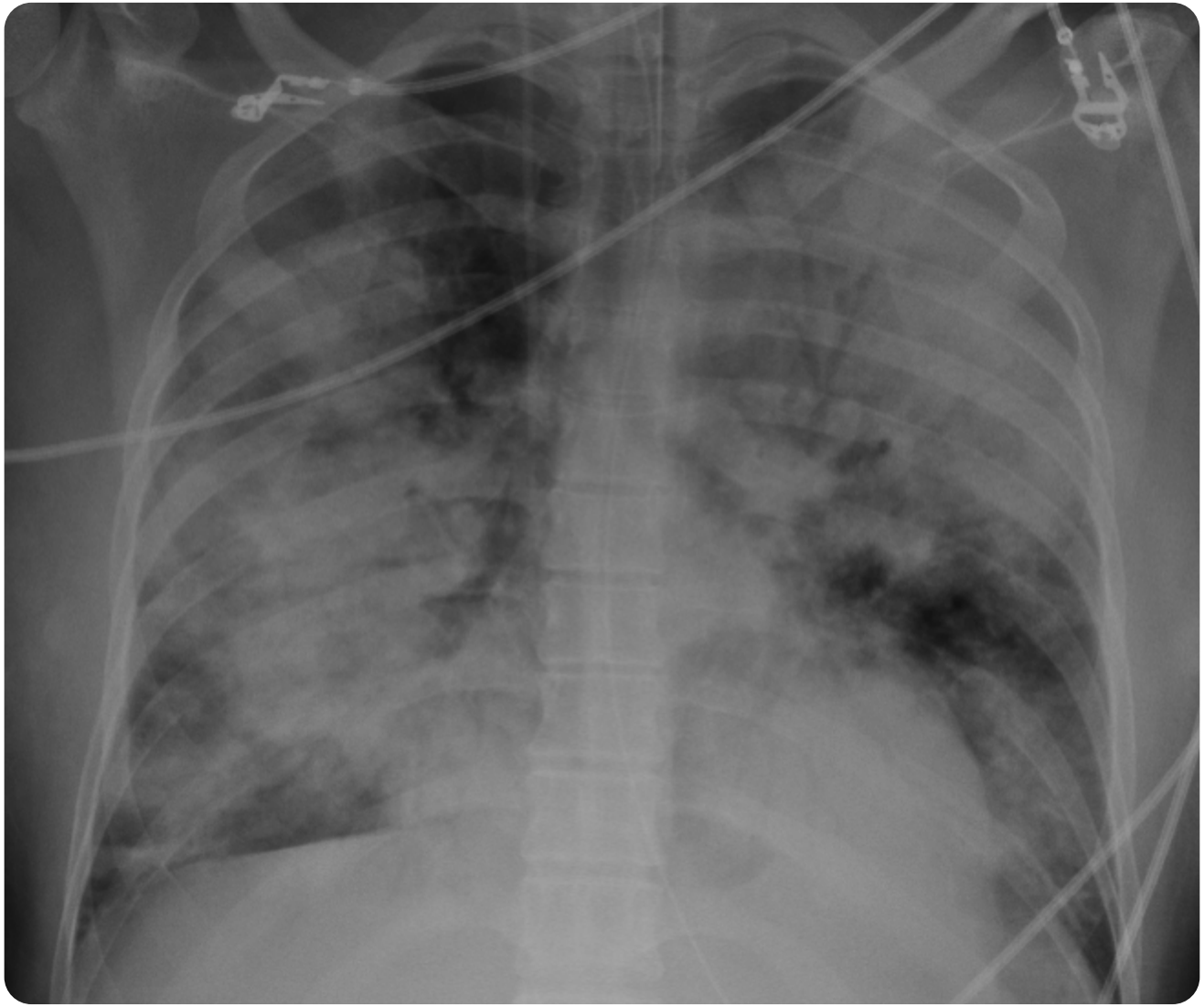

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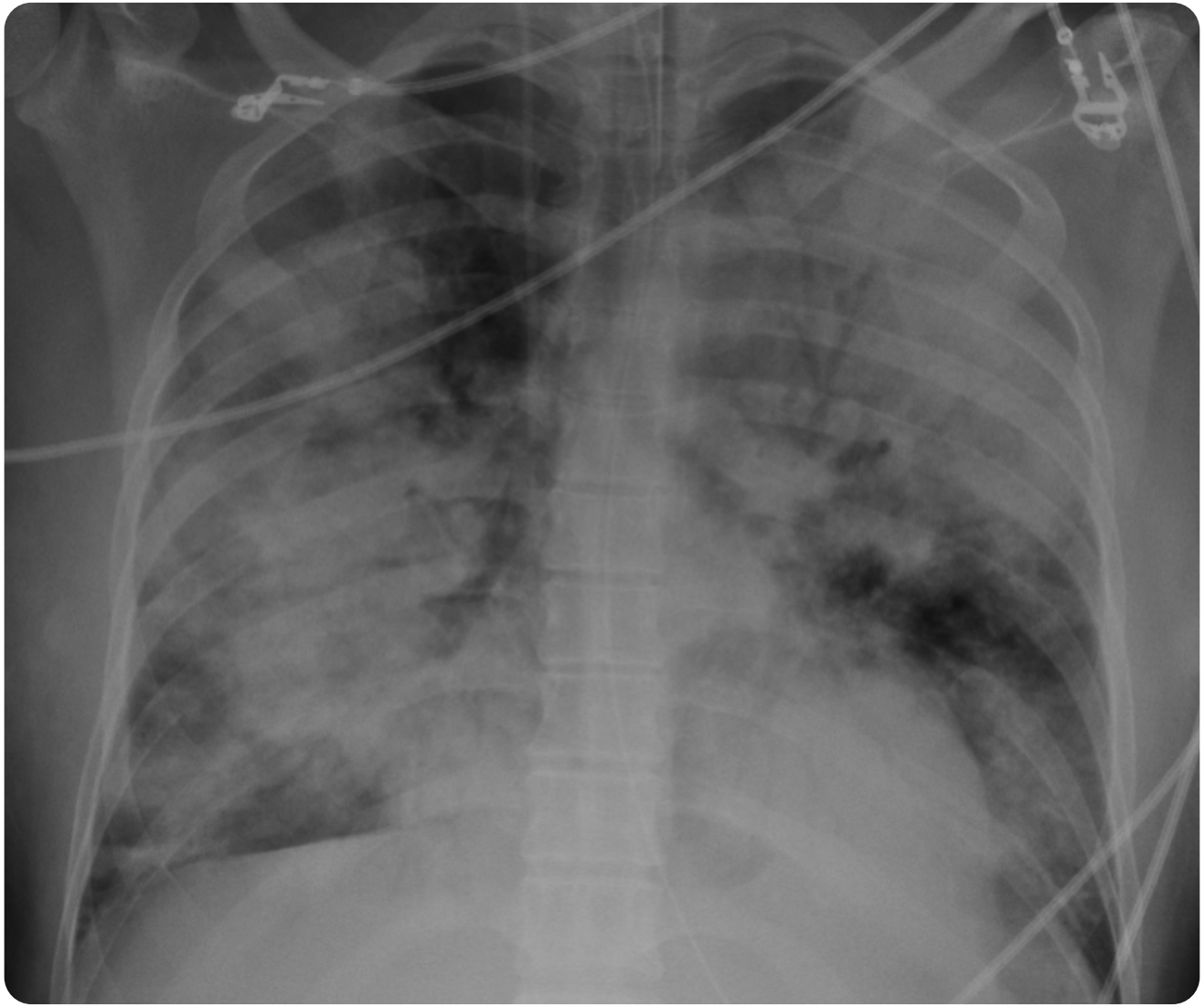
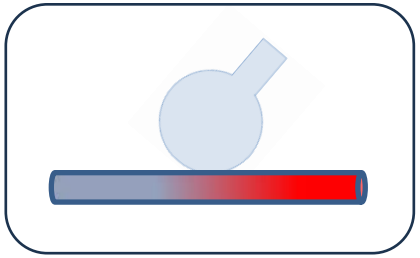
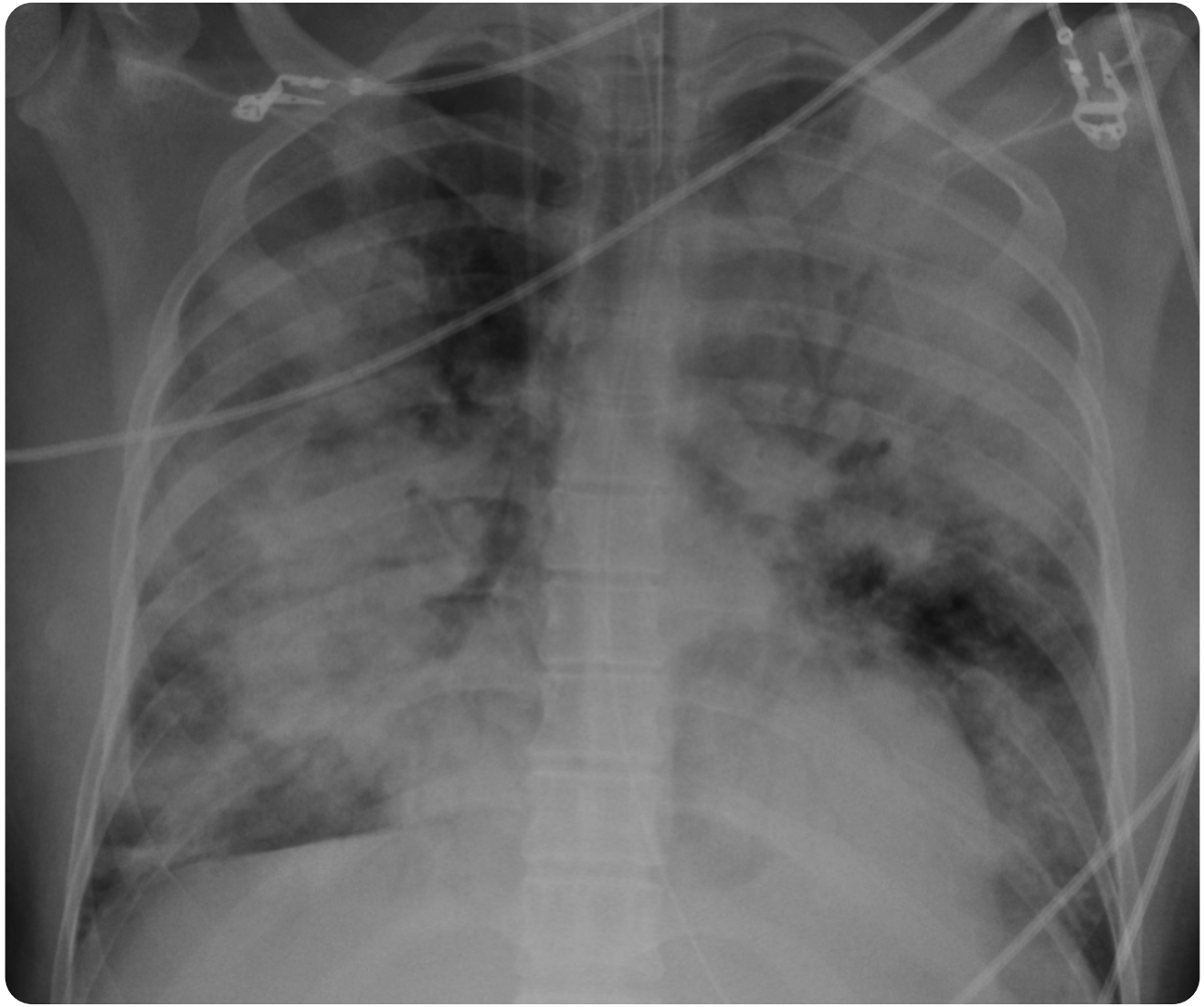
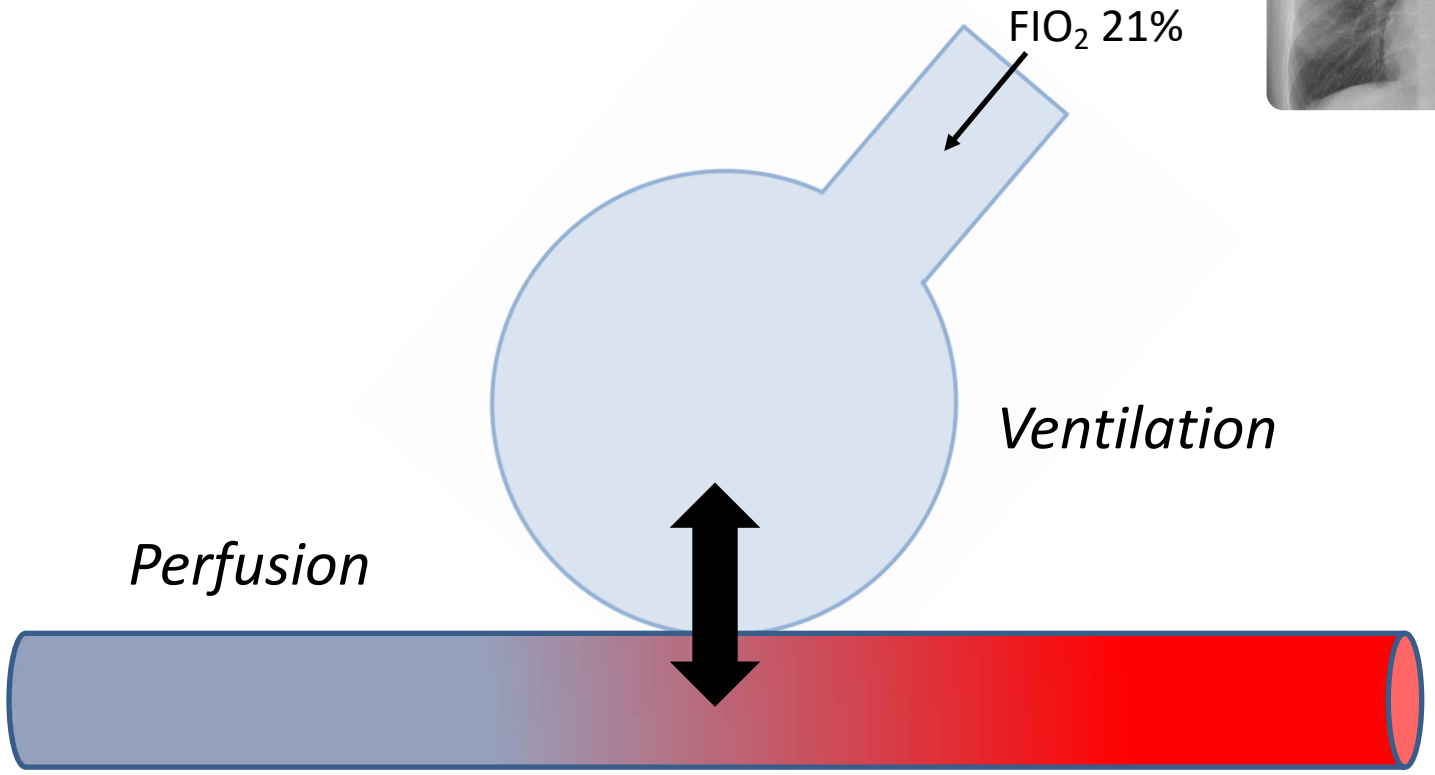






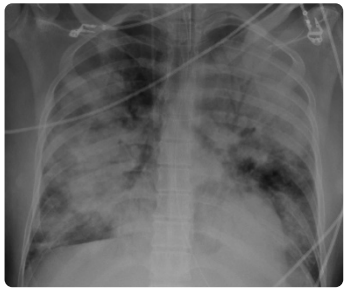
L'unité alvéolaire en physiologie

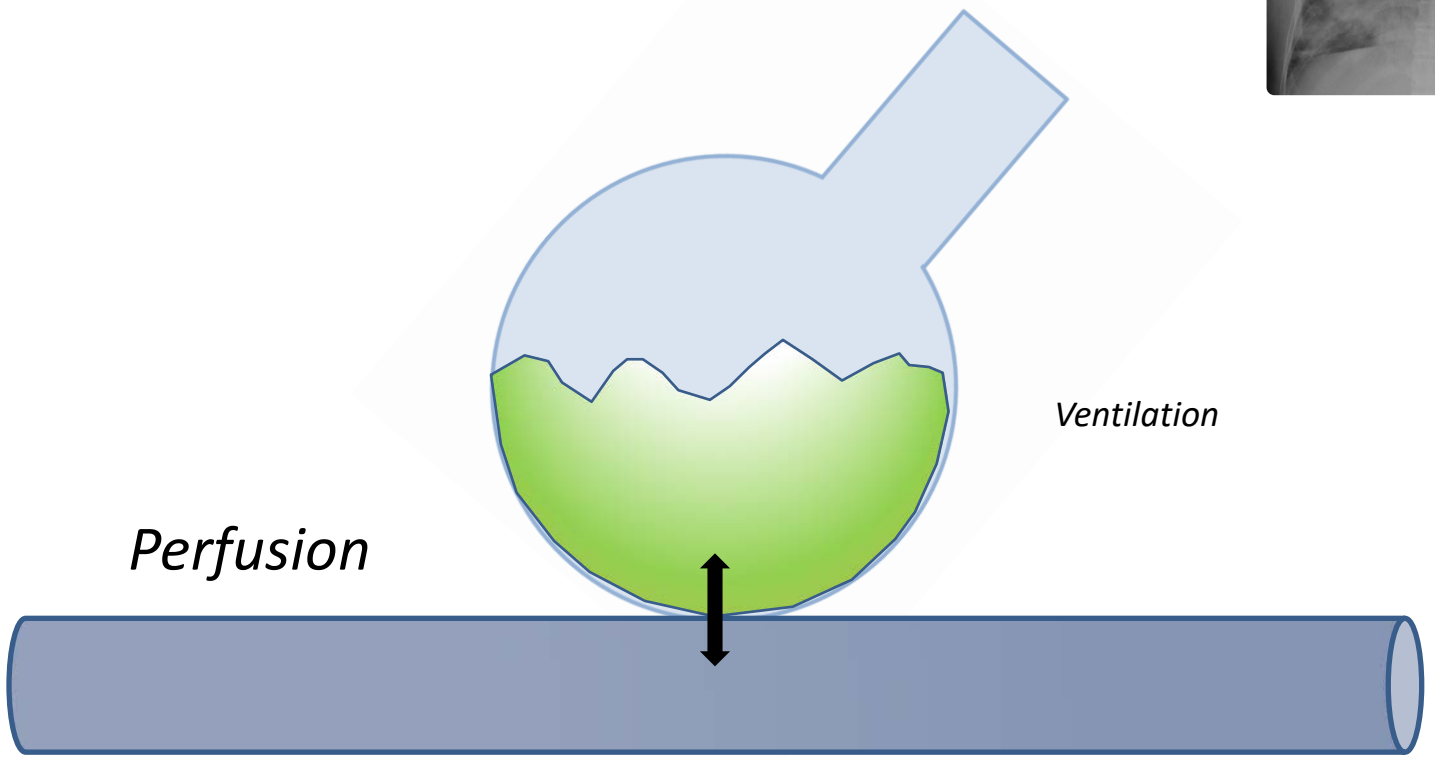


PvO_2 40 mmHg

PaO_2 100 mmHg

L'unité alvéolaire dans le SDRA

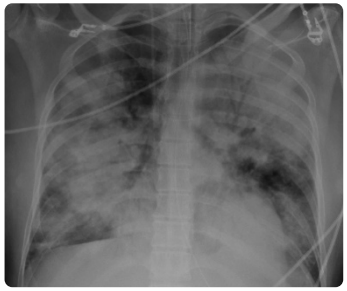


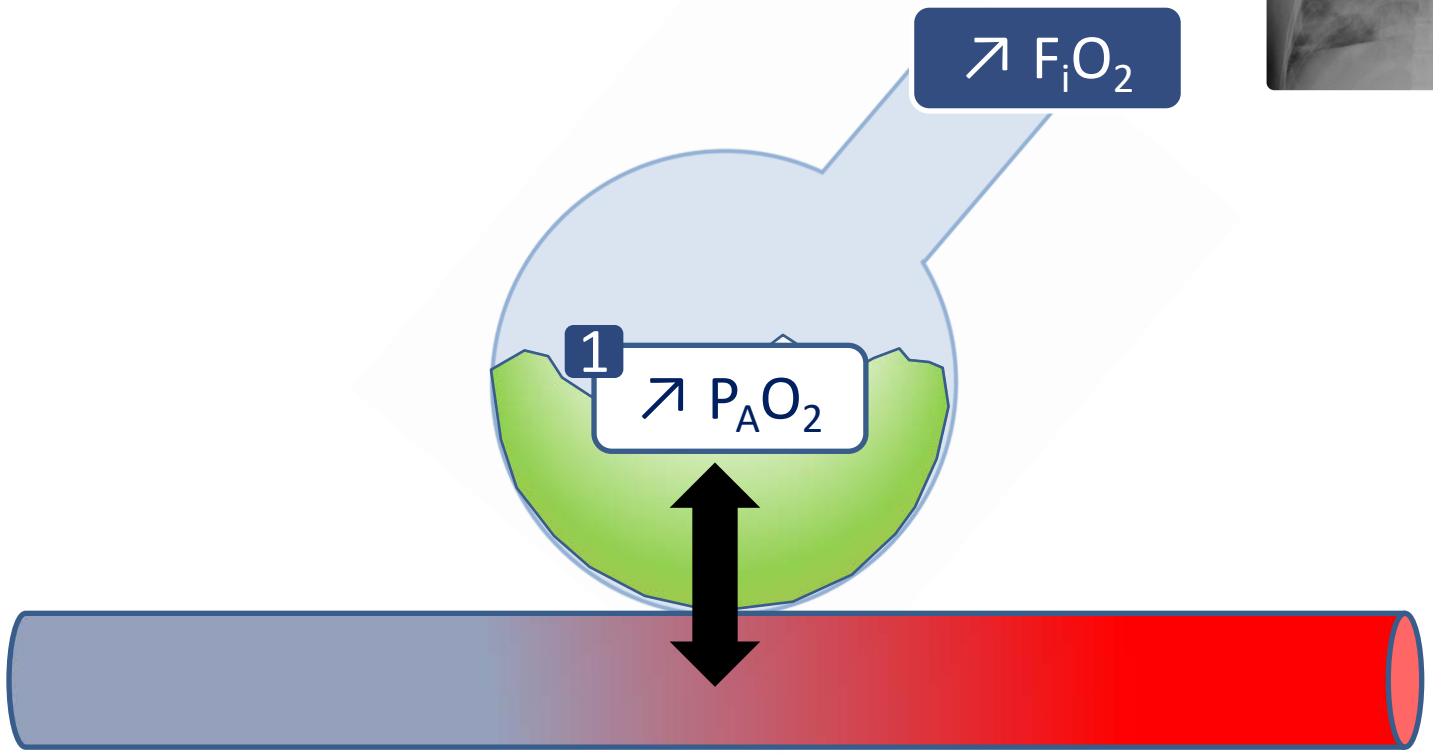


PvO_2 40 mmHg

PaO_2 40 mmHg

L'unité alvéolaire dans le SDRA

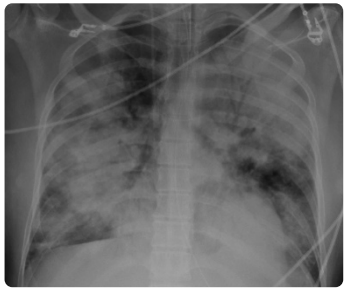


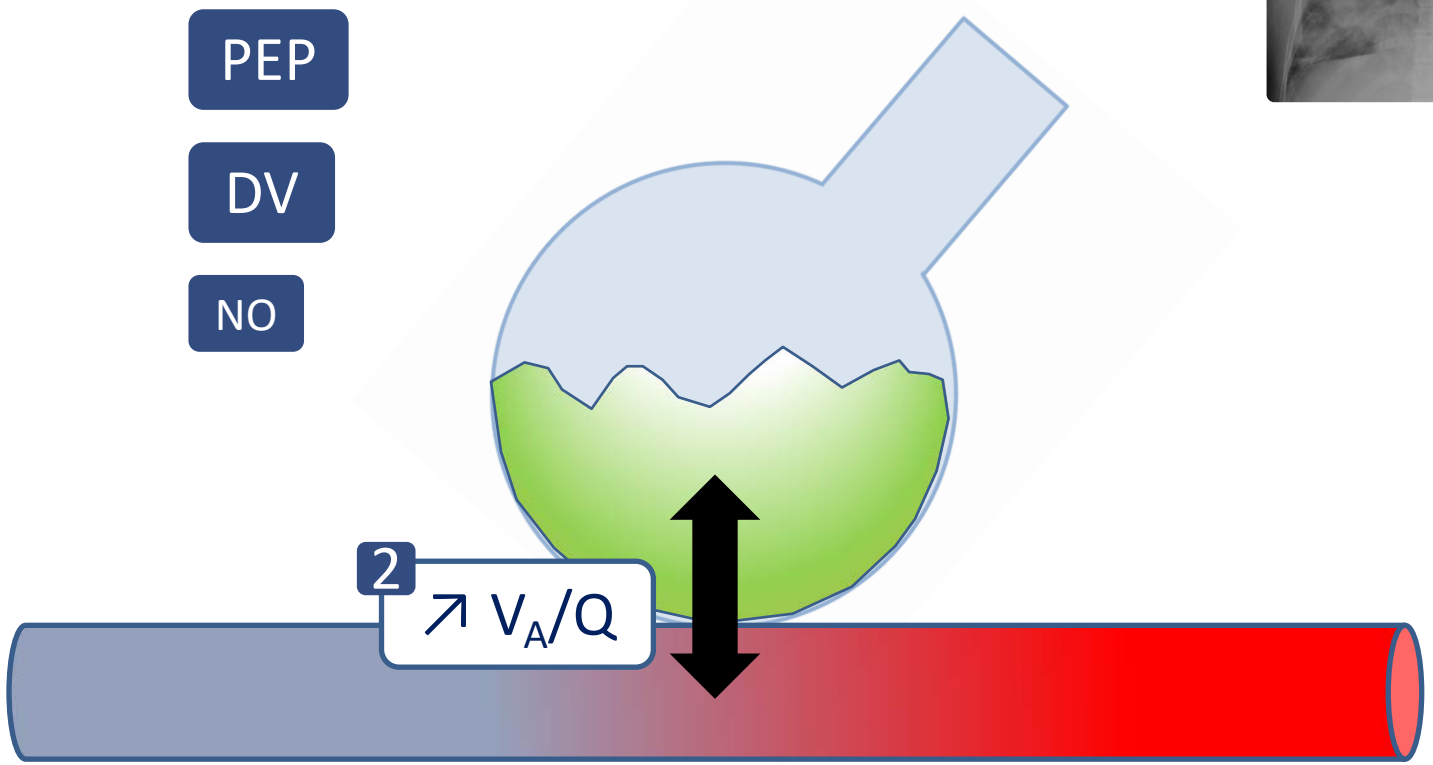


PvO_2 40 mmHg

PaO_2 70 mmHg

L'unité alvéolaire dans le SDRA

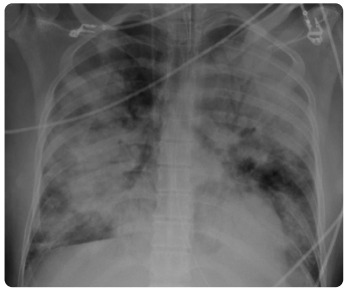




PvO_2 40 mmHg

PaO_2 70 mmHg

L'unité alvéolaire dans le SDRA



PEP

DV

NO

↗ F_iO_2

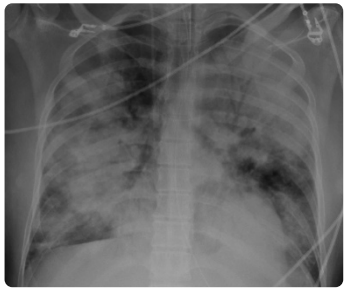
1 ↗ P_AO_2

2 ↗ V_A/Q

PvO_2 40 mmHg

PaO_2 40 mmHg

L'unité alvéolaire dans le SDRA



PEP

DV

NO

↗ F_iO_2

1 ↗ P_AO_2

ECMO

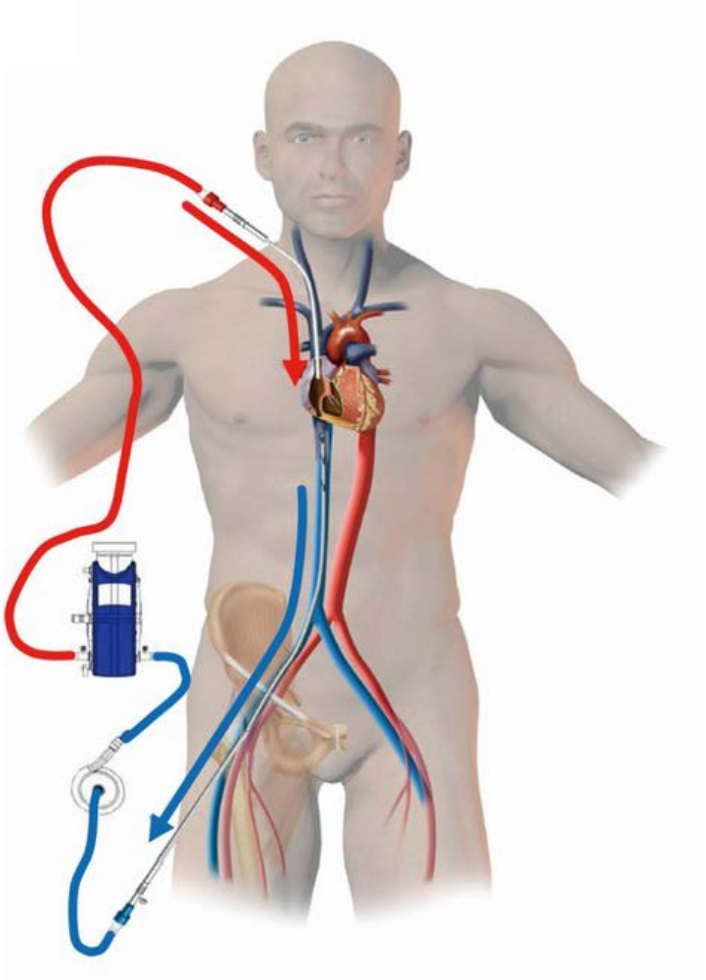
2 ↗ V_A/Q

PvO_2 70 mmHg

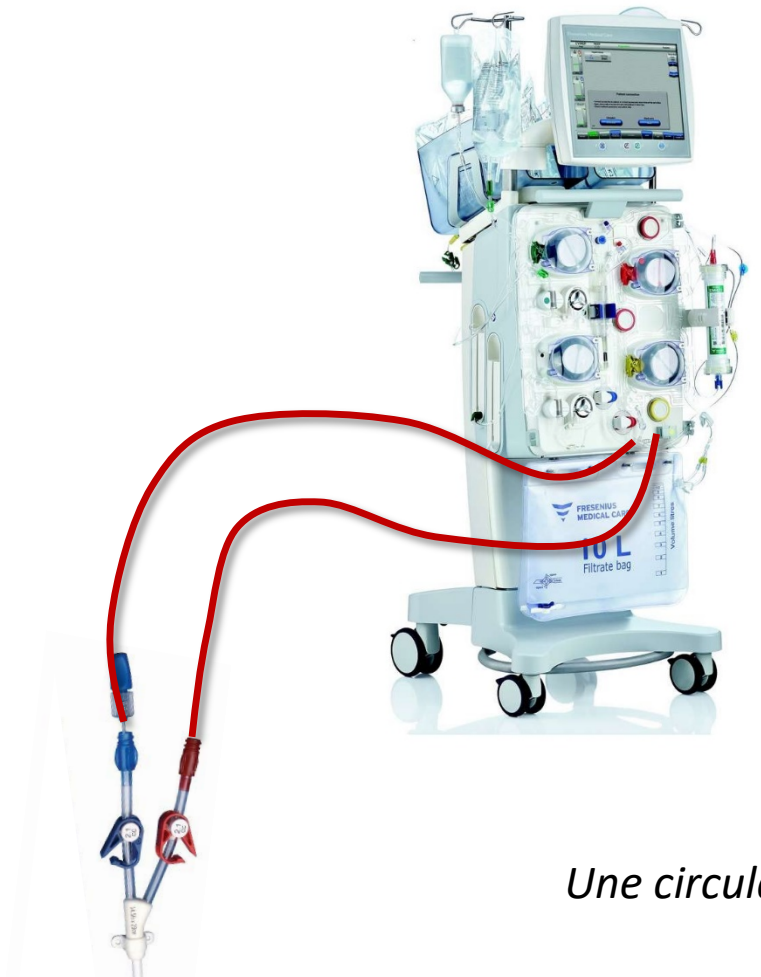
3 ↗ PvO_2

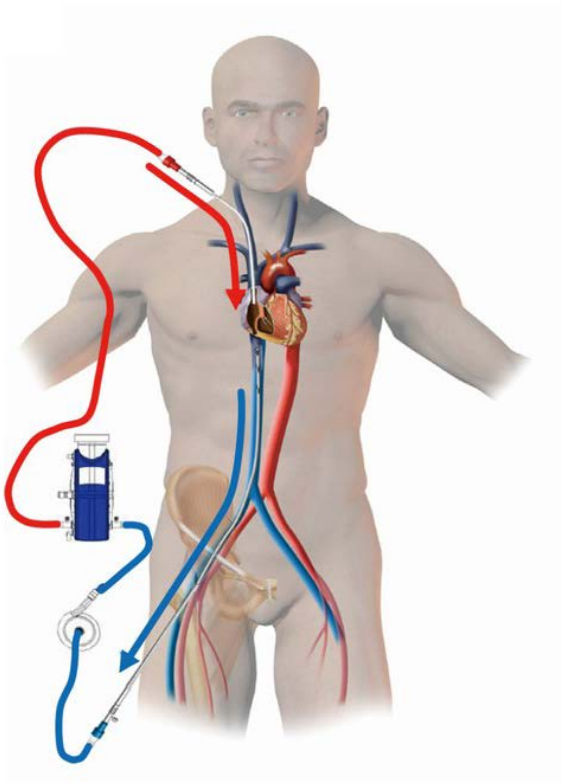
PaO_2 70 mmHg

Le principe



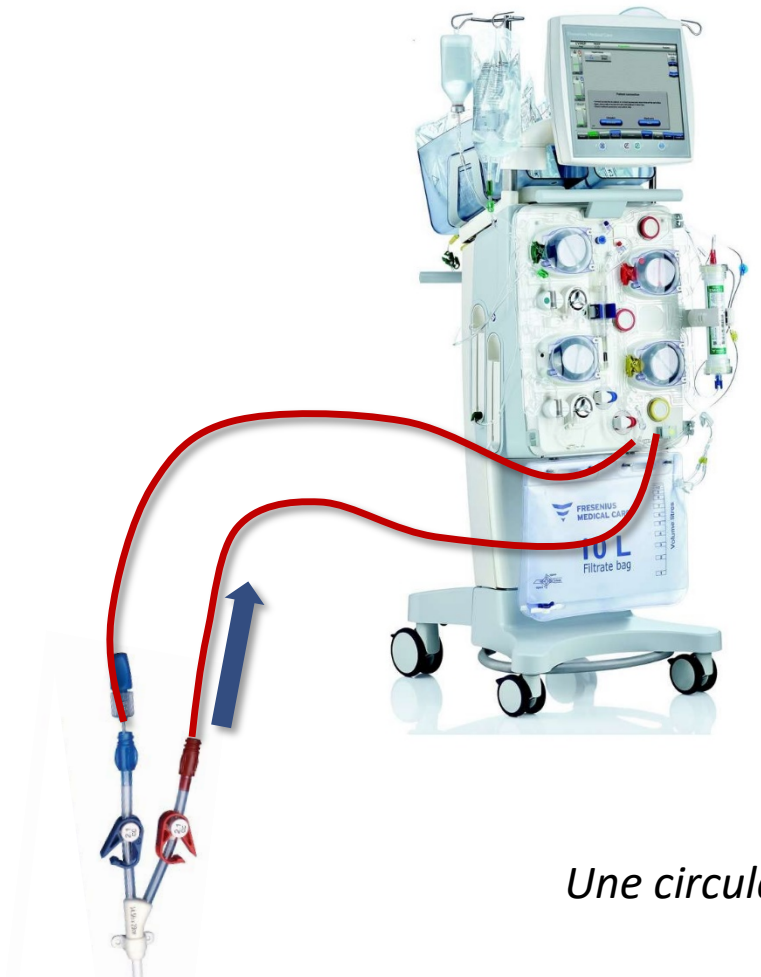
Le principe

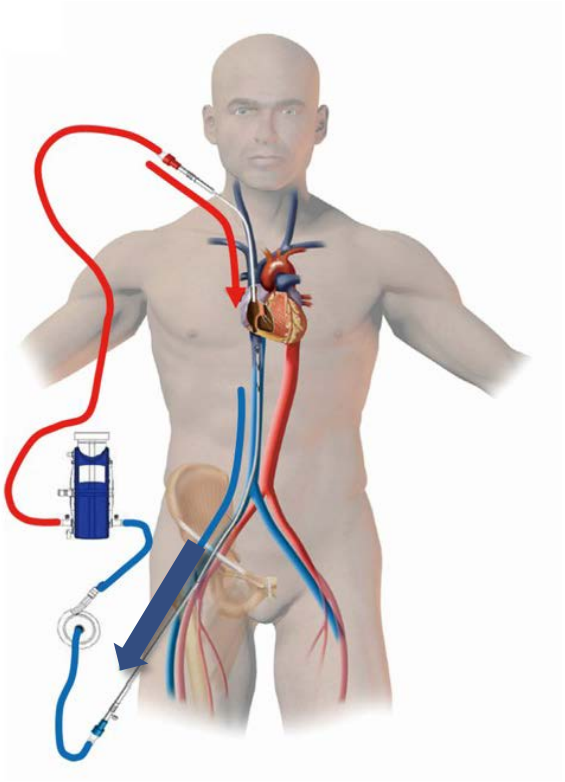




Une circulation extracorporelle veino-veineuse comme la dialyse !

Le principe





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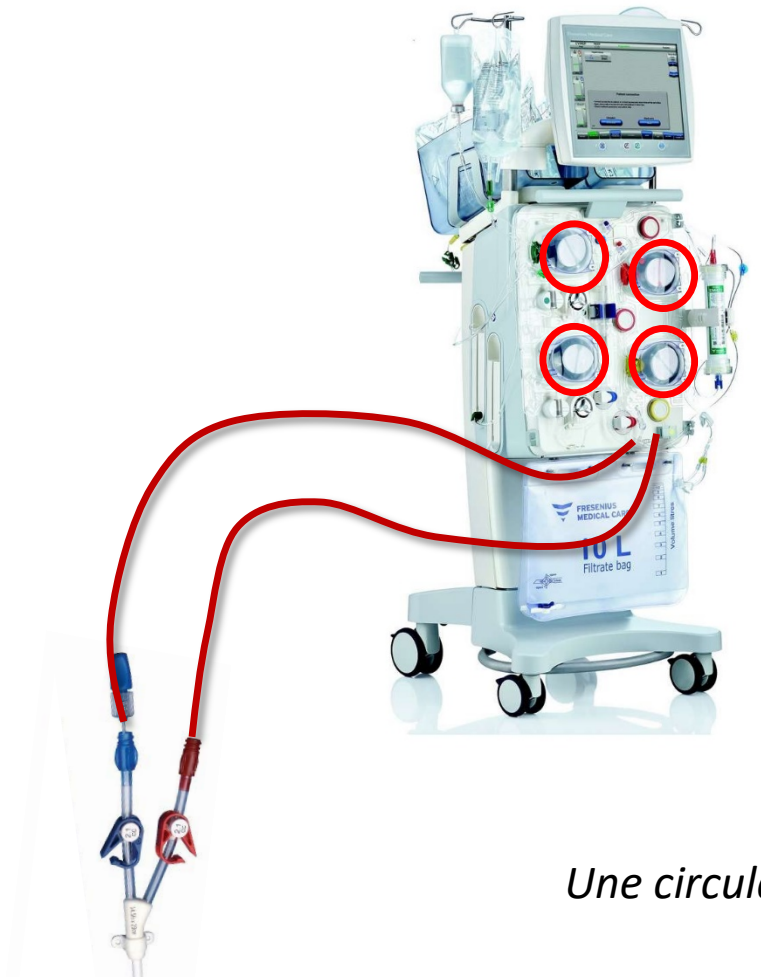
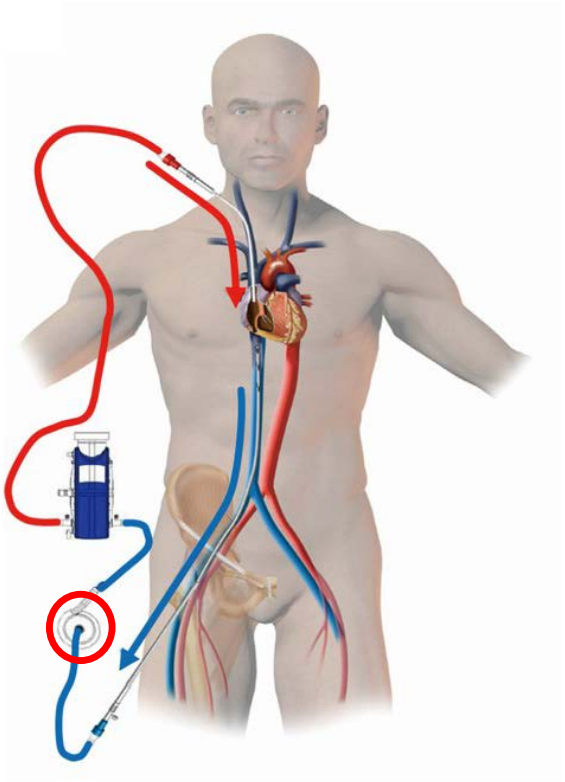
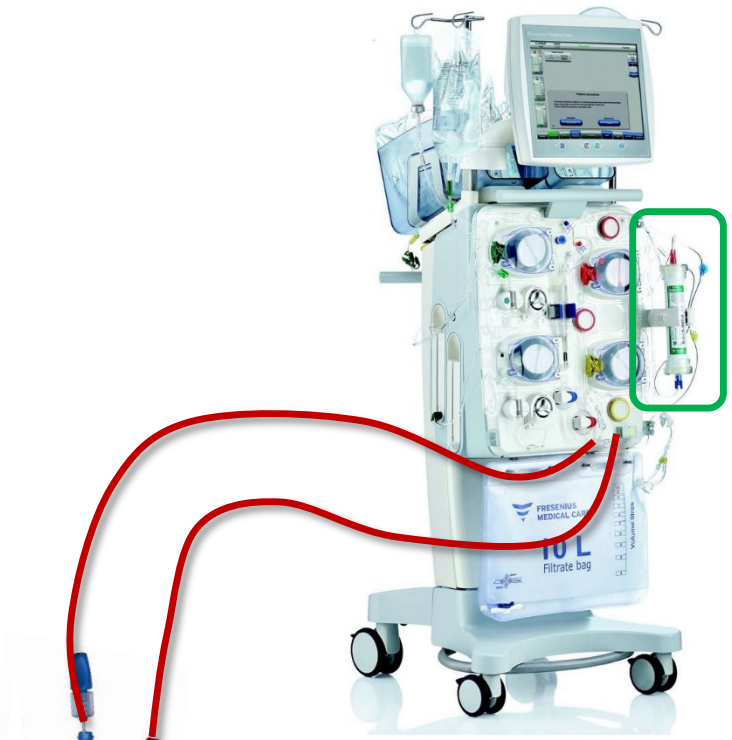


Pompe

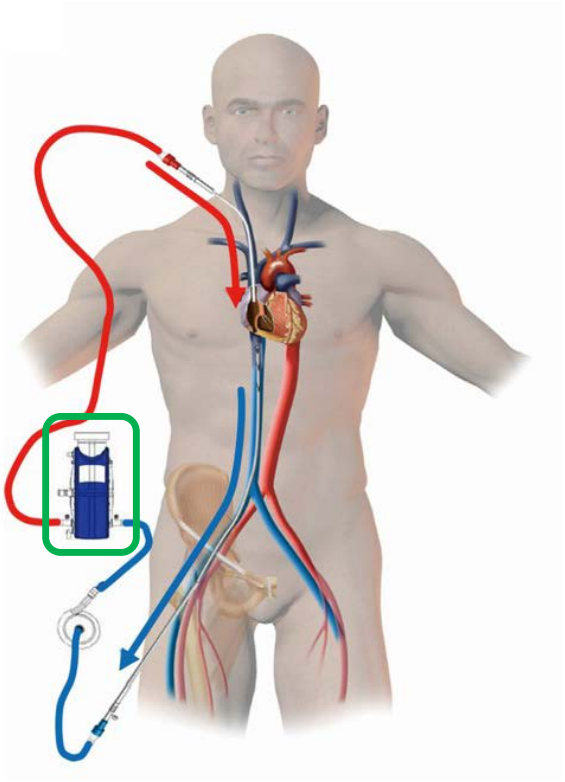


Une circulation extracorporelle veino-veineuse comme la dialyse !

Le principe

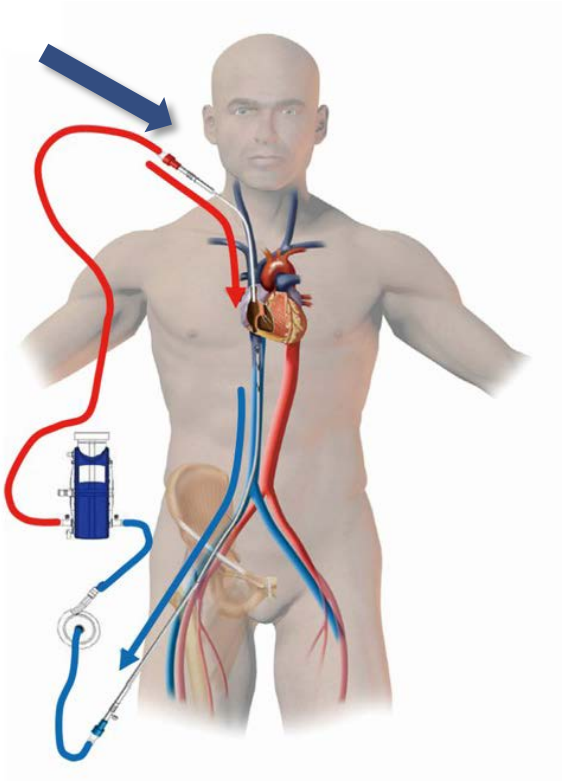


Membrane



Une circulation extracorporelle veino-veineuse comme la dialyse !

Le principe

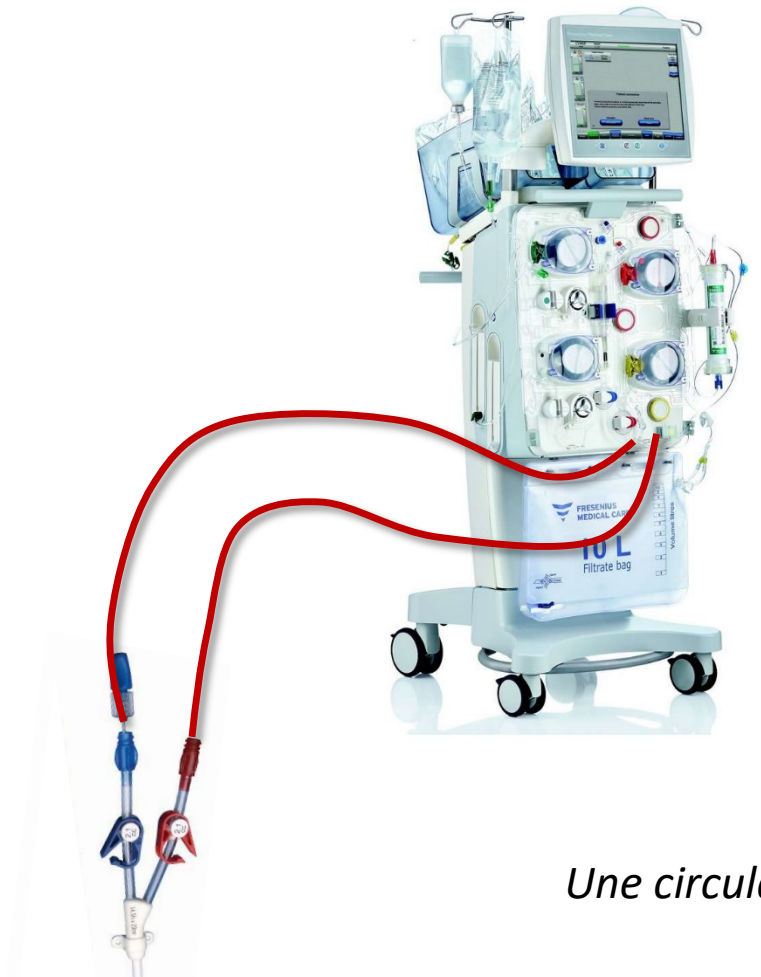


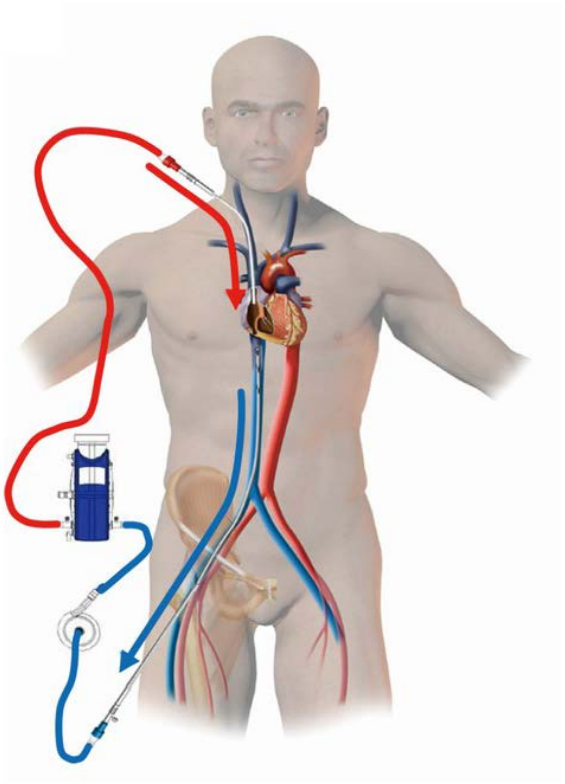
Une circulation extracorporelle veino-veineuse comme la dialyse !

Le principe

200 mL/min

4L/min

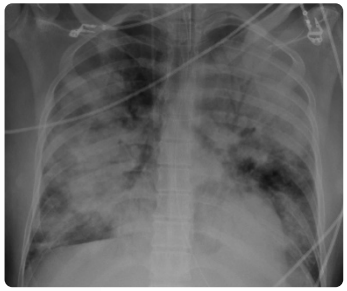


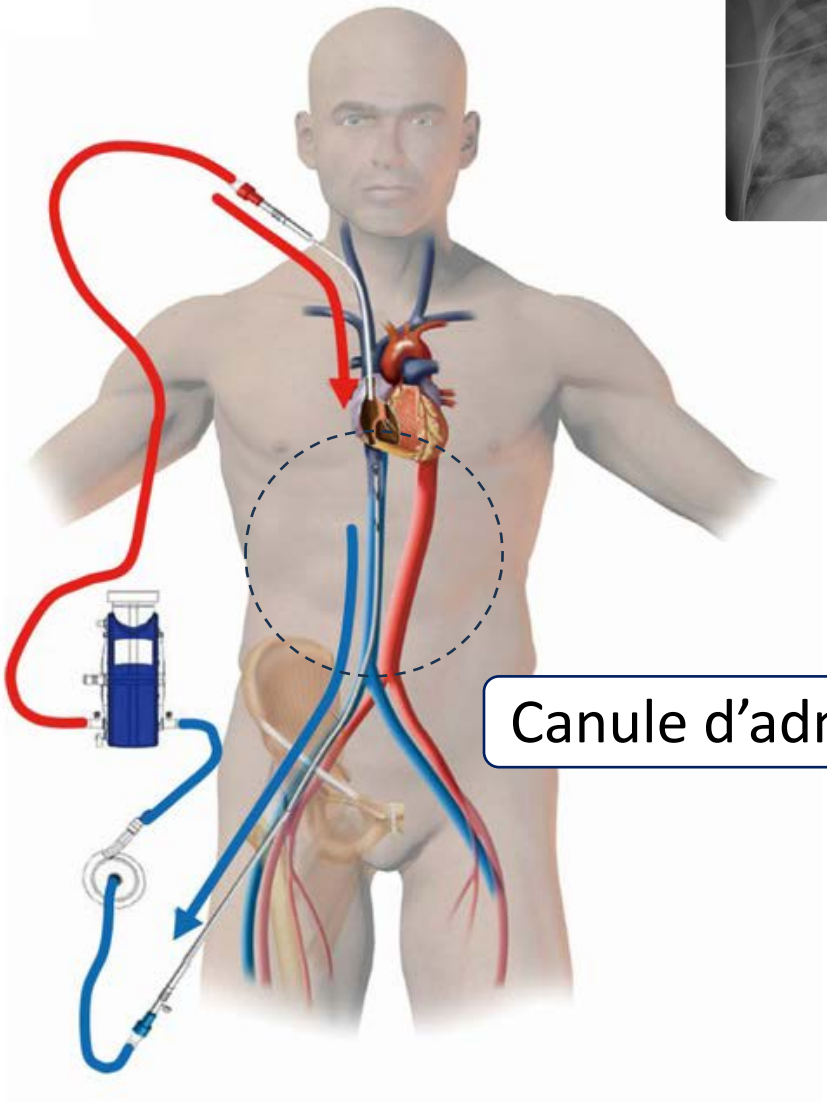


Une circulation extracorporelle veino-veineuse comme la dialyse !

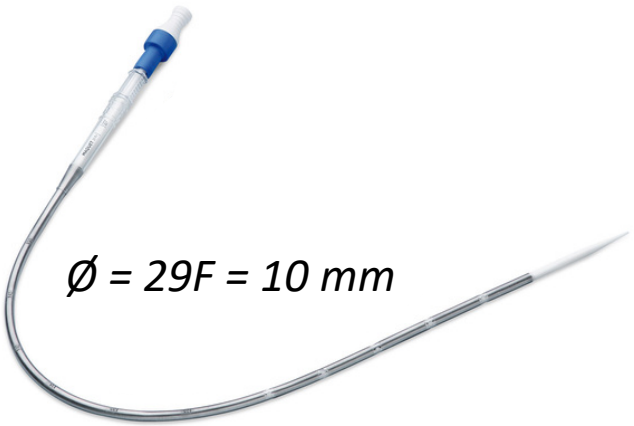
Le principe

4L/min





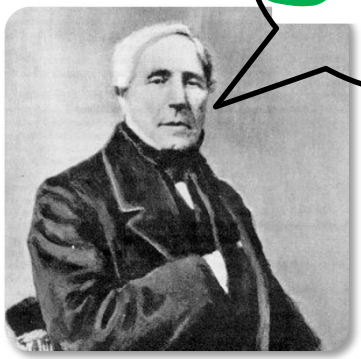
Canule d'admission



Ø = 29F = 10 mm

Le principe

$$Q = \frac{\pi r^4 \Delta P}{8 \eta L}$$



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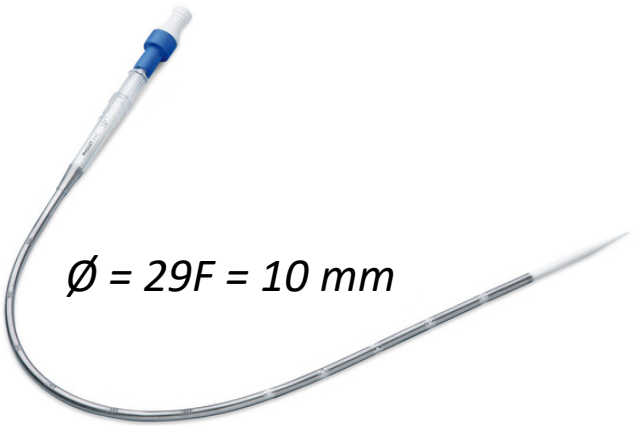
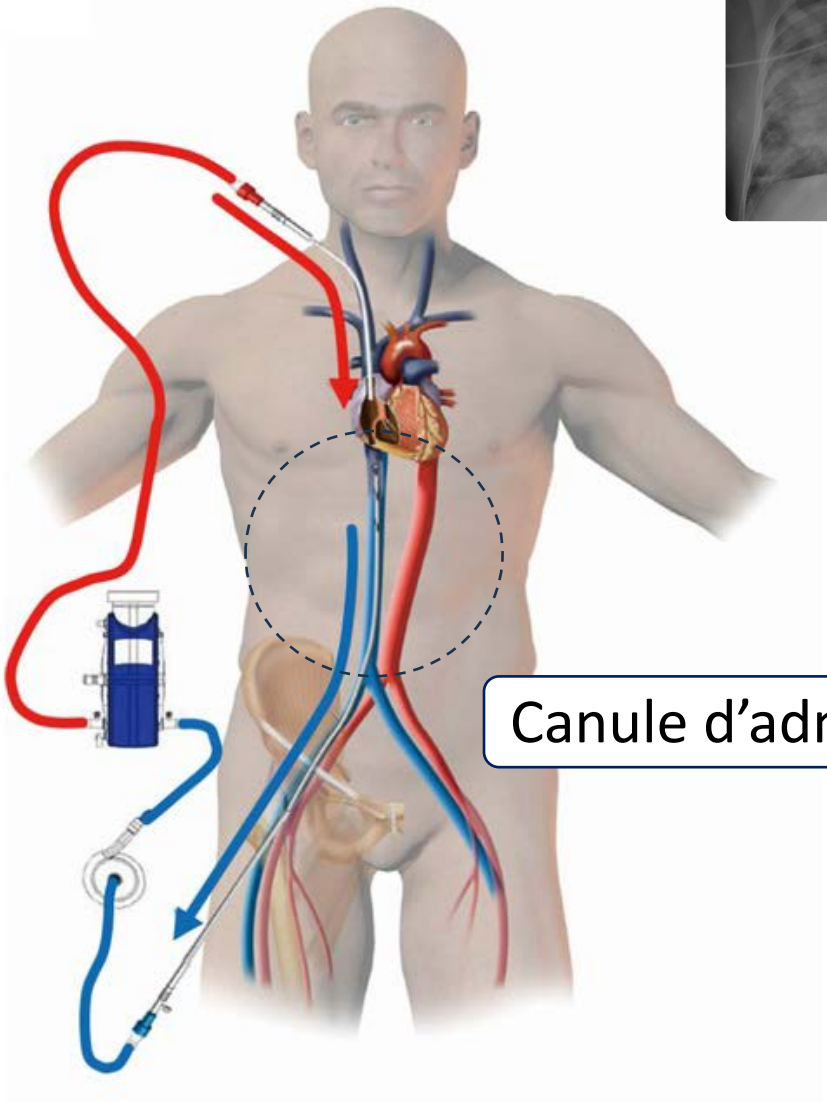
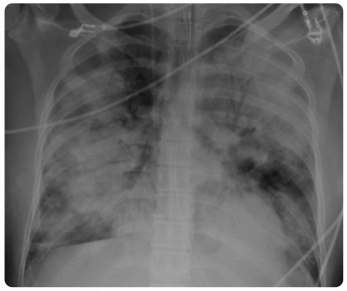


4L/min

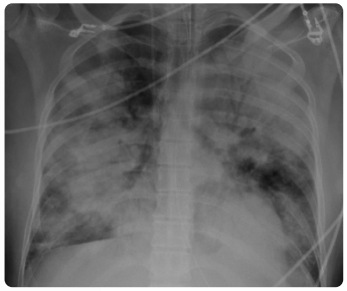


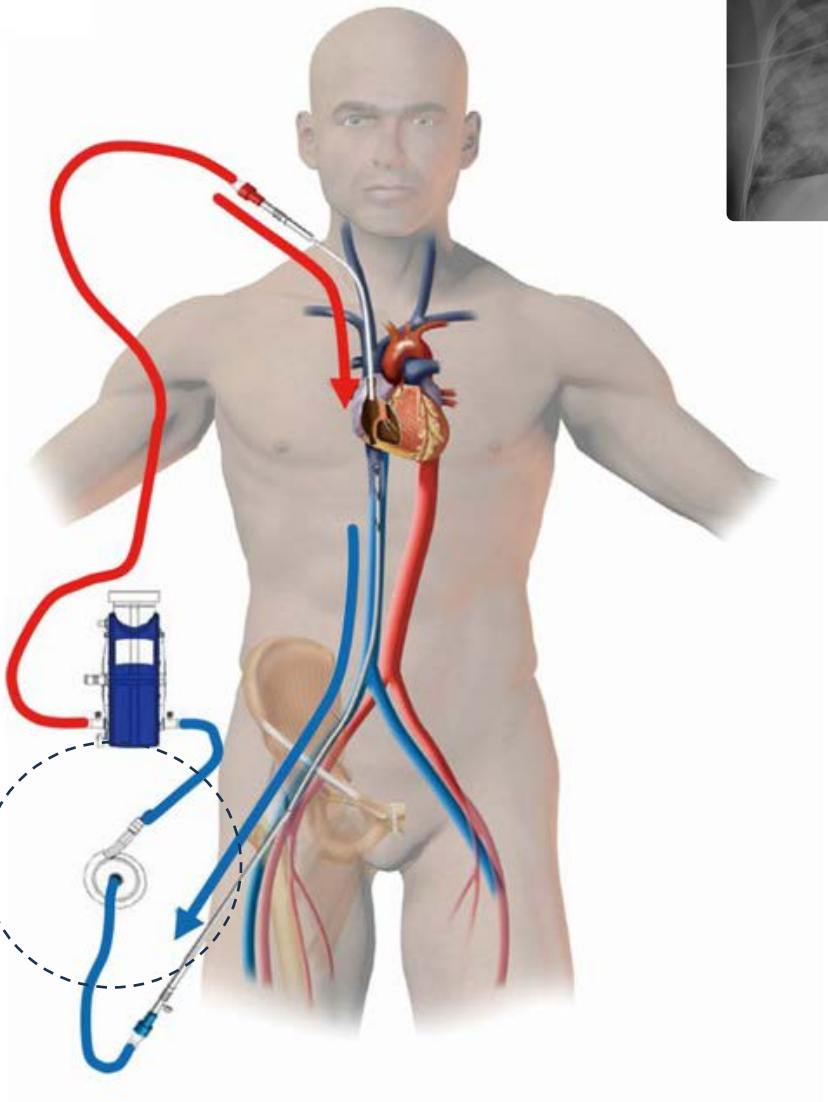
Canule d'admission



Le principe

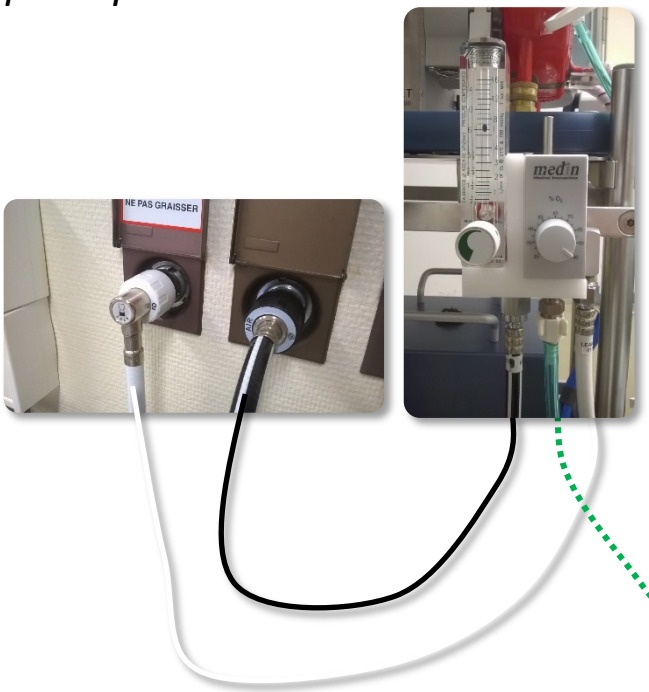
4L/min



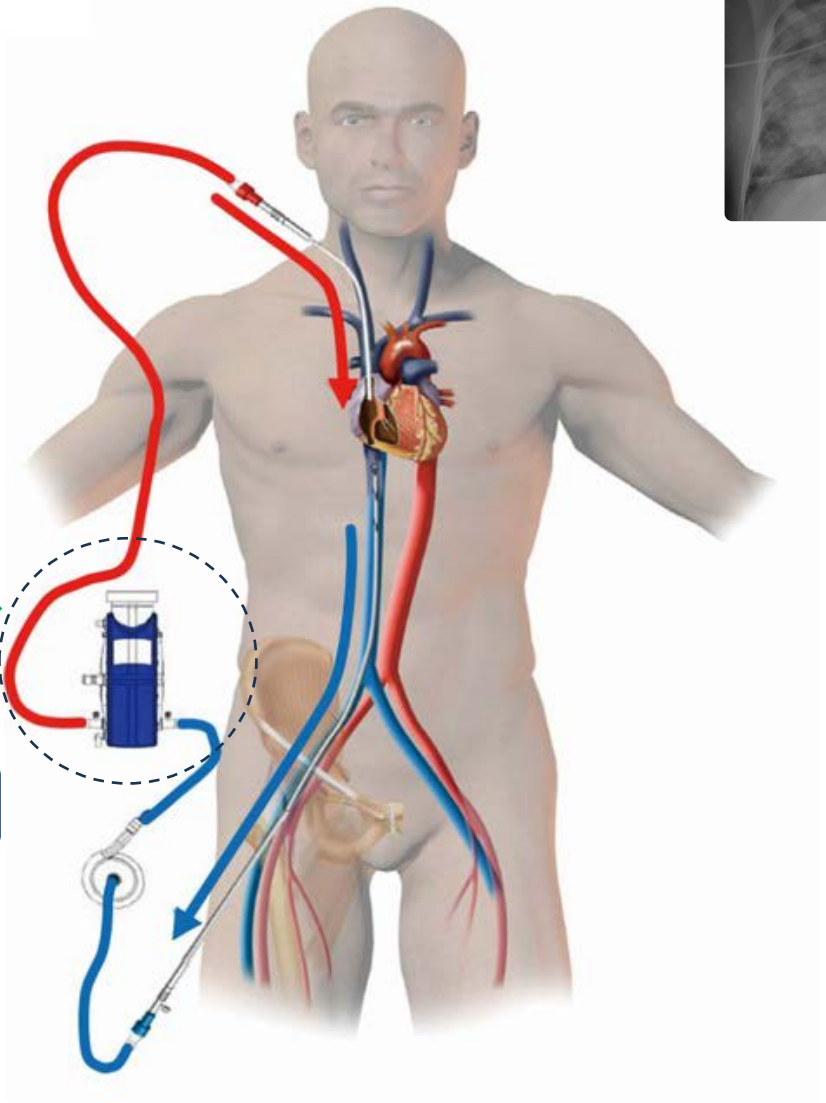


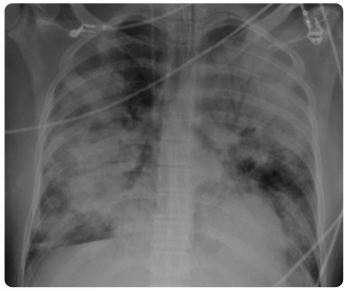
Pompe centrifuge

Le principe



4L/min

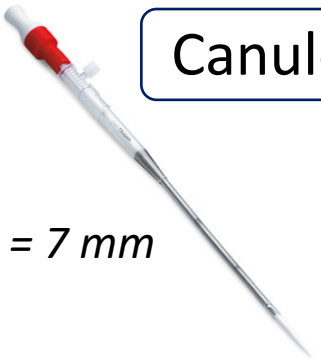




Oxygénateur

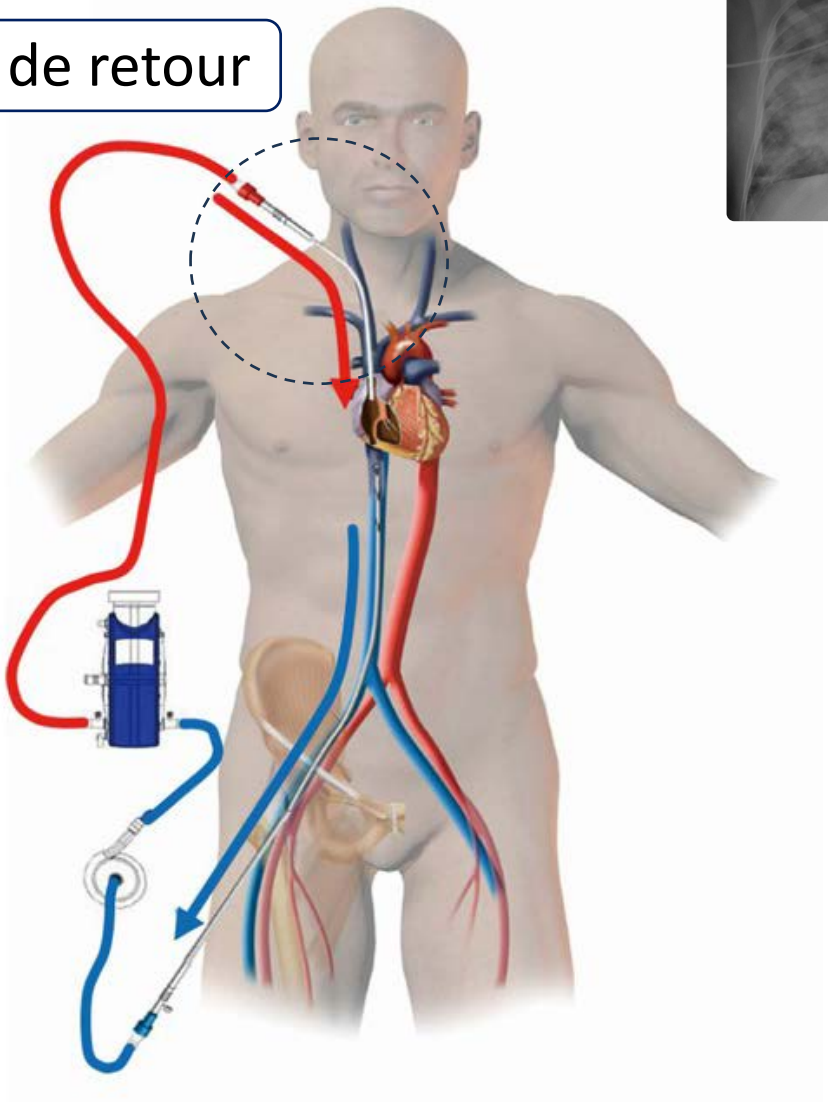
Le principe

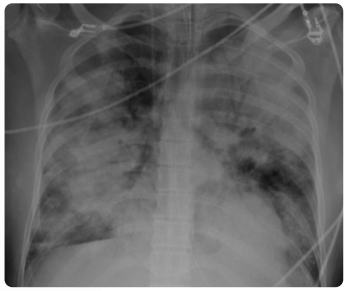
4L/min



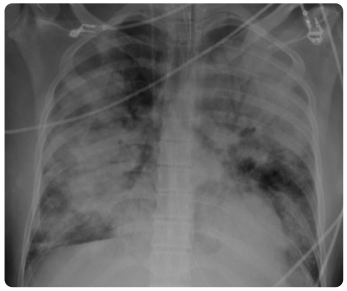
Ø = 21F = 7 mm

Canule de retour

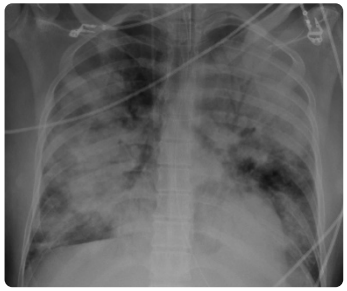


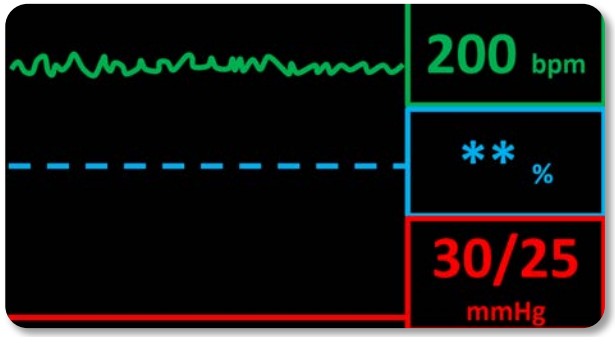


Le principe



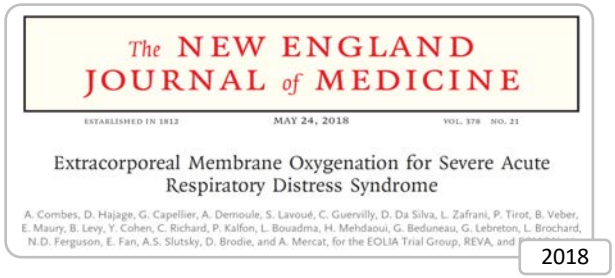
Le principe





Pas d'assistance circulatoire !

Les indications



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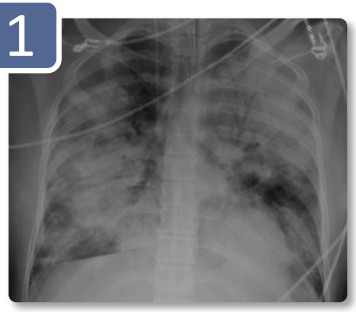
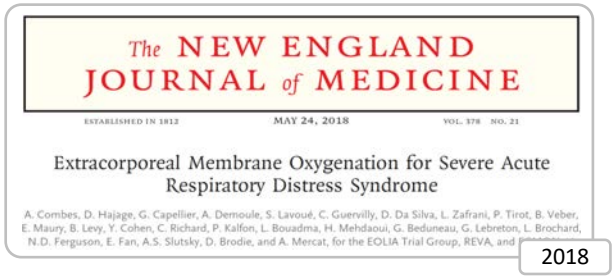


Un SDRA

Les indications


The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 MAY 24, 2018 VOL. 378 NO. 21

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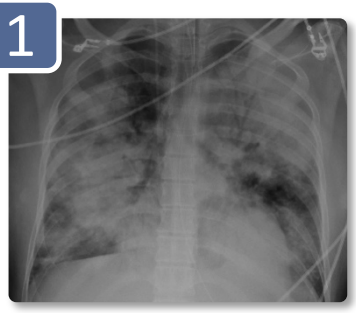
A. Combes, D. Hajage, G. Capellier, A. Demoule, S. Lavoué, C. Guervilly, D. Da Silva, L. Zafrani, P. Tirot, B. Veber, E. Maury, B. Levy, Y. Cohen, C. Richard, P. Kalfon, L. Bouadma, H. Mehdaoui, G. Beduneau, G. Lebreton, L. Brochard, N.D. Ferguson, E. Fan, A.S. Slutsky, D. Brodie, and A. Mercat, for the EOLIA Trial Group, REVA, and

2018

1



Un SDRA

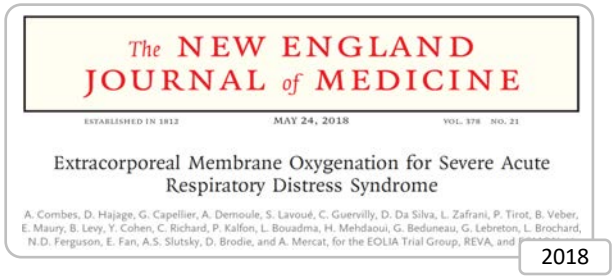
2

- VT 6 mL/kg
- $FiO_2 \geq 80\%$
- PEP ≥ 10
- VM < 7 jours

+ DV

« Bien ventilé »

Les indications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ESTABLISHED IN 1812 MAY 24, 2018 VOL. 378 NO. 21

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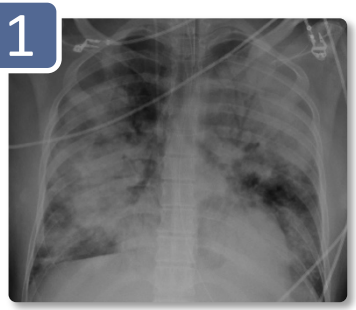
2018

1



Un SDRA

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- VM < 7 jours

+ DV

« Bien ventilé »

3

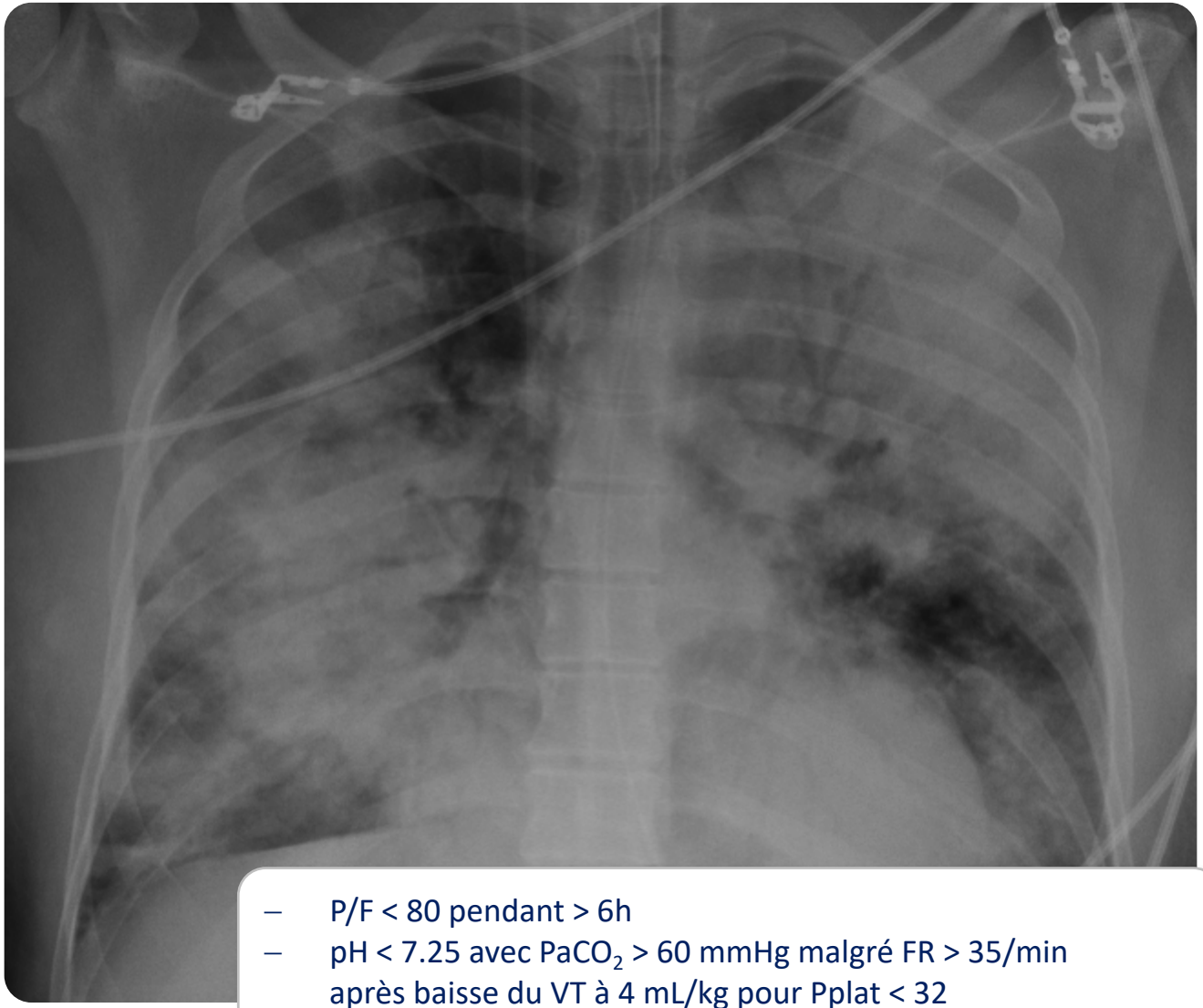
- P/F < 80 pendant > 6h
- pH < 7.25 avec $PaCO_2$ > 60 mmHg malgré FR > 35/min après baisse du VT à 4 mL/kg pour Pplat < 32

Avec hypoxémie ou hypercapnie réfractaire

Mr S. 45 ans
AgU pneumocoque +

VAC 460.30
FiO_2 100%
PEP 12 Pplat 34
pH 7.27
$PaCO_2$ 60 mmHg
PaO_2 66 mmHg

NAD 4 mg/h
RV 3L, marbré
Lactate 6 mmol/L



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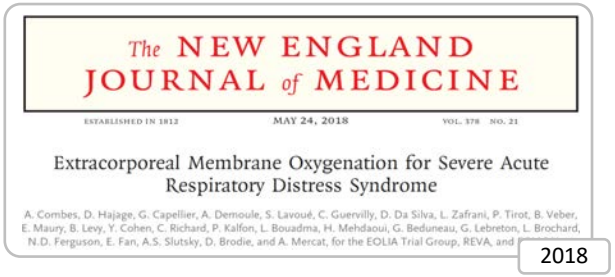

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2018

SE	Lundi	Mardi	Mercredi	Jeudi	Vendredi	Samedi	Dimanche
1				1	2	3	4
2	5	6	7	8	9	10	11
3	12	13	14	15	16	17	18
4	19	20	21	22	23	24	25
5	26	27	28	29	30	31	

Durée médiane de séjour en réa 23 jours

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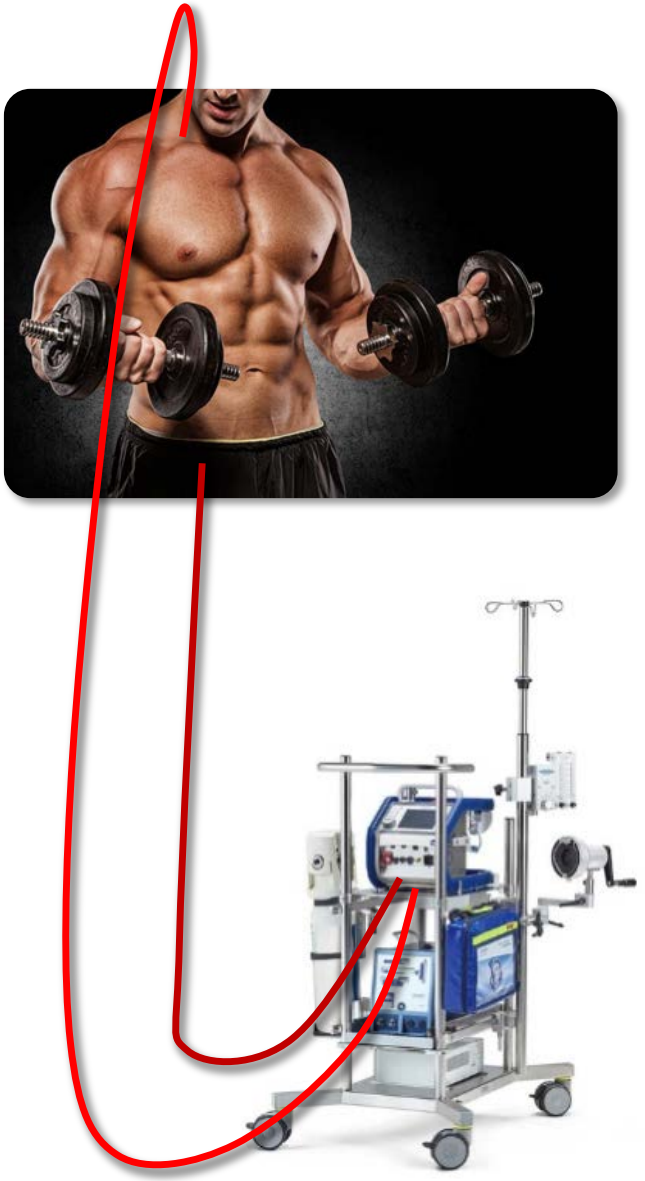

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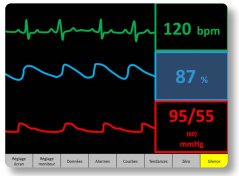
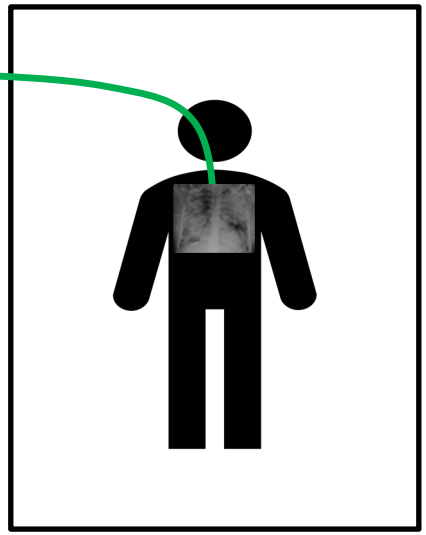
Durée médiane de séjour en réa 23 jours

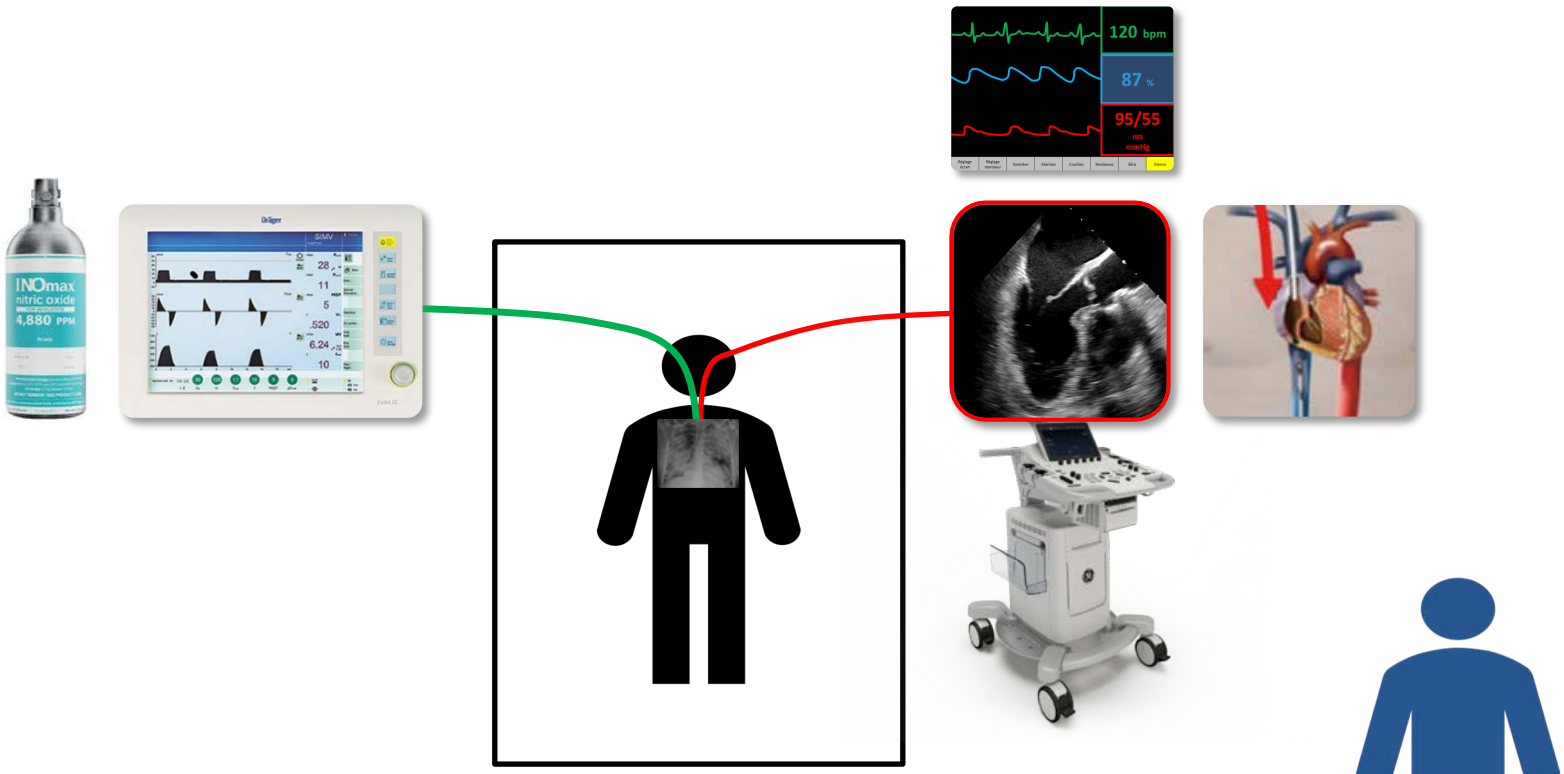
La pose





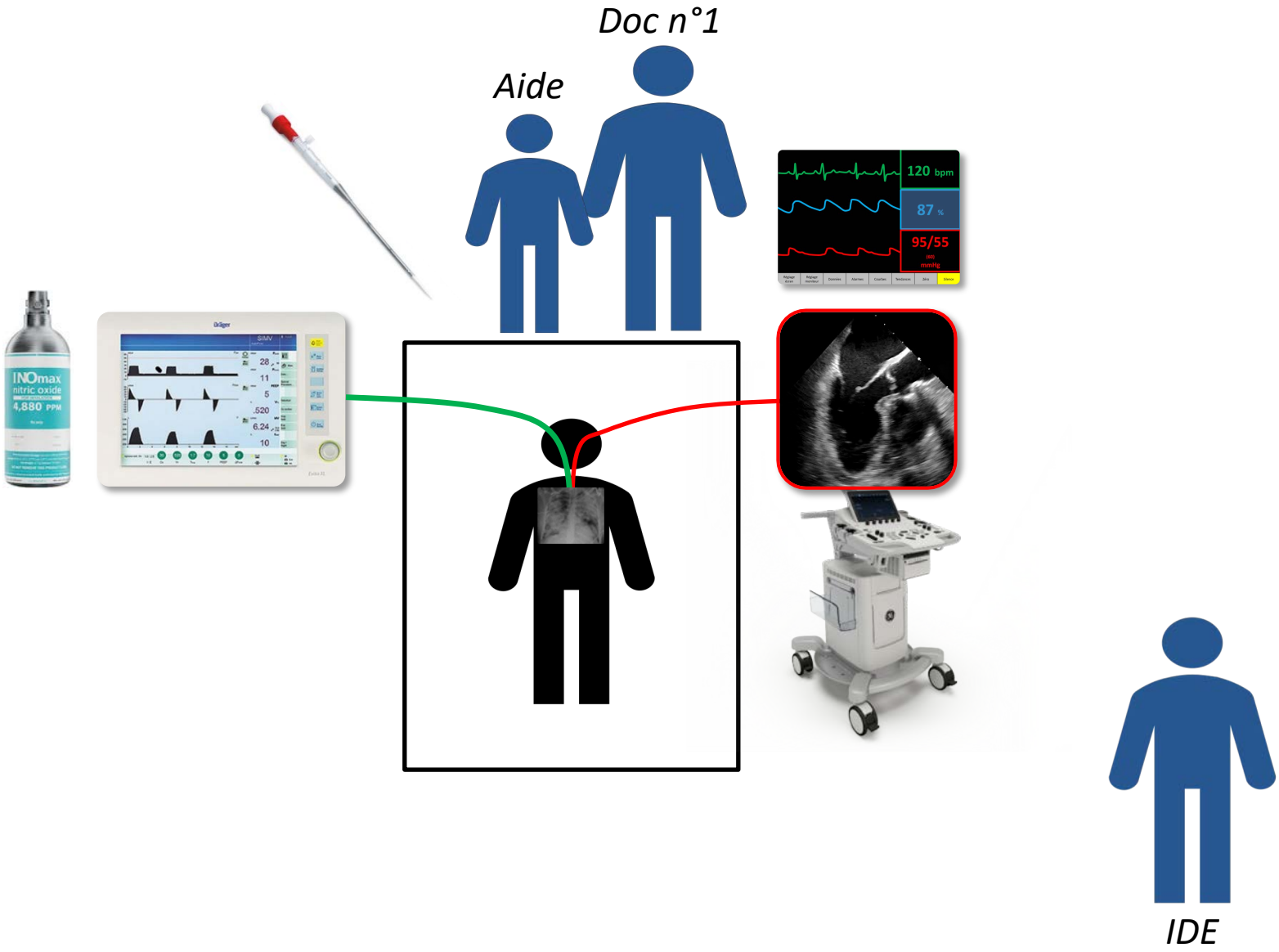
IDE

La pose

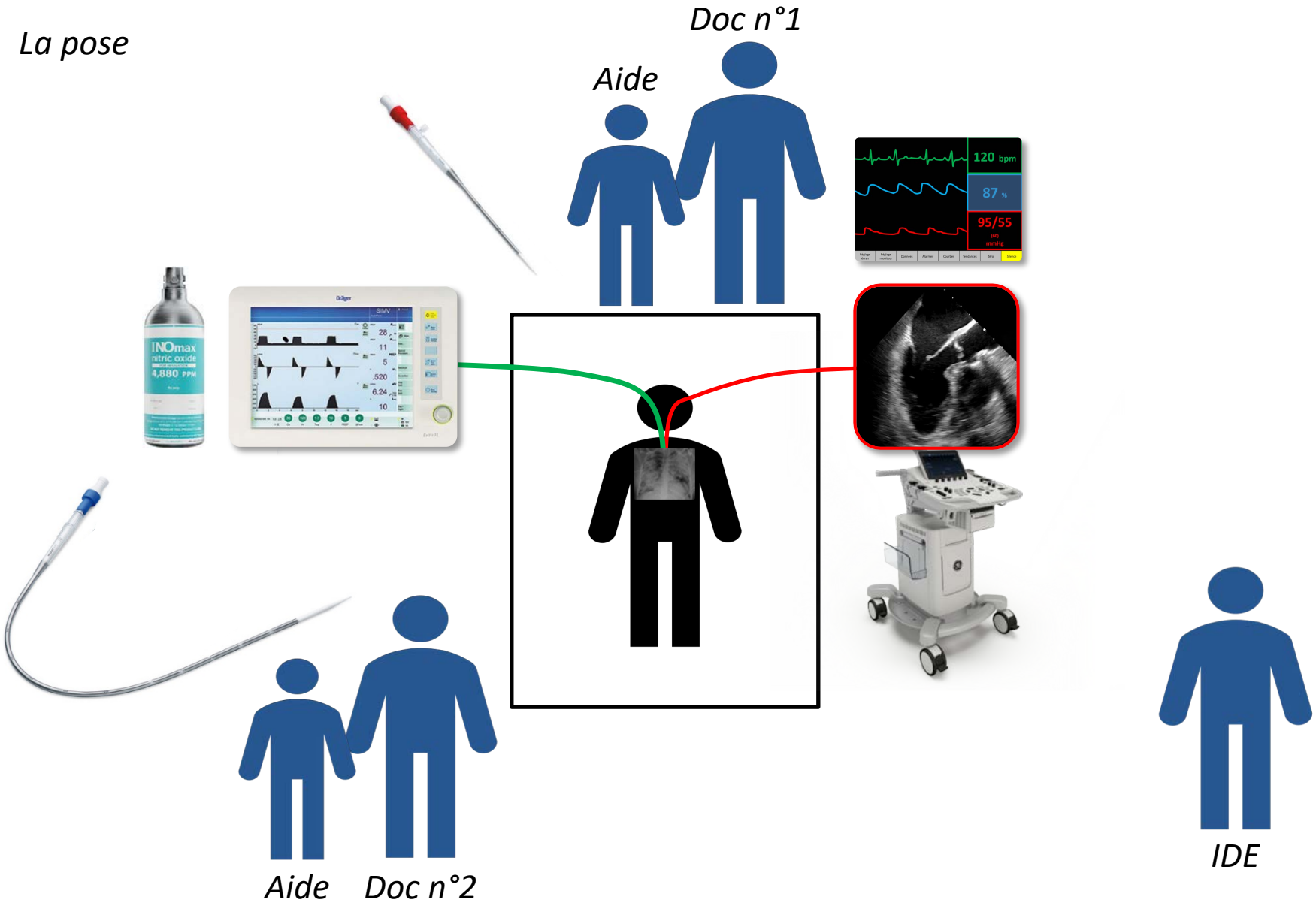


IDE

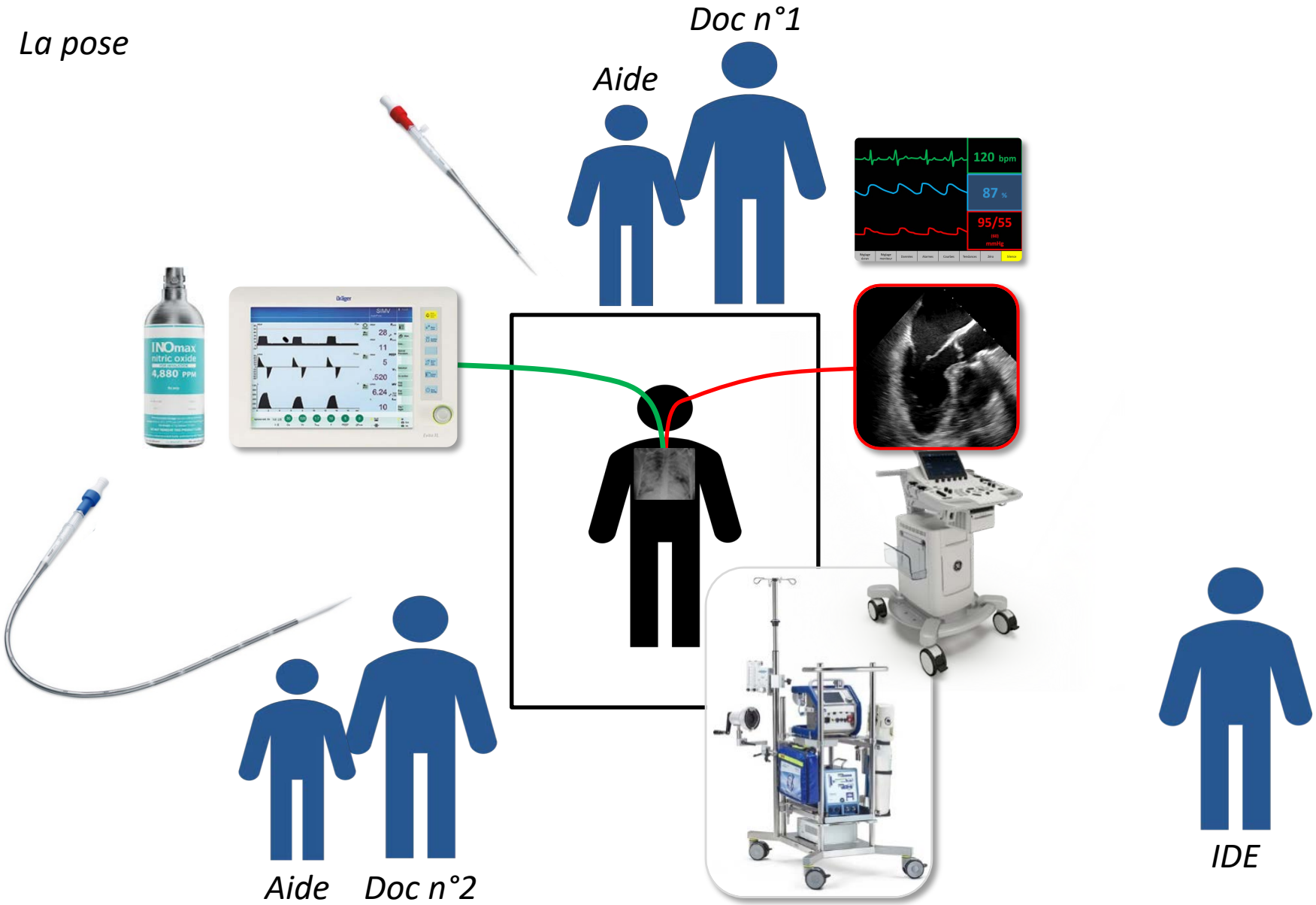
La pose



La pose


Doc n°1
Aide
INOmax
nitric oxide
4,880 PPM
120 bpm
87 %
95/55
Aide
Doc n°2
IDE

La pose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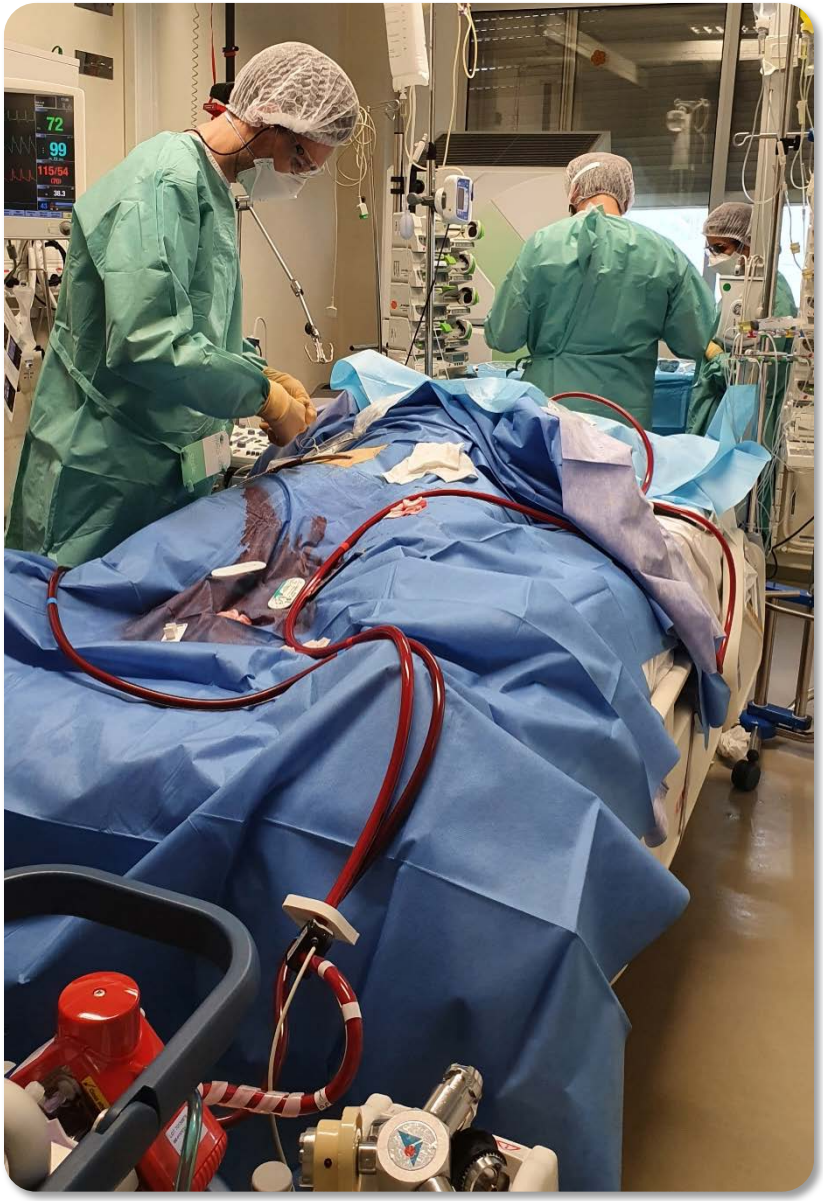
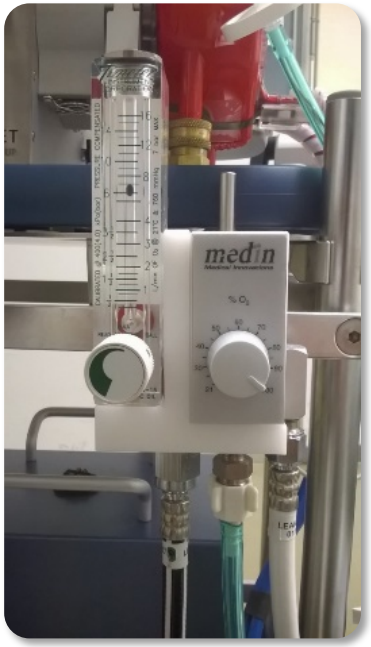
IDE


87
79


72
99
115/54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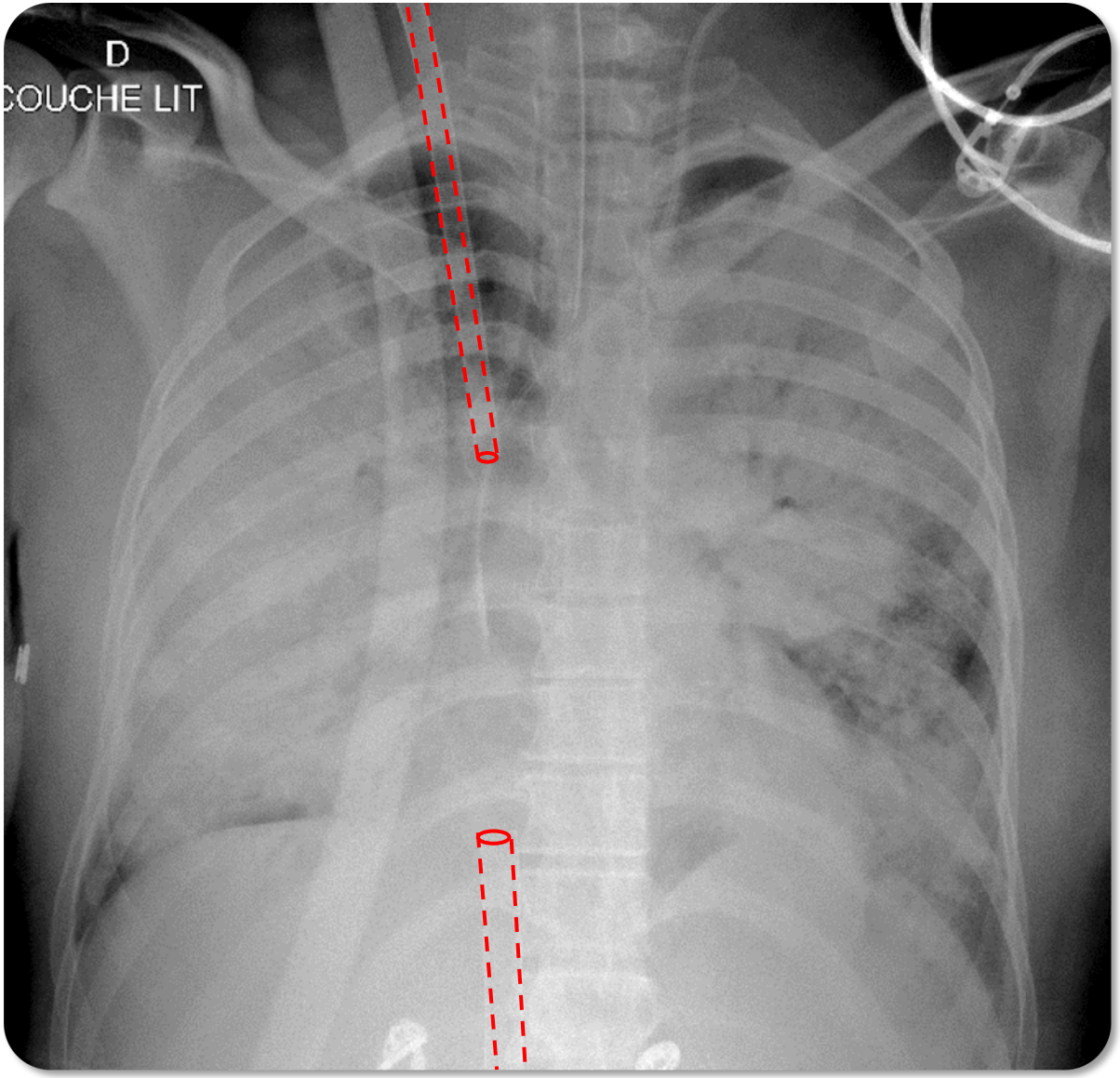
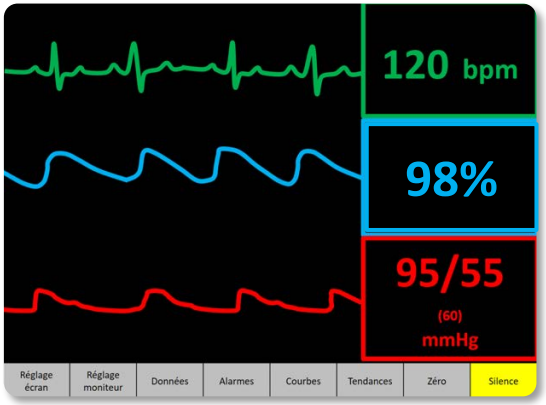
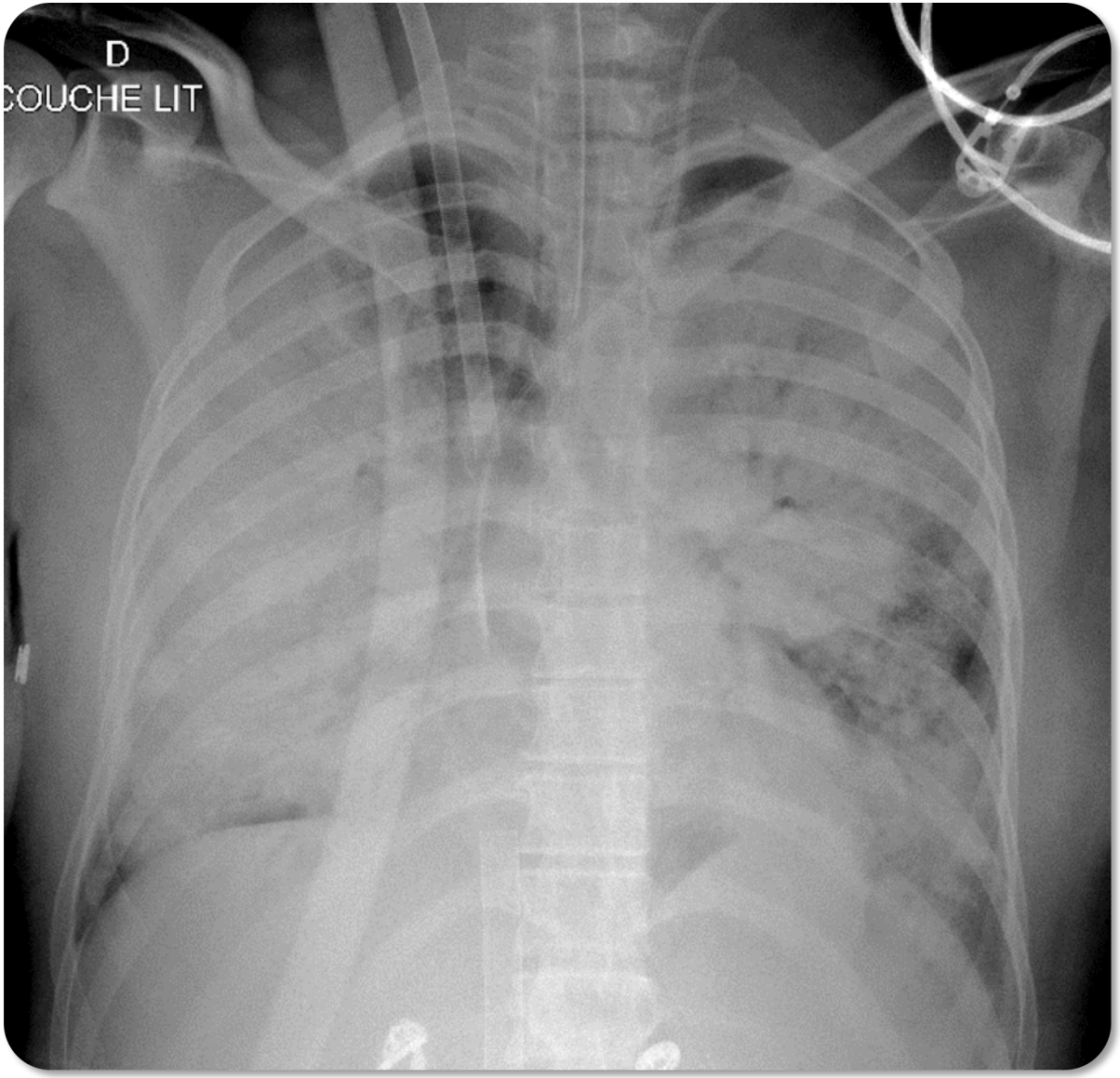

D
COUCHE LIT


120 bpm
98%
95/55
(60)
mmHg
Réglage écran
Réglage moniteur
Données
Alarmes
Courbes
Tendances
Zéro
Silence


D
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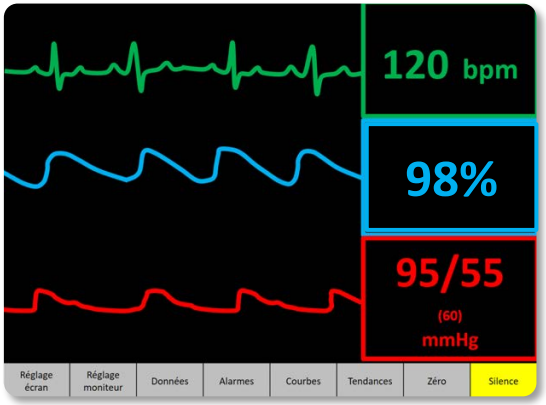
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Données
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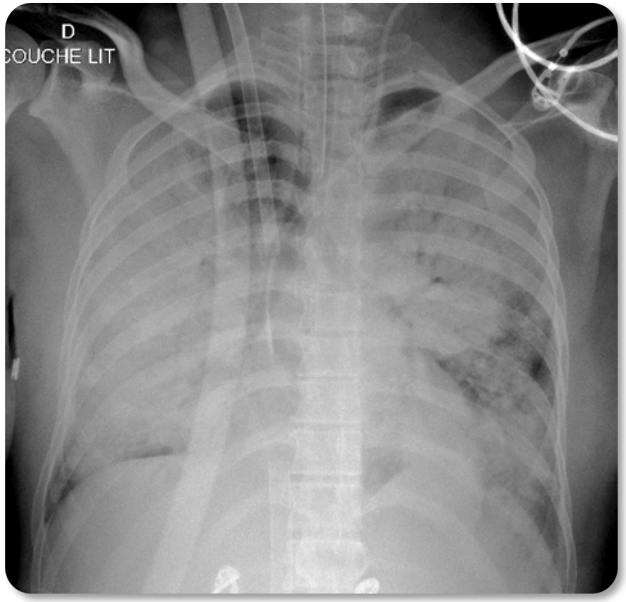
Tendances
Zéro
Silence

*En sécurité pour appliquer une **ventilation ultraprotectrice***



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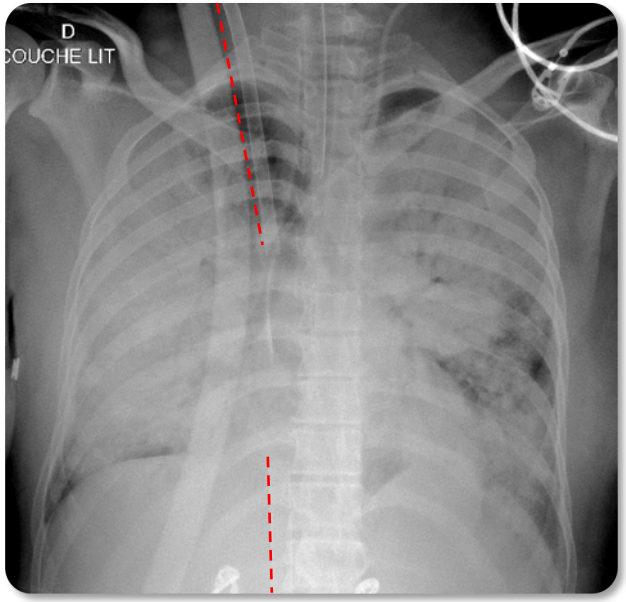
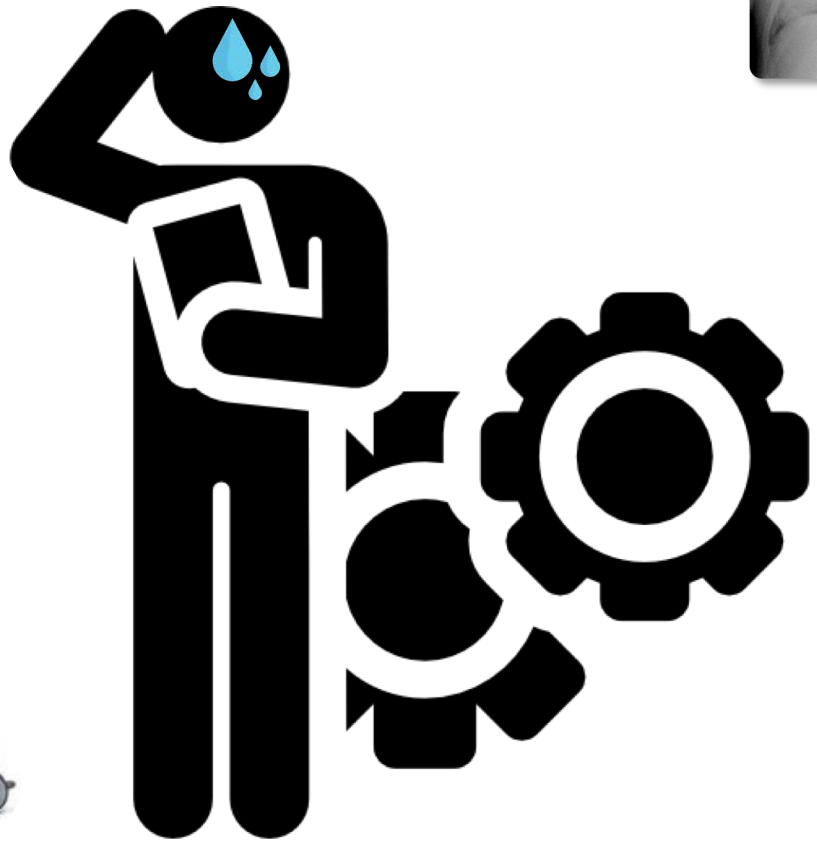


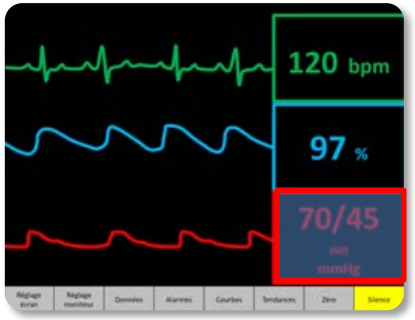
↘ *VT (4 mL/kg)*

↘ *FR 10/min*

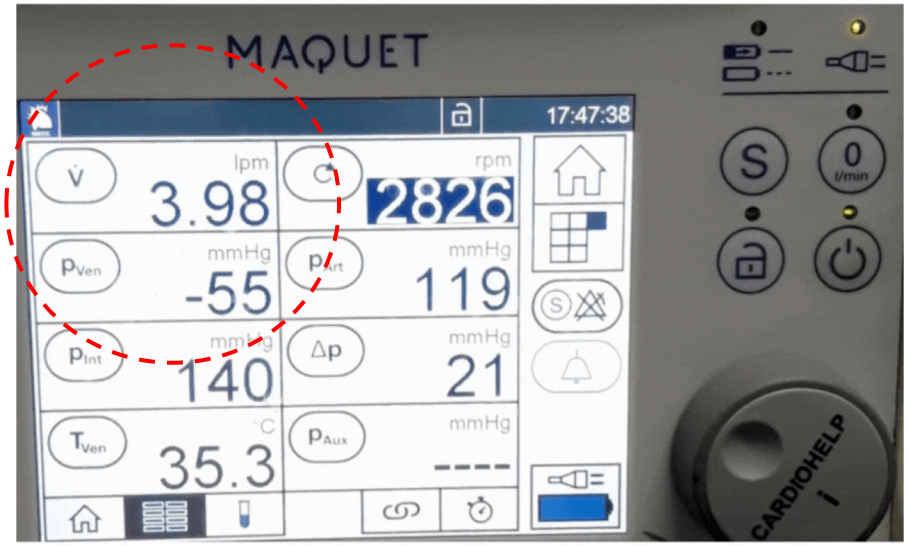
(±↘ PEP)



Pression veineuse négative & fluctuation du débit d'ECMO



$P_{veineuse}$ – 150 mmHg



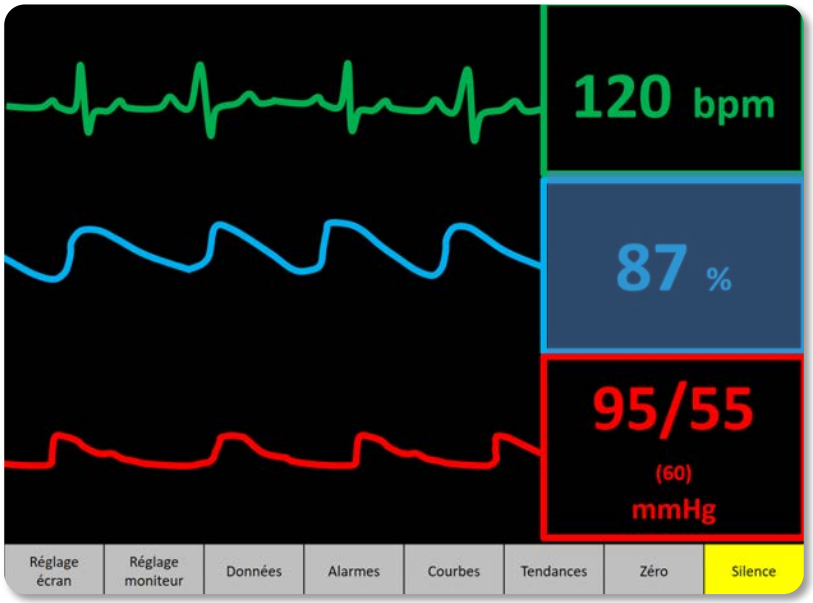
Pression veineuse négative & fluctuation du débit d'ECMO

La « danse des canules »

Pression veineuse négative & fluctuation du débit d'ECMO

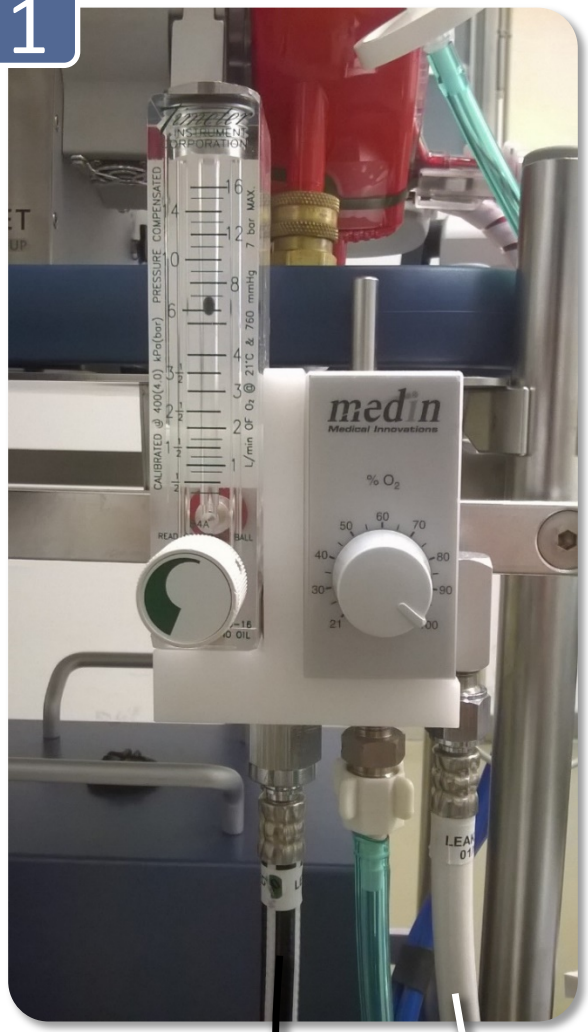
*Pompe centrifuge : **Précharge (volémie)**, RPM et postcharge dépendante*

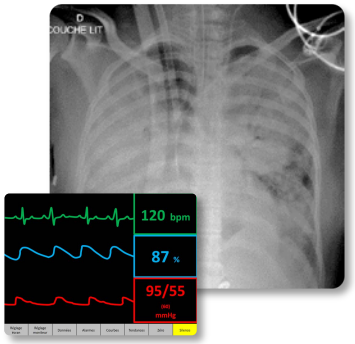
Hypoxémie sous ECMO VV



Hypoxémie sous ECMO VV

1

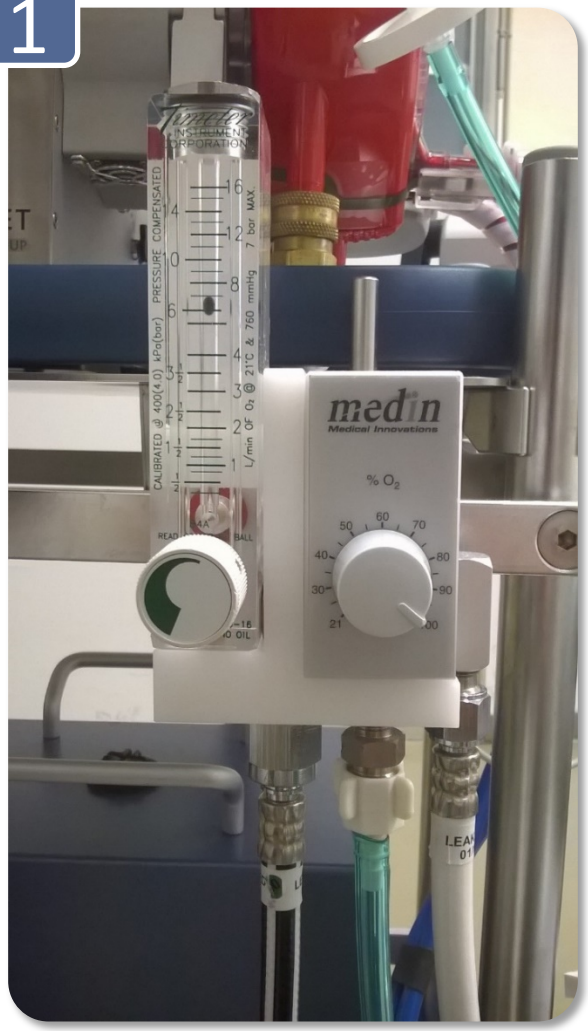


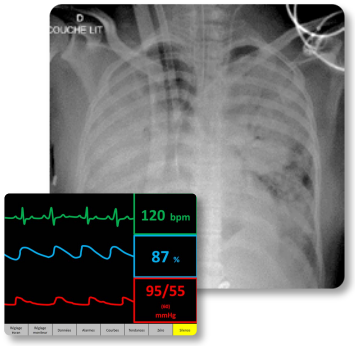


L'ECMO est-elle connectée au gaz muraux ?

Hypoxémie sous ECMO VV

1





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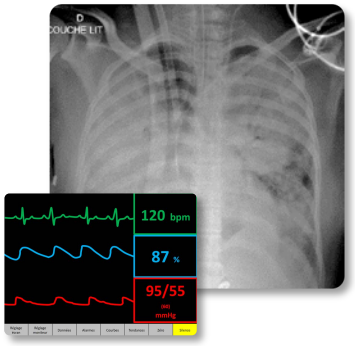

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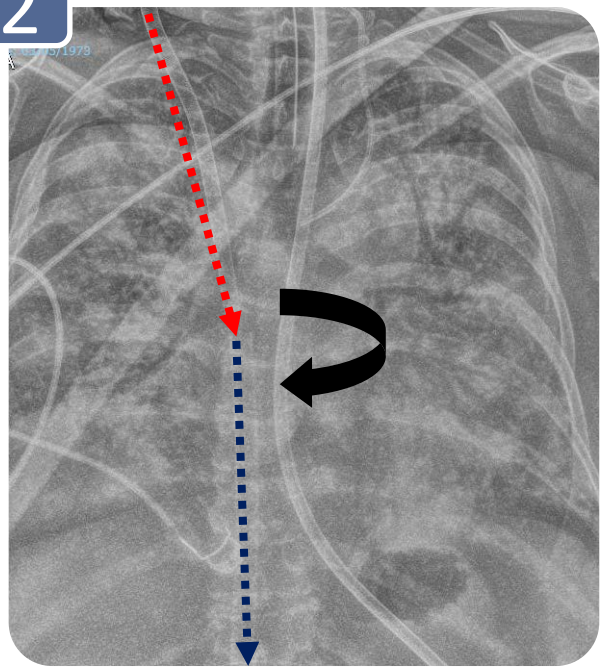
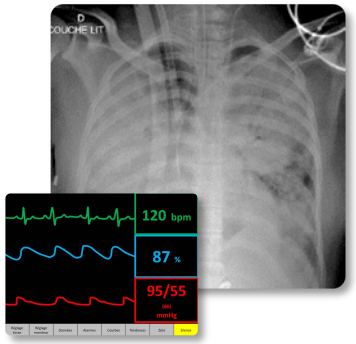


Recirculation ?

Hypoxémie sous ECMO VV



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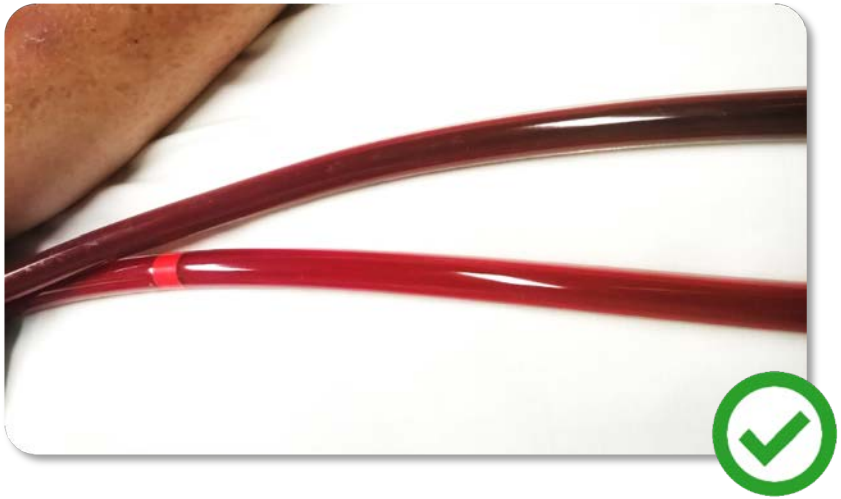
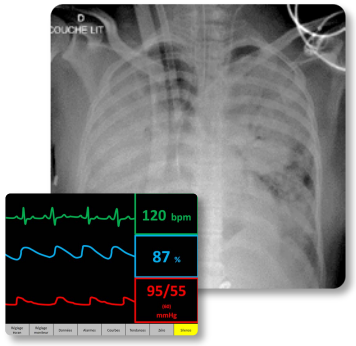
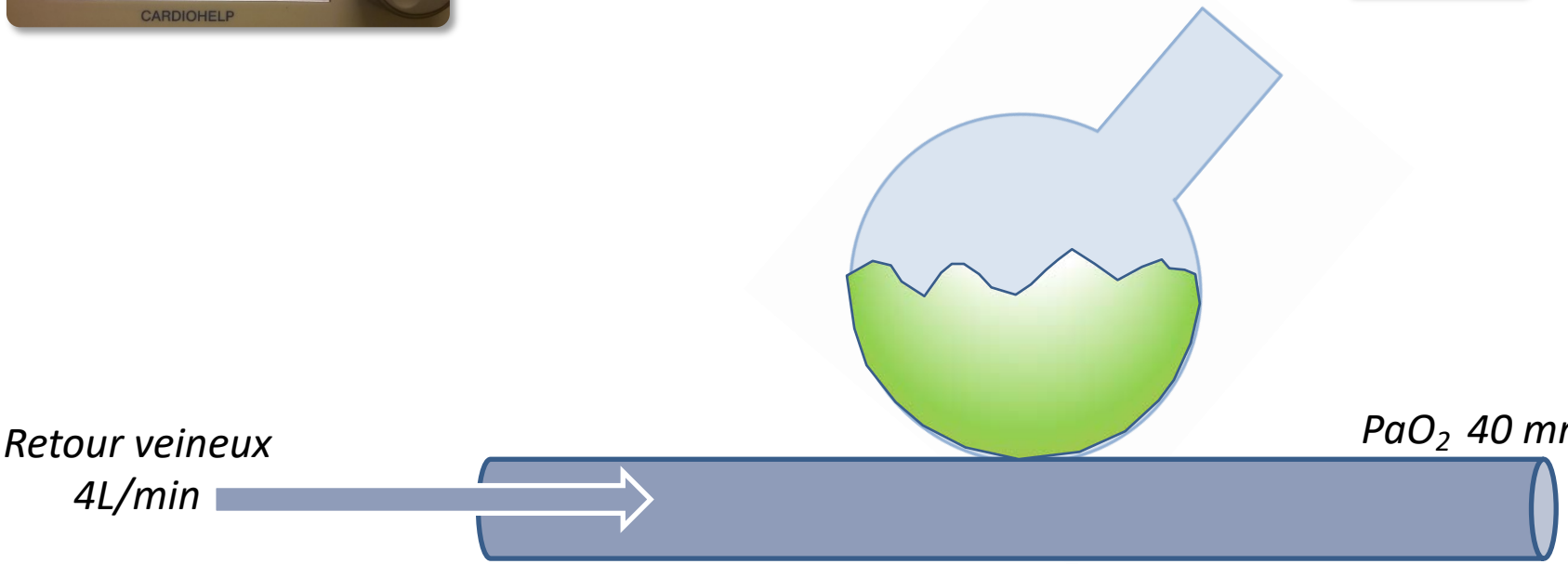


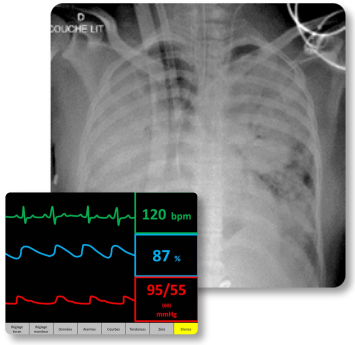
Débit d'ECMO insuffisant par rapport au retour veineux ?

Hypoxémie sous ECMO VV





Hypoxémie sous ECMO VV



Débit d'ECMO
4L/min

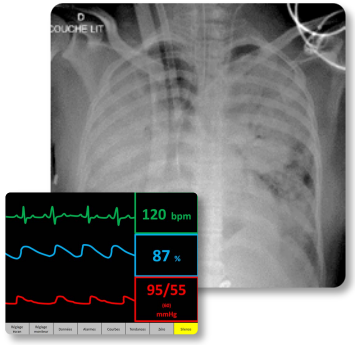
ECMO

↗ PvO_2

Retour veineux
4L/min

PaO_2 80 mmHg

Hypoxémie sous ECMO VV



Débit d'ECMO
4L/min

ECMO

↗ PvO_2

Retour veineux
8L/min

PaO_2 50 mmHg

Débit d'ECMO insuffisant par rapport au retour veineux

Hémorragie

Hémorragie

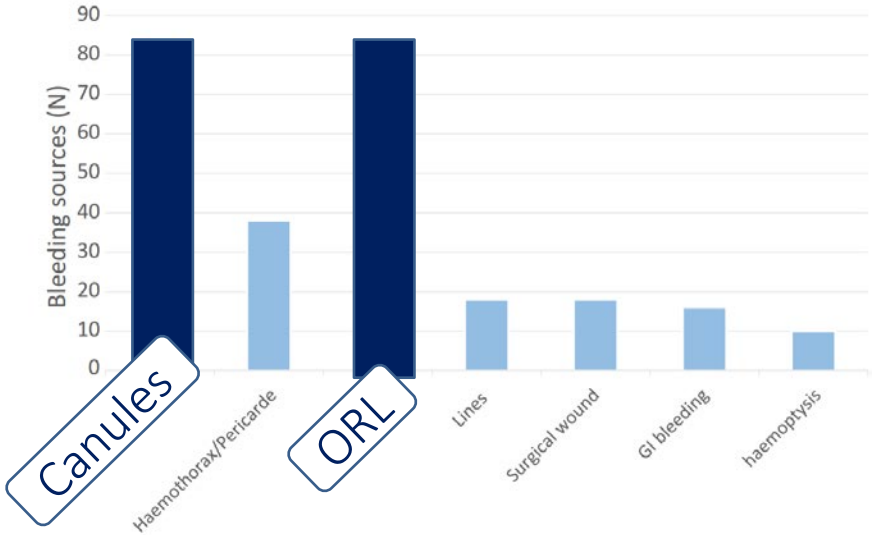
RESEARCH Open Access

Predictive factors of bleeding events in adults undergoing extracorporeal membrane oxygenation

Cécile Aubron[1,2,7,8*], Joris DePuydt[3,4], François Belon[5], Michael Bailey[1], Matthieu Schmidt[1,9], Jayne Sheldrake[1], Deirdre Murphy[3,6], Carlos Scheinkestel[3,6], D Jamie Cooper[1,3], Gilles Capellier[5], Vincent Pellegrino[3,6], David Pilcher[1,3] and Zoe McQuilten[1,2]

AIC Annals of Intensive Care

2016

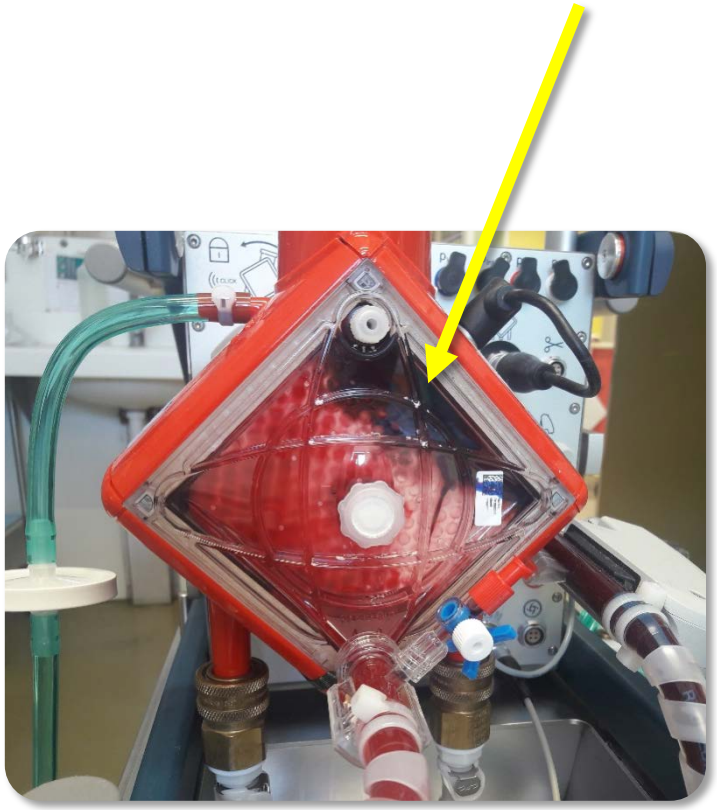


Hémorragie

Héparine

Hémorragie

Héparine



Hémorragie

Héparine

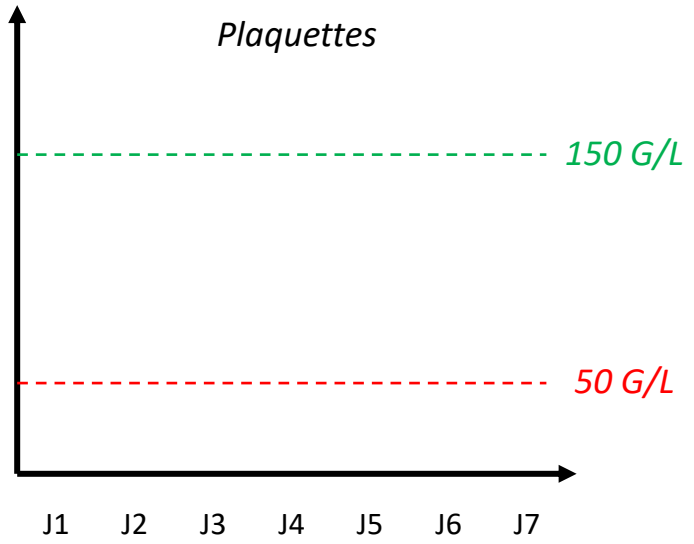
AntiXa 0,2-0,3

Hémorragie

Héparine

AntiXa 0,2-0,3

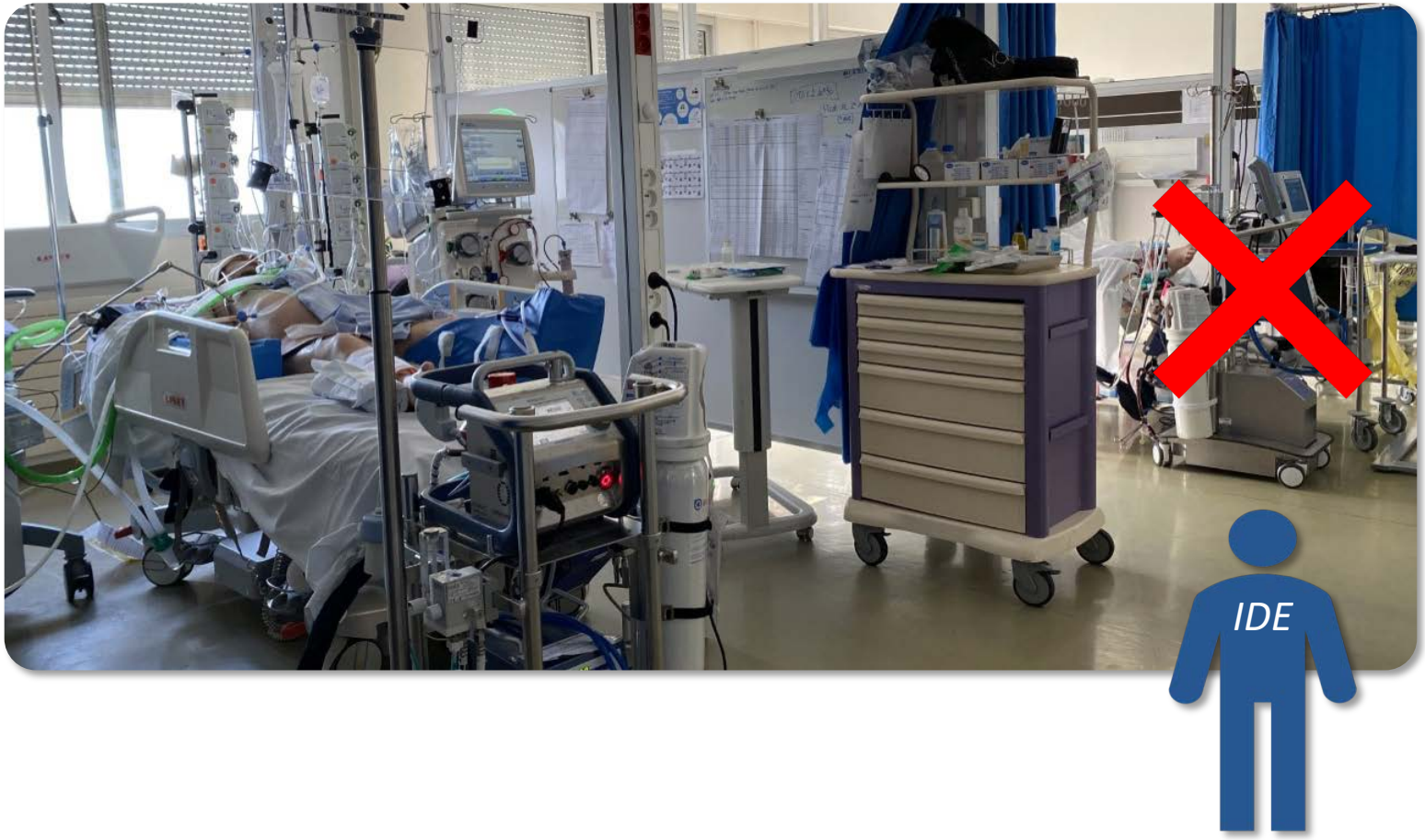
Thrombopénie



Hémorragie

L'organisation : 2 IDE pour 5 patients

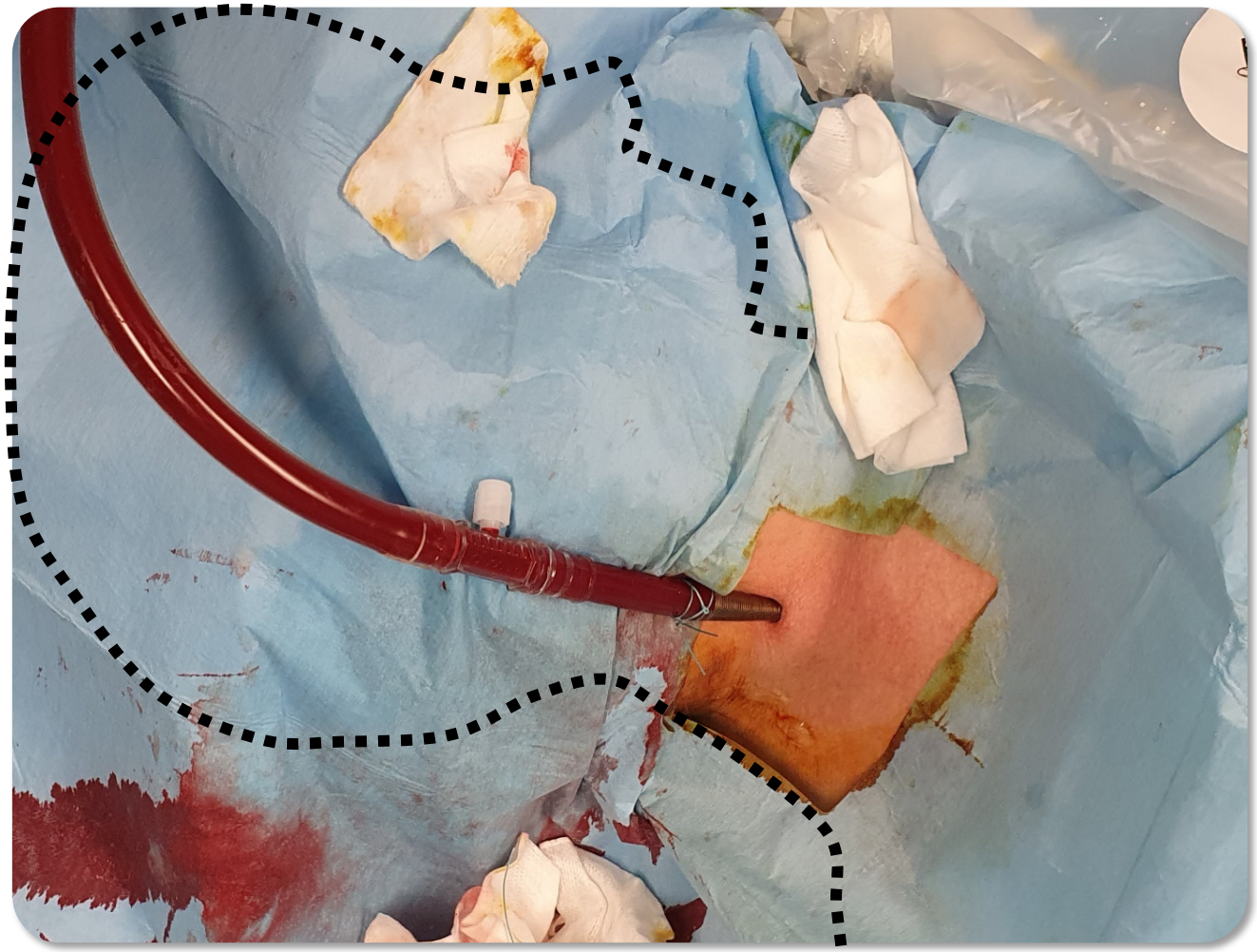
L'organisation : 2 IDE pour 5 patients



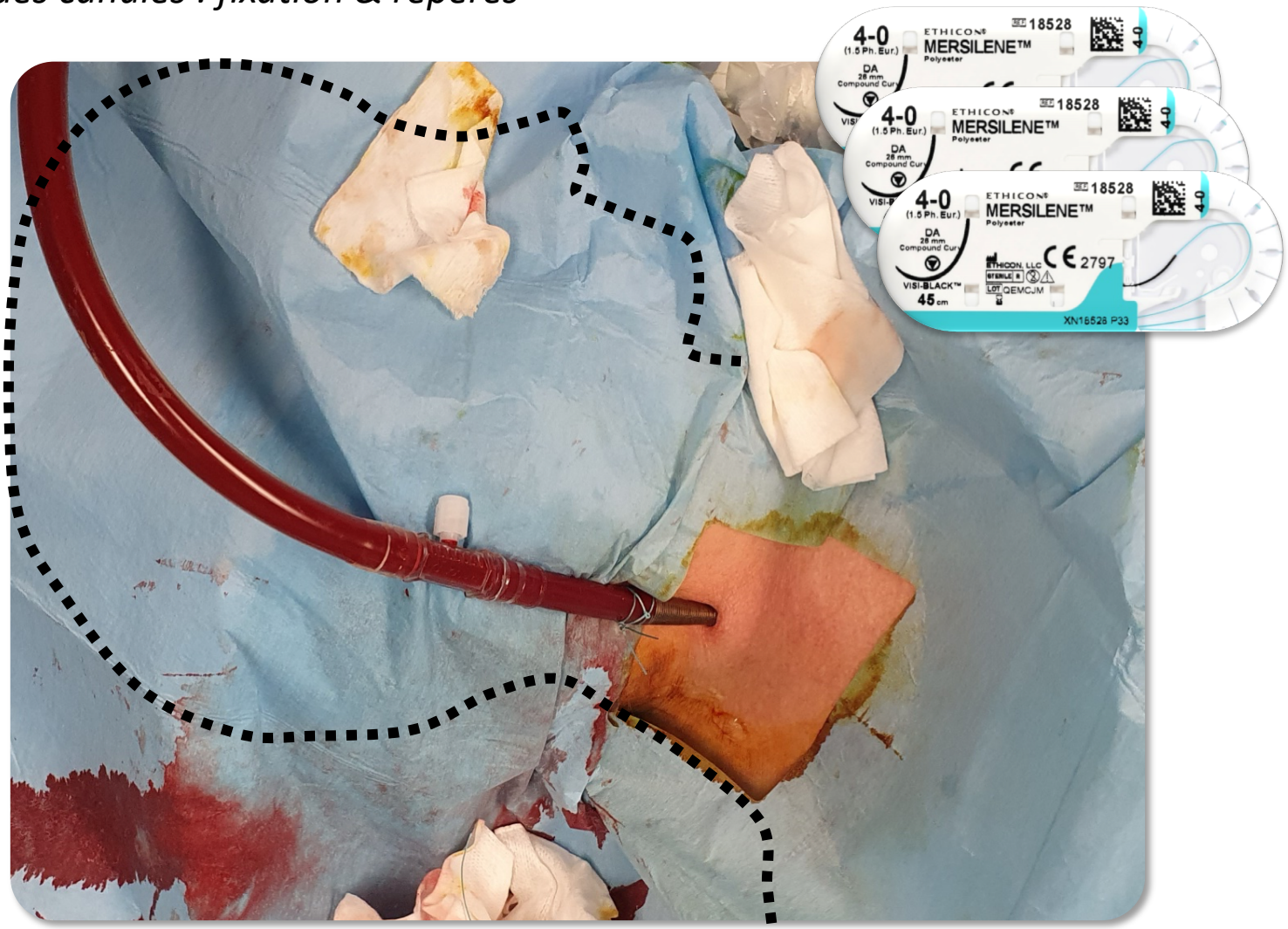
	Matin	Soir	Nuit
CONSOLE CEC :			
- Branchement électrique (réseau onduleur)	□	□	□
- Voyant batterie	□	□	□
- Manivelle accessible et tournable sans obstacle	□	□	□
- Vérification alarmes de pression (Ve-80&Art +400)	□	□	□
- Présence de clamps métal sur la console (min 2)	□	□	□
FLUIDE MEDICAUX :			
- Branchement O_2 mural	□	□	□
- Branchement Air mural	□	□	□
- Connexion au mélangeur	□	□	□
- Bouteille O_2 pleine	□	□	□
GROUPE THERMIQUE :			
- Branchement électrique (prise blanche)	□	□	□
- Température	…	…	…
- Absence de fuite d'eau	□	□	□
OXYGENATEUR :			
- Absence de fuite plasmatique	□	□	□
- Absence de thrombus visible	□	□	□
CANULES :			
- Absence de fuite de sang	□	□	□
- Connexions vérifiées visuellement	□	□	□
- Absence de coudure	□	□	□
- Alignement des lignes dans l'axe du membre	□	□	□
- Différence de couleur entre les lignes veineuse et artérielle	□	□	□
- Robinet pour EER	□	□	□

Checklist spécifique

Surveillance des canules : fixation & repères



Surveillance des canules : fixation & repères



Surveillance des canules : fixation & repères

Mobilisation : la ligne de vie

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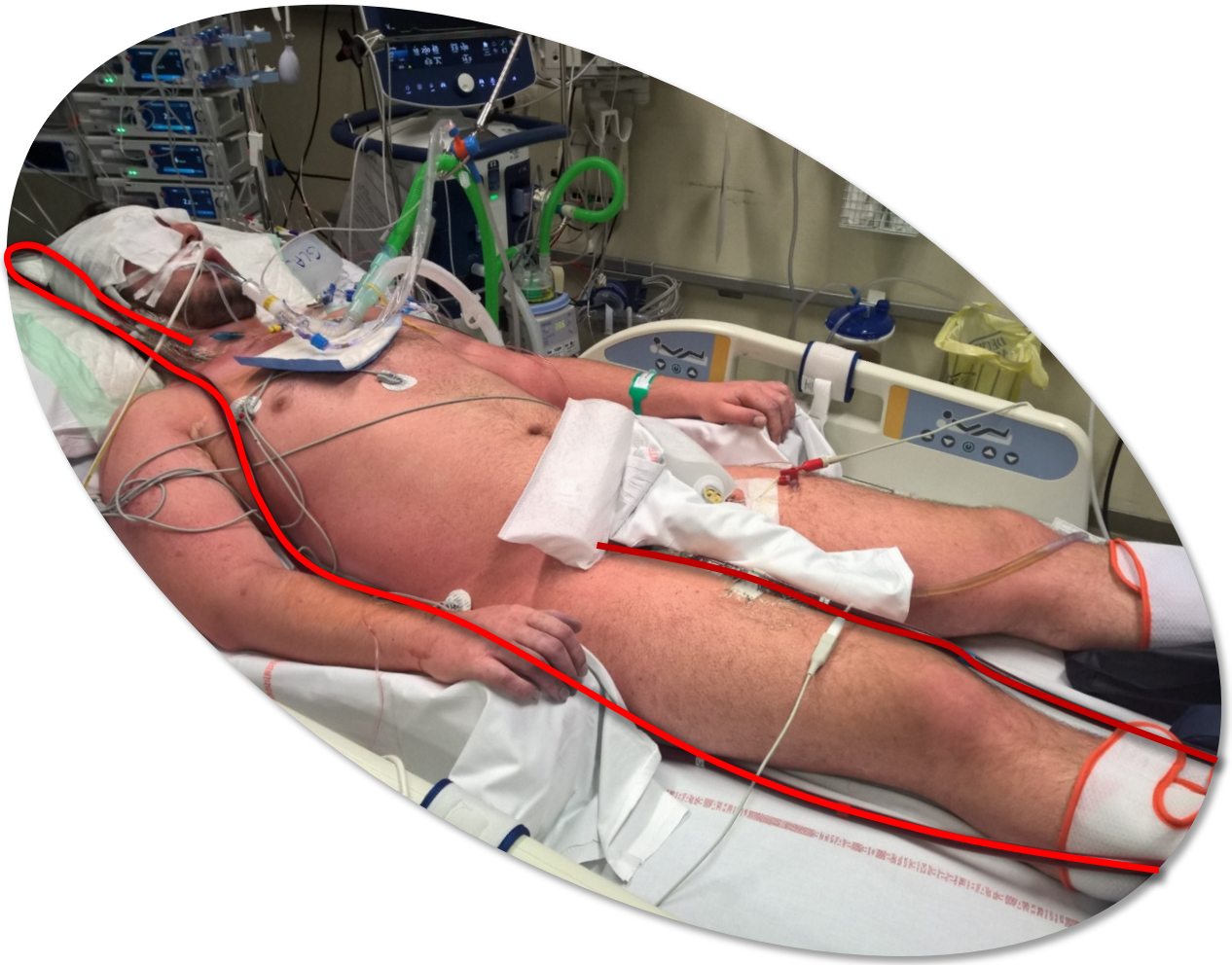


Mobilisation

DV ?

JAMA | Original Investigation | CARING FOR THE CRITICALLY ILL PATIENT

Prone Positioning During Extracorporeal Membrane Oxygenation in Patients With Severe ARDS

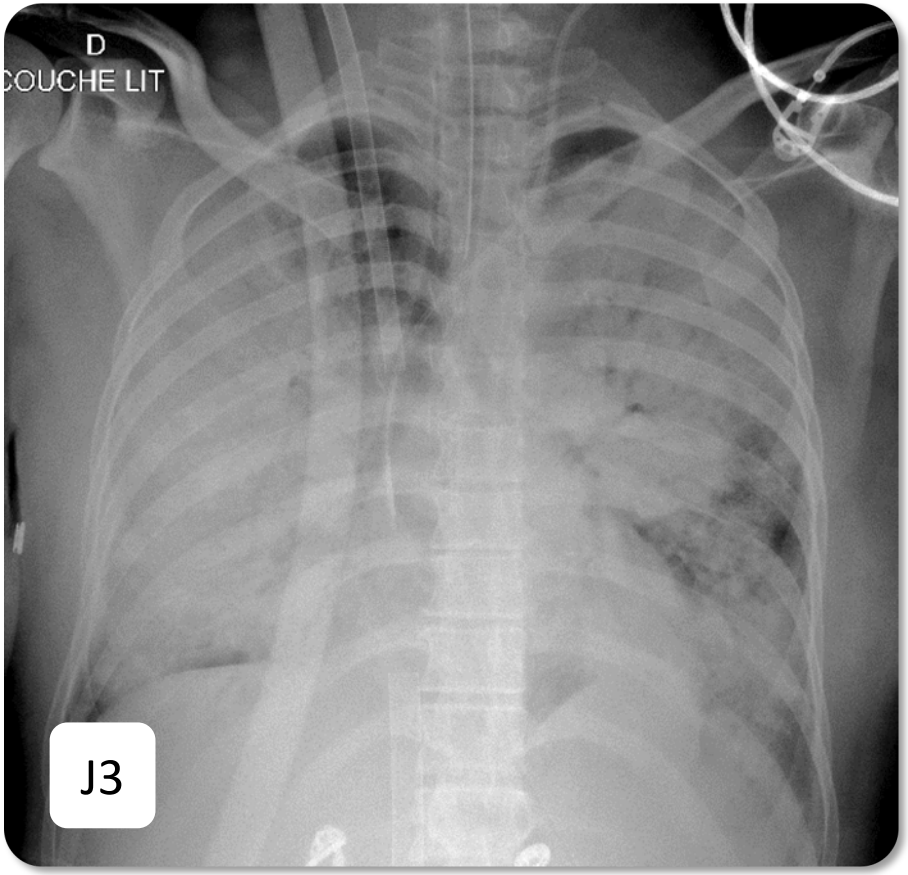
The PRONECMO Randomized Clinical Trial

Matthieu Schmidt, MD; David Hajage, MD; Guillaume Lebreton, MD; Martin Dres, MD; Christophe Guervilly, MD;

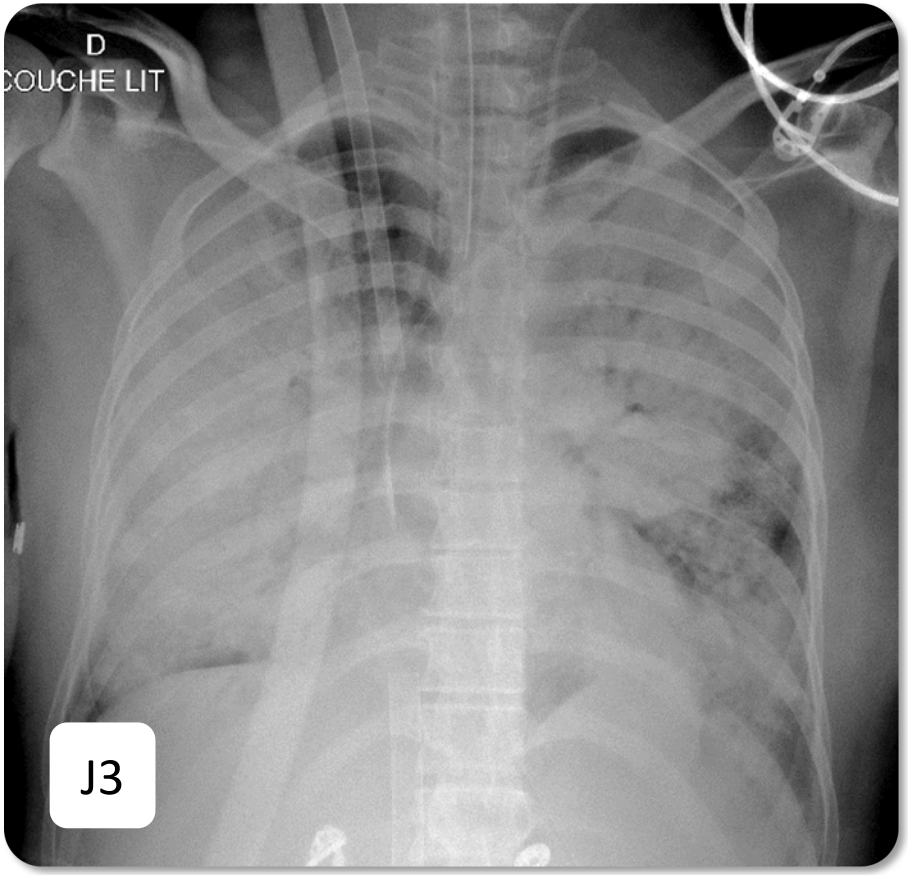
2023

DV

Faisable



pH 7,25
PaCO2 40 mmHg
HCO3 15 mmol/L
Créatinine 300 µmol/L
Diurèse 200 mL/48h



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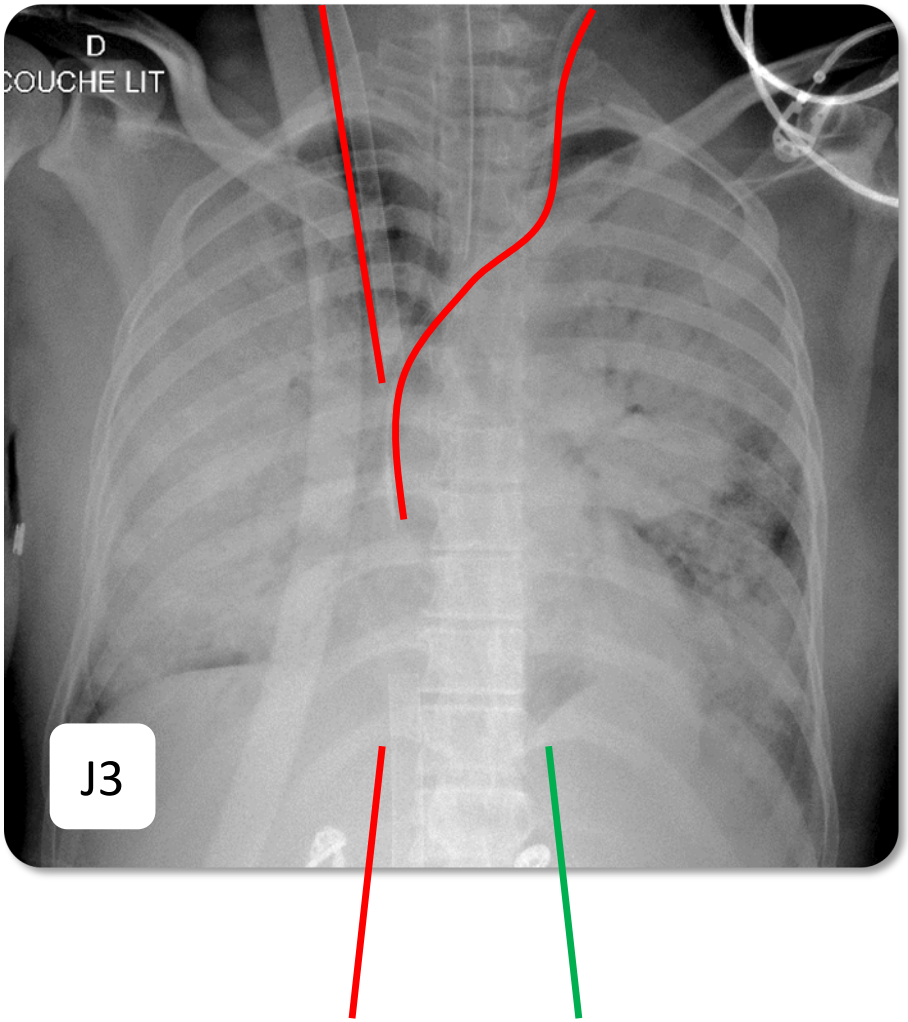

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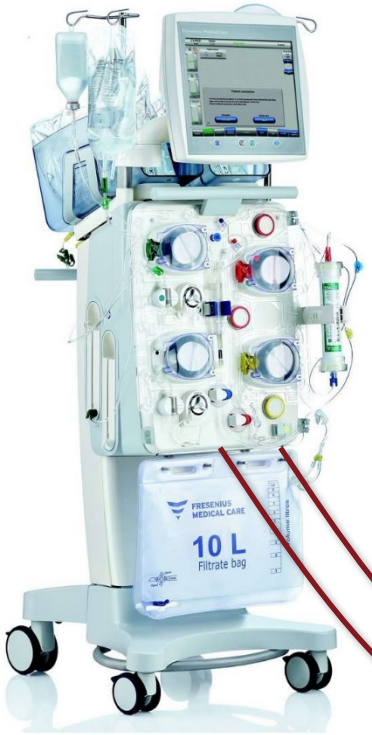
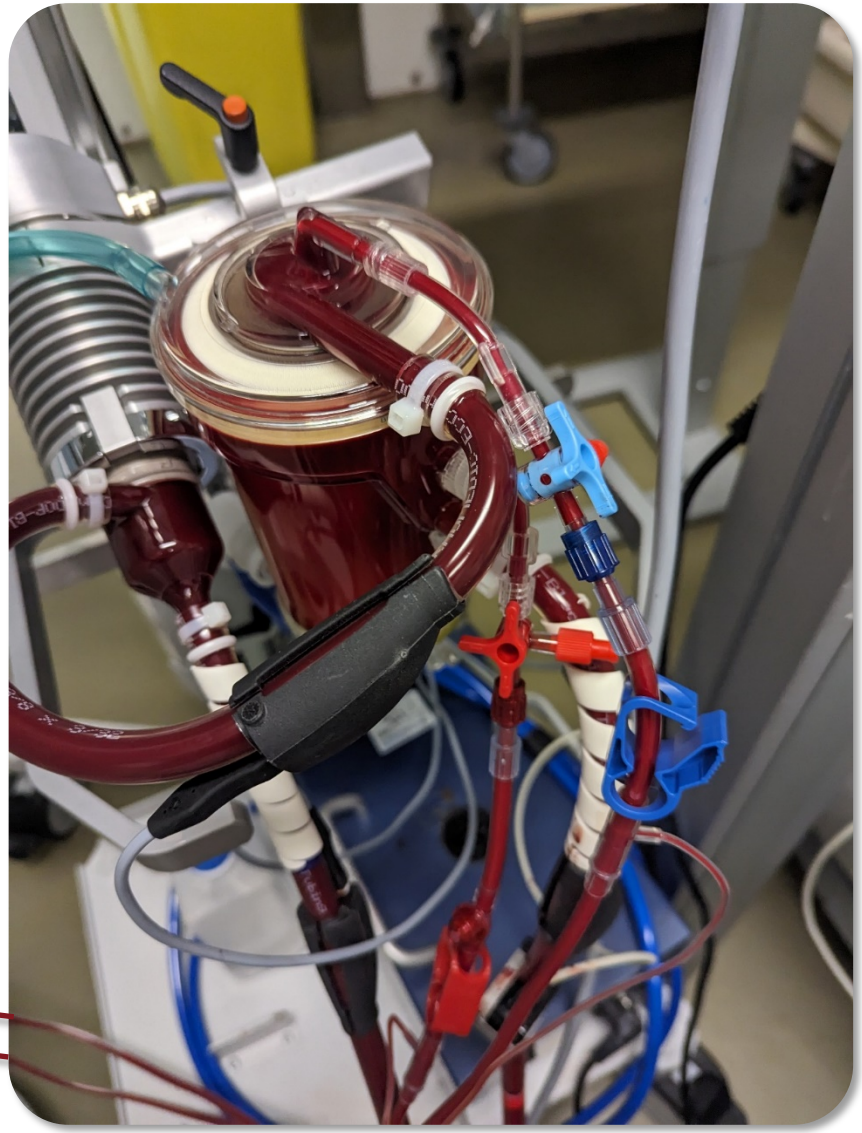
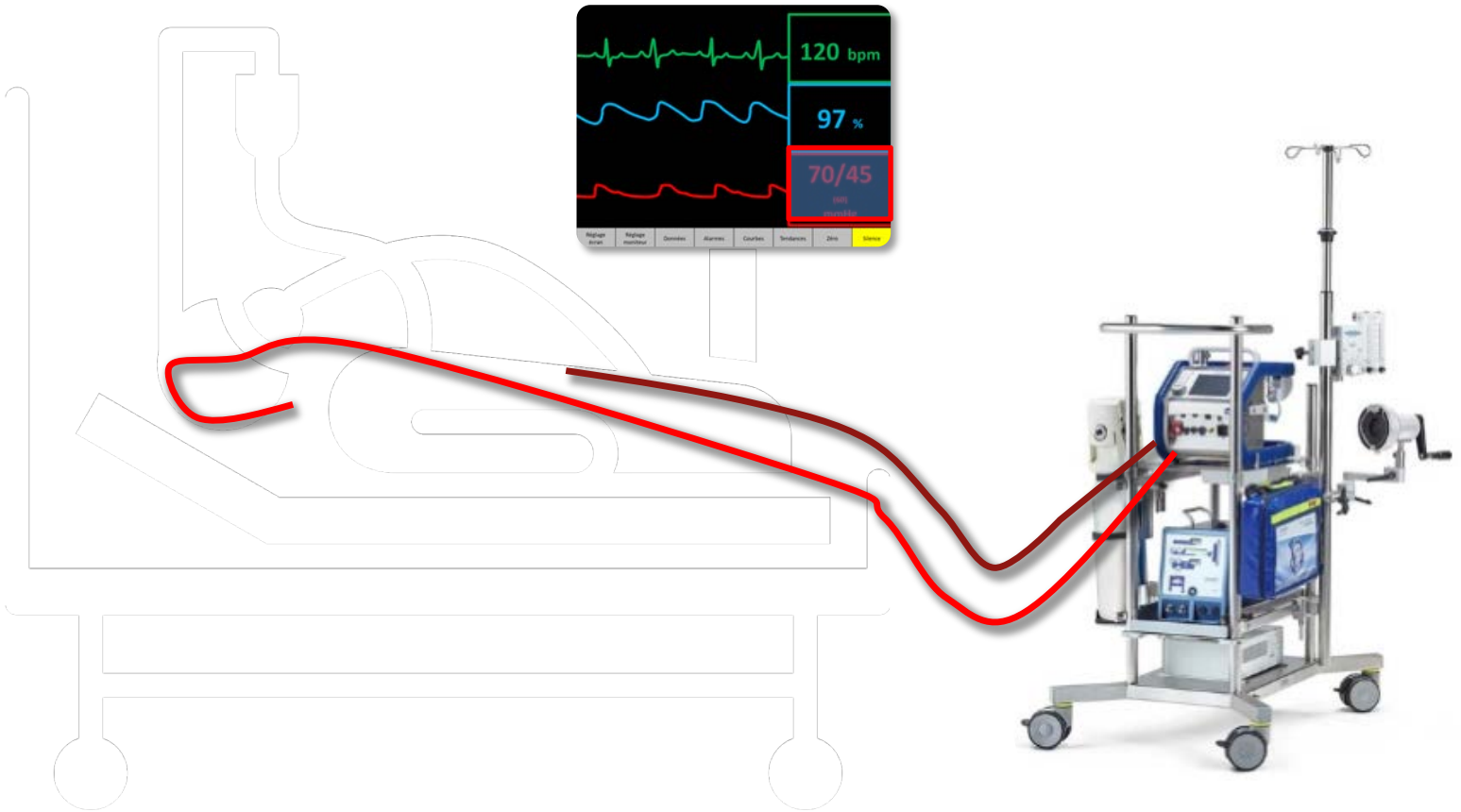

FRESENIUS
MEDICAL CARE
10 L
Filtrate bag



Sepsis



J10

Sepsis

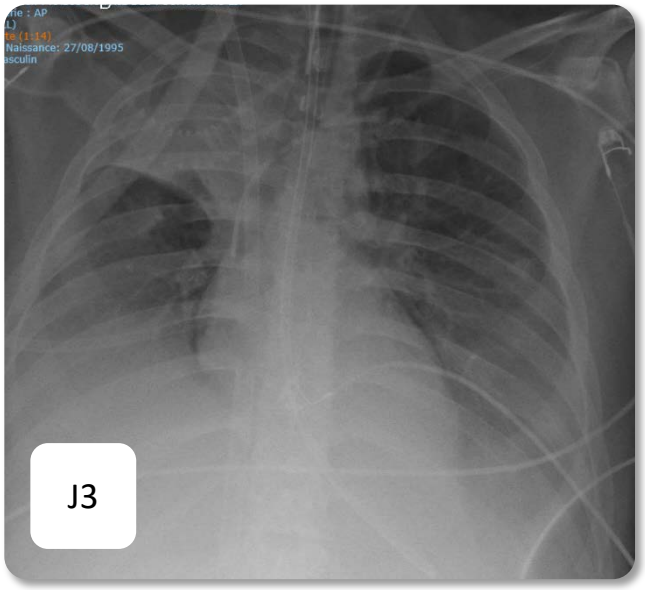
J10

La circulation extracorporelle masque la fièvre

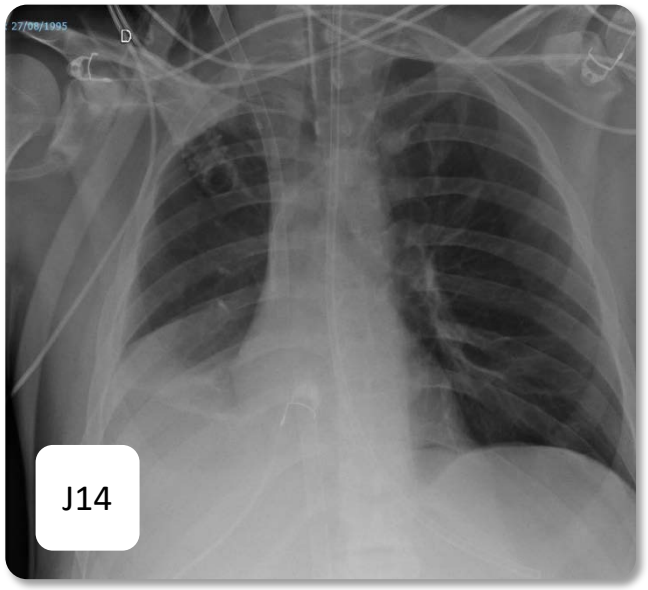
Sepsis

J10

Le sevrage



Le sevrage



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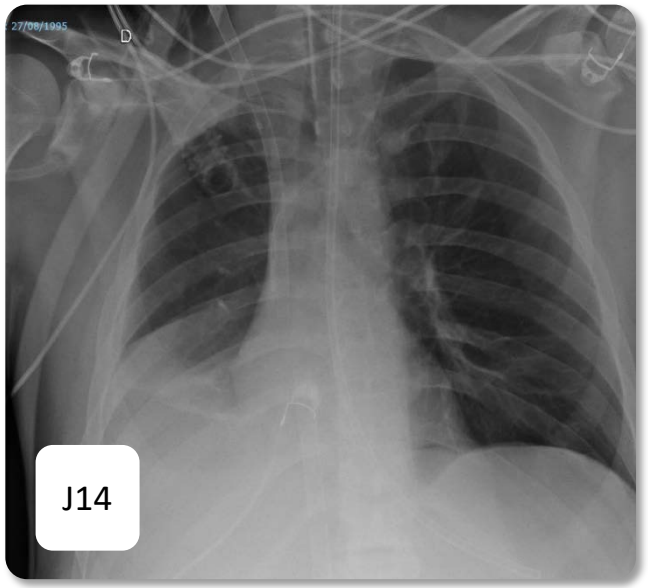

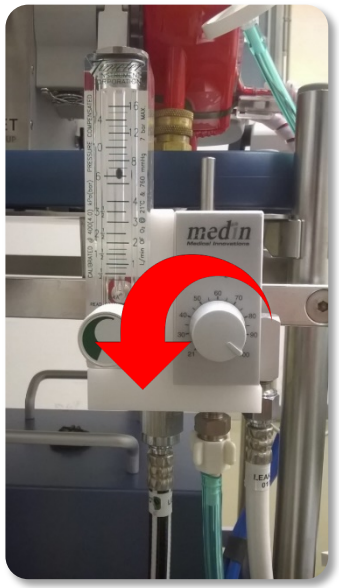

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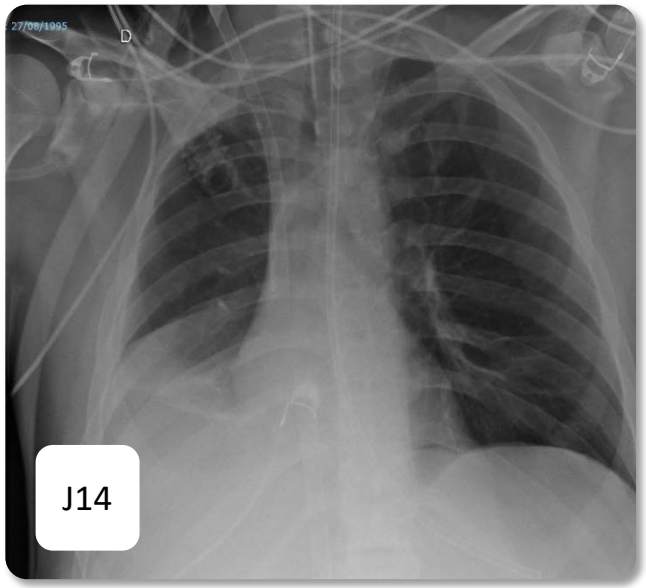

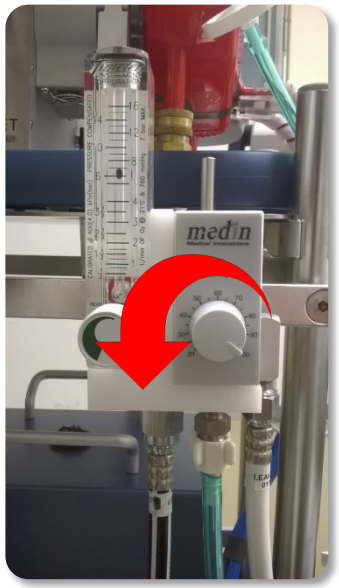

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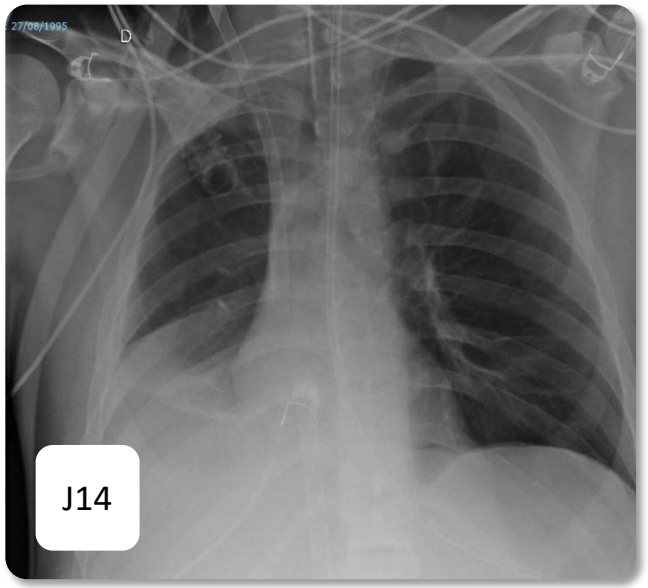

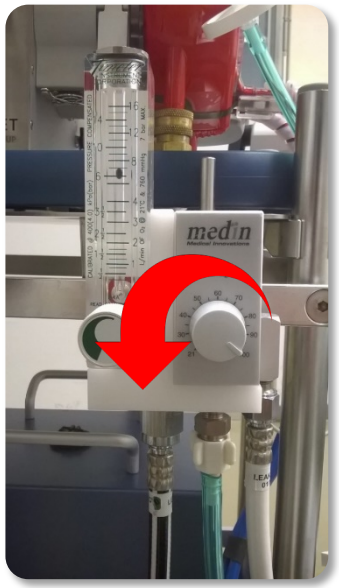

P/F
pH
PaCO2
$P_{Plateau}$

<u>S'entrainer</u> à régir dans l'urgence : la décanulation accidentelle

La règle des 3C

<u>S'entrainer</u> à régir dans l'urgence : la décanulation accidentelle

La règle des 3C

On Clampe,

On Comprime,

On Crie !!!

Les 4 points à retenir

L'ECMO VV augmente la PvO_2

SDRA avec PEP ≥ 10 & P/F < 80 pendant > 6h

SpO2 < 92% : couleur des canules & Q_{ECMO}

La bonne fixation permet la mobilisation