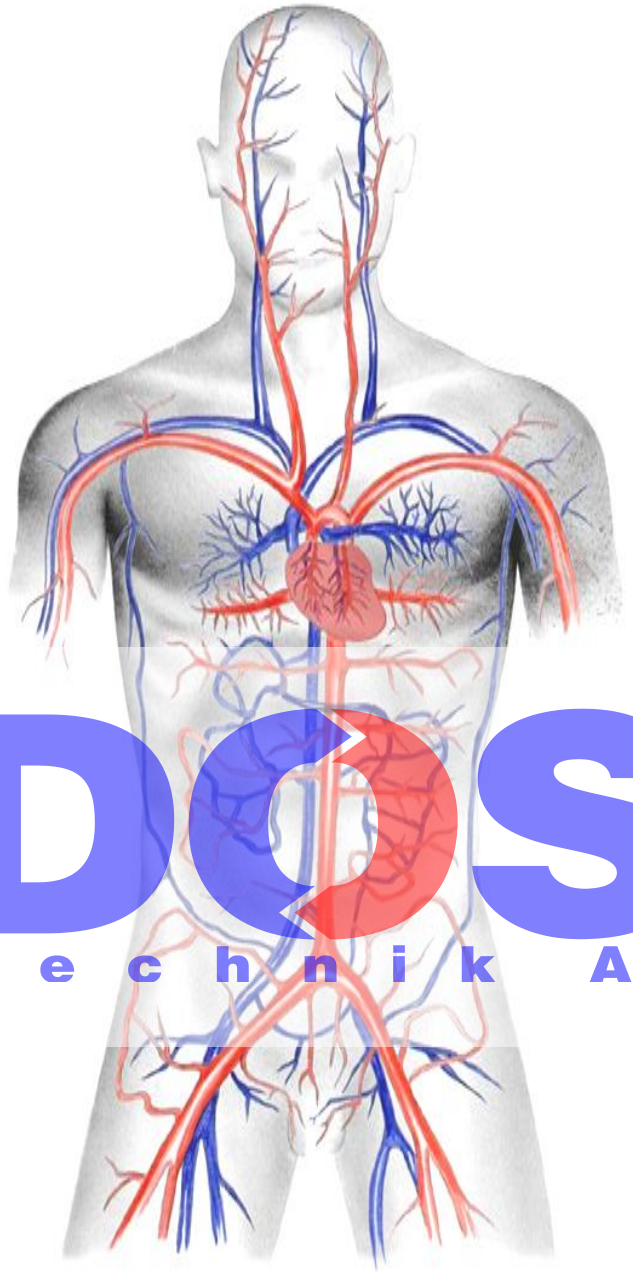

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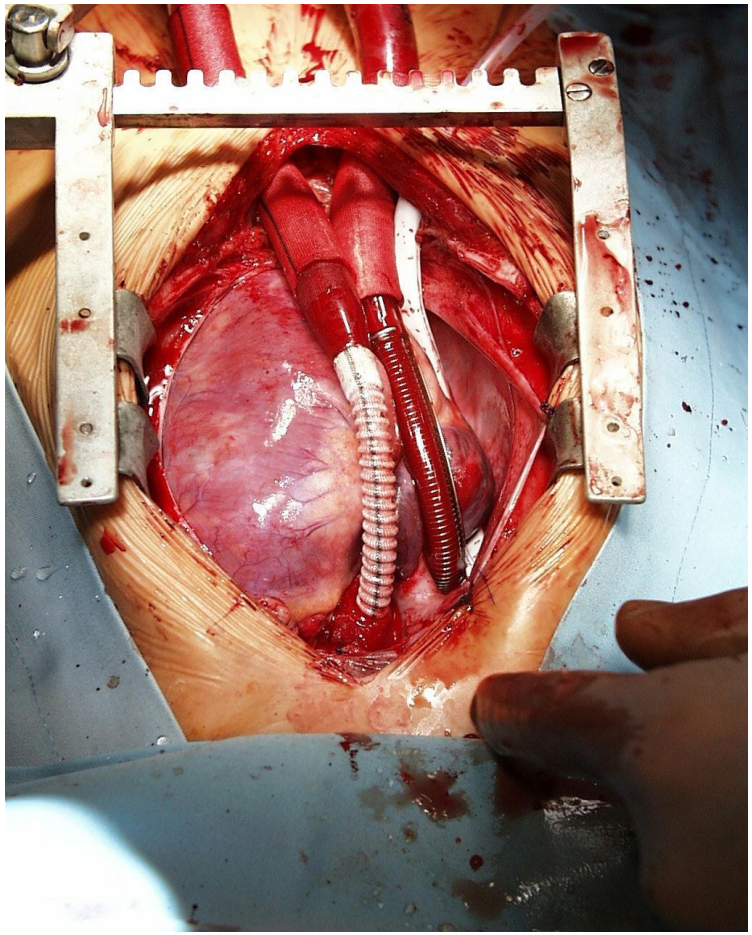
The MEDOS VAD System

- On the market since 1994
- more than 500 operations in about 80 heart centres
- short and medium therm use
- one of the leading systems in Europe
- Application field not as a matter of routine, therefore simplicity and efficiency is of particular importance

Indications

- Short to midterm circulation assistance for patients whith myocardiac failure of circulation and failure in conventional therapy
- postcardiotomy
- Cardiogenic shock
- DCM
- myocarditis
- Myocardial infarct
- Acute rejection after TX
- Acute left and right heart failure



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Components

- MEDOS-VAD cannulae

- MEDOS-VAD ventricles

- MEDOS-VAD driving

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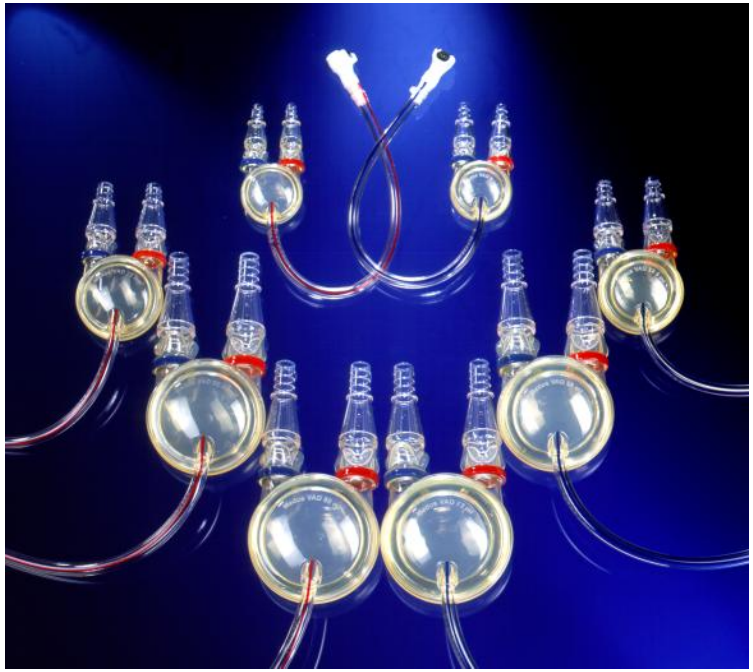
The ventricle family



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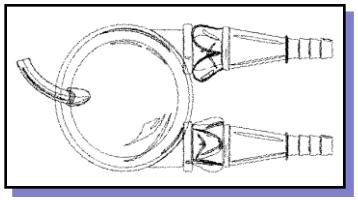
Describtion of the MEDOS-VAD ventricles

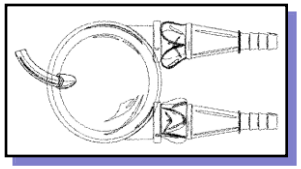
sterile disposable pneumatic bloodpump in the following sizes

adults



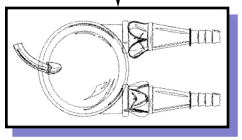
RVAD (72 ml; 1/2")
LVAD (80 ml; 1/2")

RVAD (72 ml; 19/32")
LVAD (80 ml; 19/32")



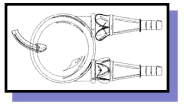
RVAD (54 ml; 1/2")
LVAD (60 ml; 1/2")

children



RVAD (22,5 ml; 3/8")
LVAD (25 ml; 3/8")

infants



RVAD (9 ml; 1/4")
LVAD (10 ml; 1/4")

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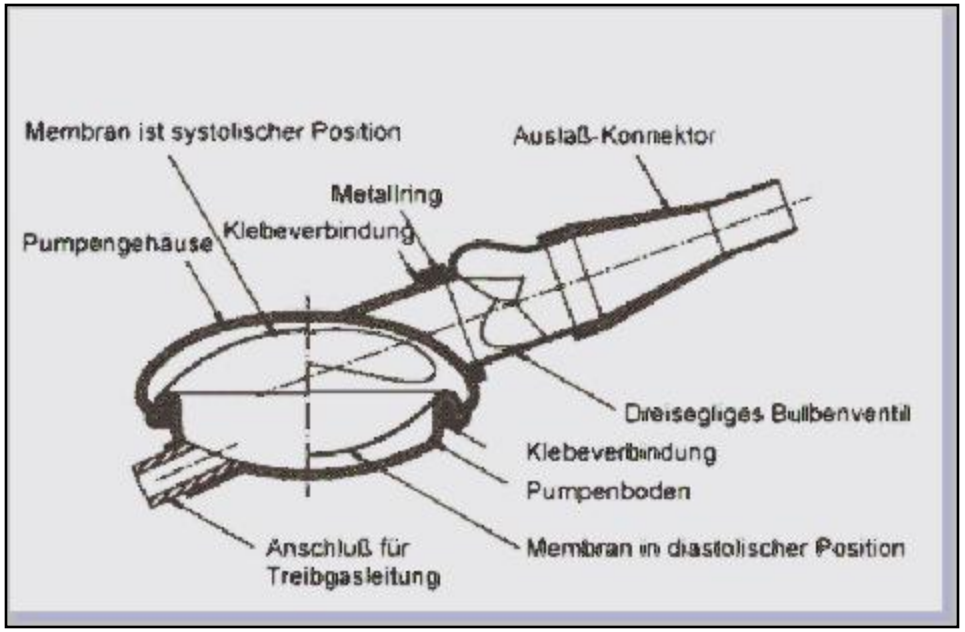
Essential characteristics of the pump I

- Displacemement pump
  - extracorporeal
  - pulsatile
- Volume flow via enlargement resp. Reduction of the workspace volume
- the bloodflow is straightened by using a three leaflet bulb valve for inlet and outlet



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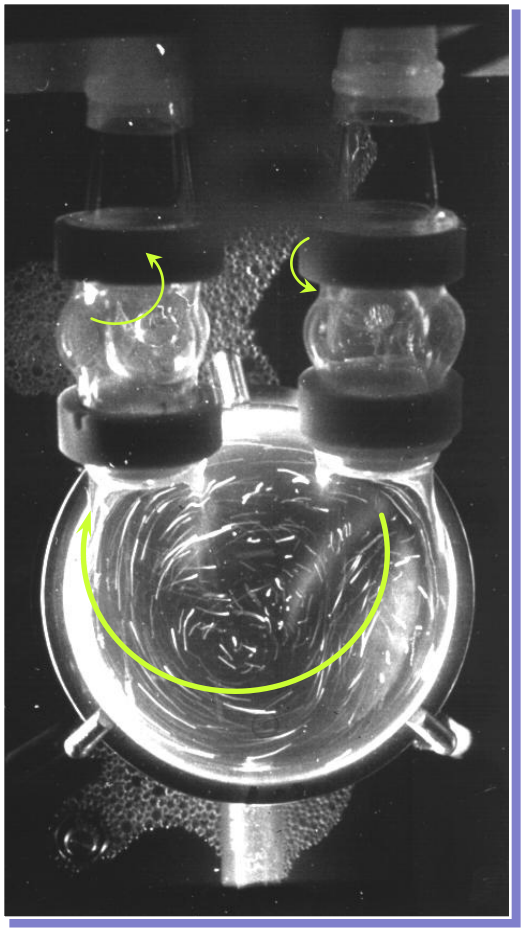
Essential characteristics of the pump II

- Optimal outwash of the pumping body and the valves only possible via taking the advantage of using the whole discharge volume

- Therefor the Full-/Empty-Mode has to be controled and eventually set by medical personell



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The conventional drive

- very stable and solid
- battery supply 45 minutes for BiVAD Use
- flow measuring for patients monitoring
- very large and heavy
- complicated data acquisition
- small touch screen
- EKG triggered mode

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The Driving-System

- Programming via Touch Screen Monitor
- monitoring of all user instructions on dialogue menue
- Use very safe by easy handling of the system

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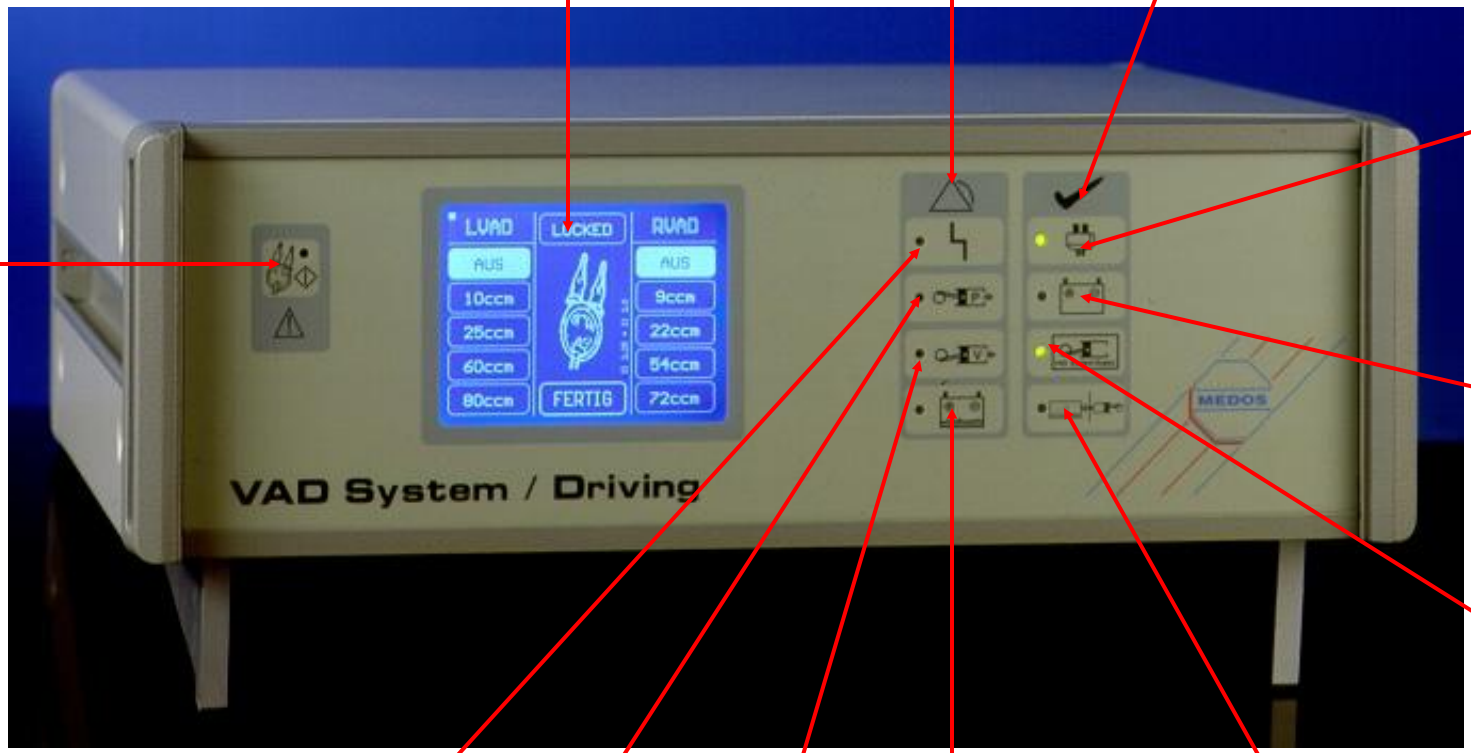
Frontview of the Driving



Touch screen monitor

display Alarm

Display operation

Mains operation

Pump On/off

Battery Operation

Internal pressure and vacuum supply

General failure

Failure in pressure Supply

Failure in vacuum supply

Failure in battery supply

external pressure and vacuum supply

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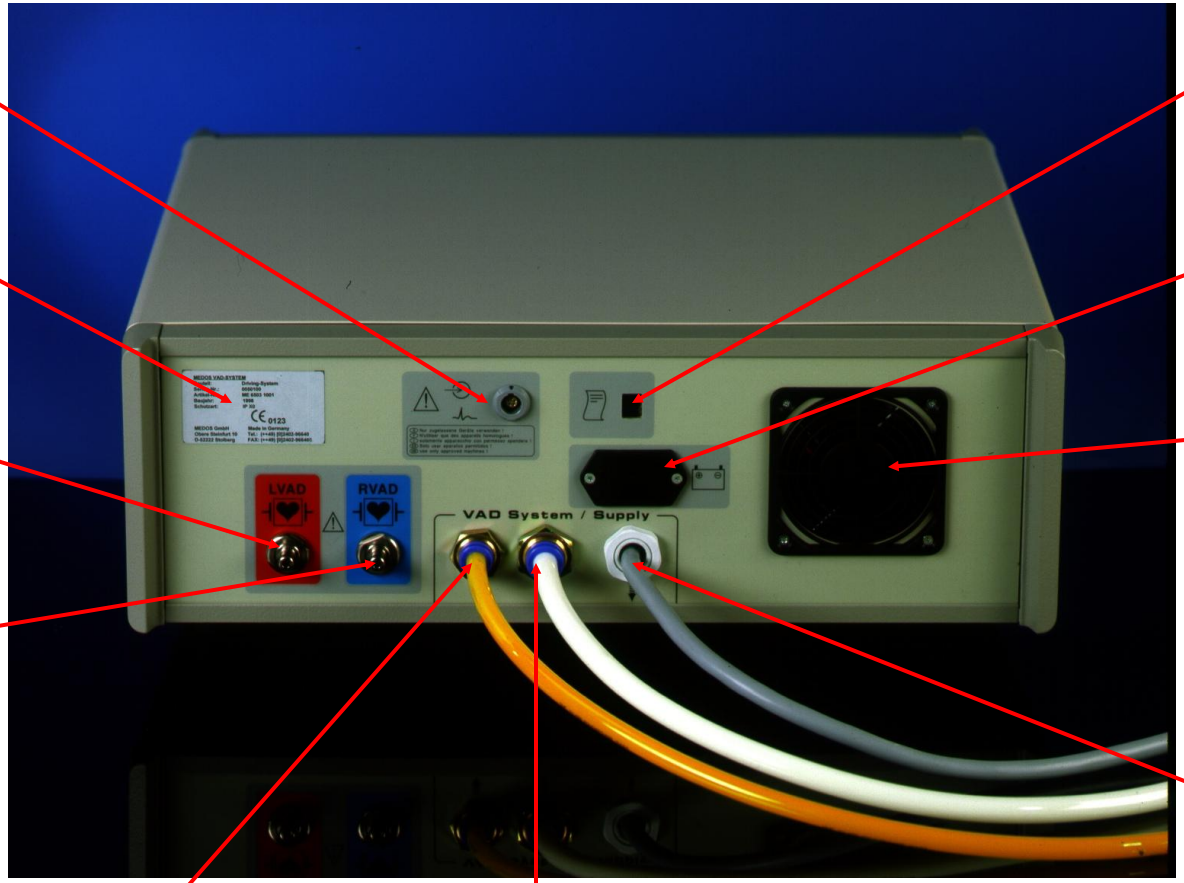
Backview of the Driving



ECG connection

Optical interface

Sign of type and licence plate

9V Lithium-battery

Connection for LVAD

ventilator

Connection for RVAD

Electrical connection for supply

Internal pressure connection for supply

Internal vacuum connection for Supply

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The Supply System

- Internal Akku (2 hrs)
- Internal Compressor
- injection of pressure and vacuum possible
- noisless operation

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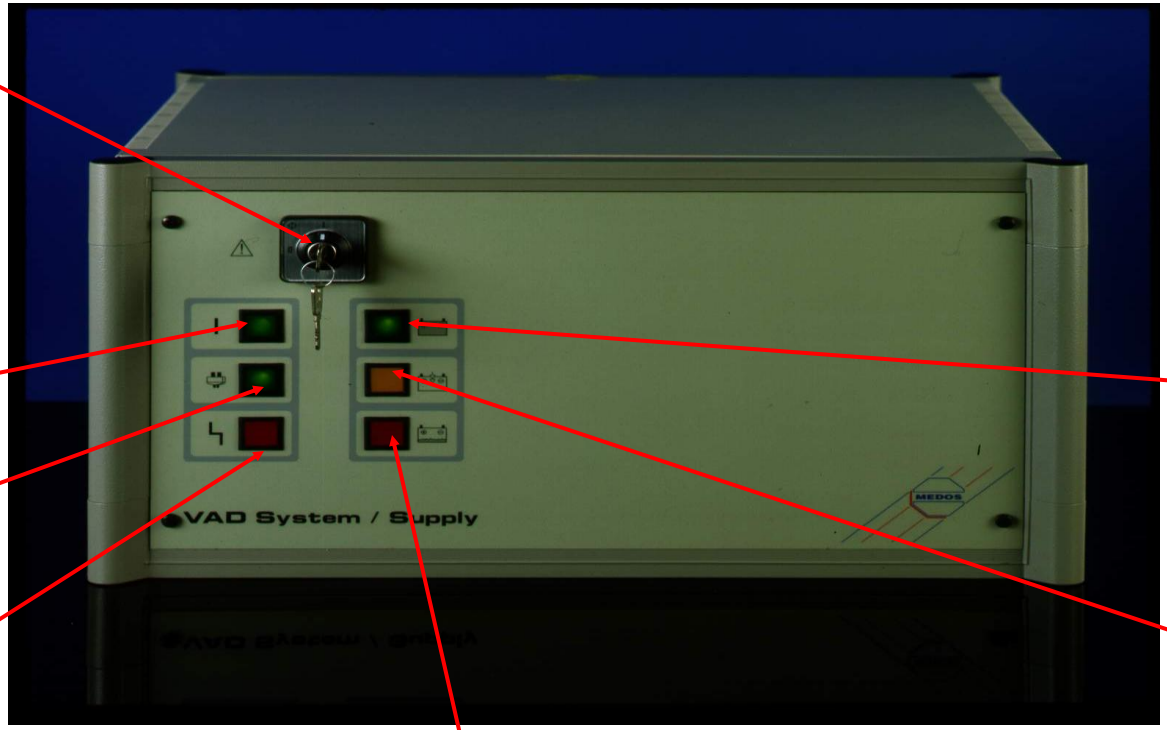
Frontview of the Supply



Operating switch

Operating indicator

Indicator for mains operating

Failure of supply

Low battery

Battery charging

Battery full

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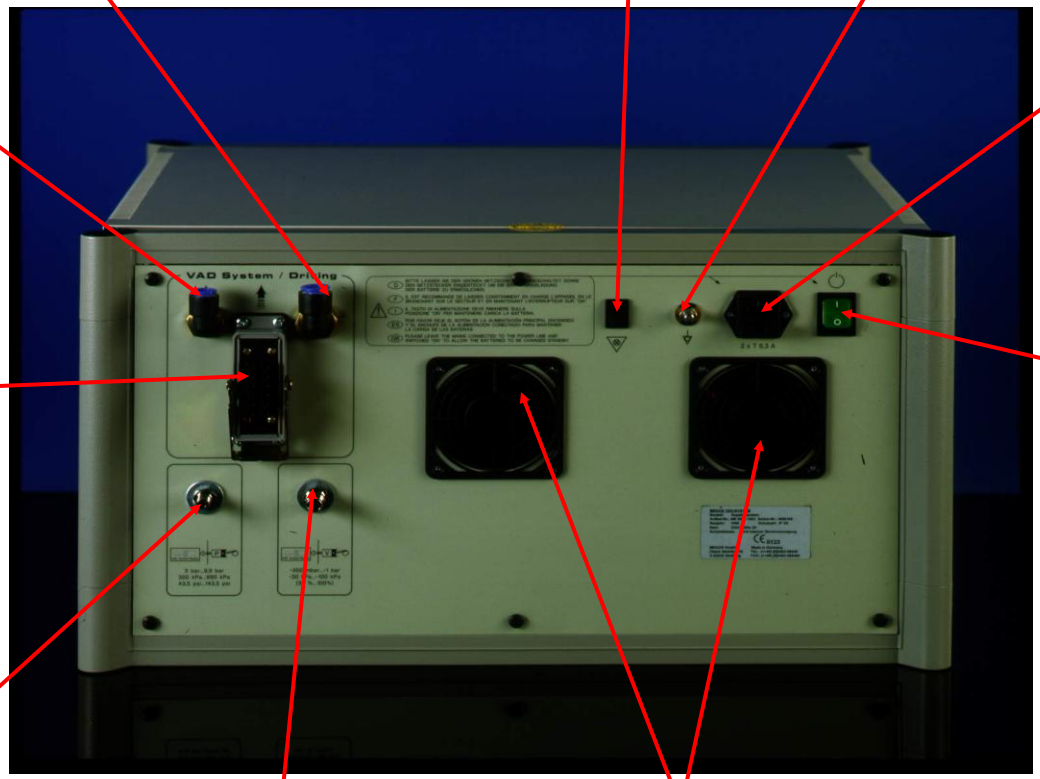
Backview of the Supply



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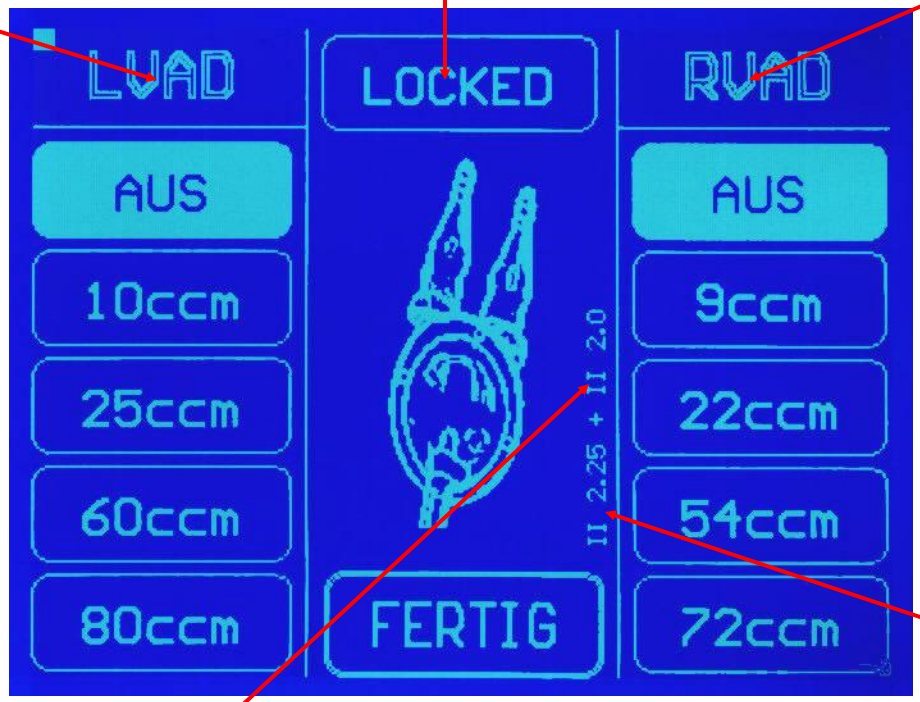
Diplay after starting the System



left pump selection

Interlock of the system

Right pump selection

Softwareversion

Softwareversion of the safety computing device

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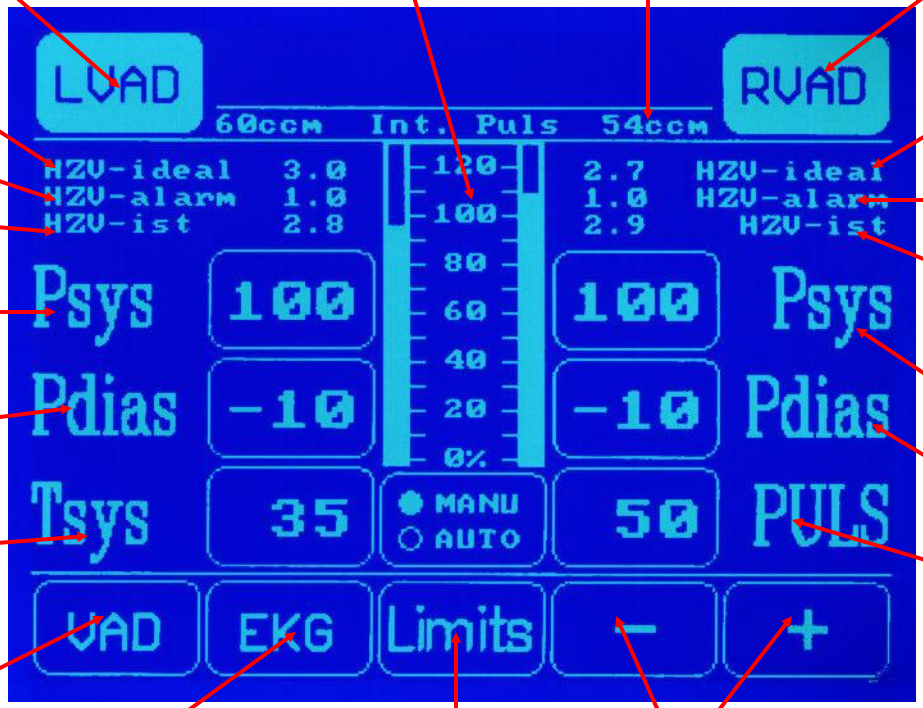
The pressure – setting - menue



Precalculated ideal value for cardiac output of the left pump

Pause left pump

Bar graph display forCardiac output

Display of the choosen pumps

Pause right pump

Precalculated ideal value for cardiac output of the right pump

Alarm limit of cardiac output left pump

Alarm limit of cardiac output right pump

Cardiac output acutal value (prediction) left Pump

Cardiac output acutal value (prediction) right Pump

Systolic pressure

Systolic pressure

Diastolic pressure

Diastolic pressure

Systolic time in %

frequency

Return to starting monitor and pump selection

Change to monitor for ECG trigger

Change to monitor for setting the alarm limit

Setting of choosen values

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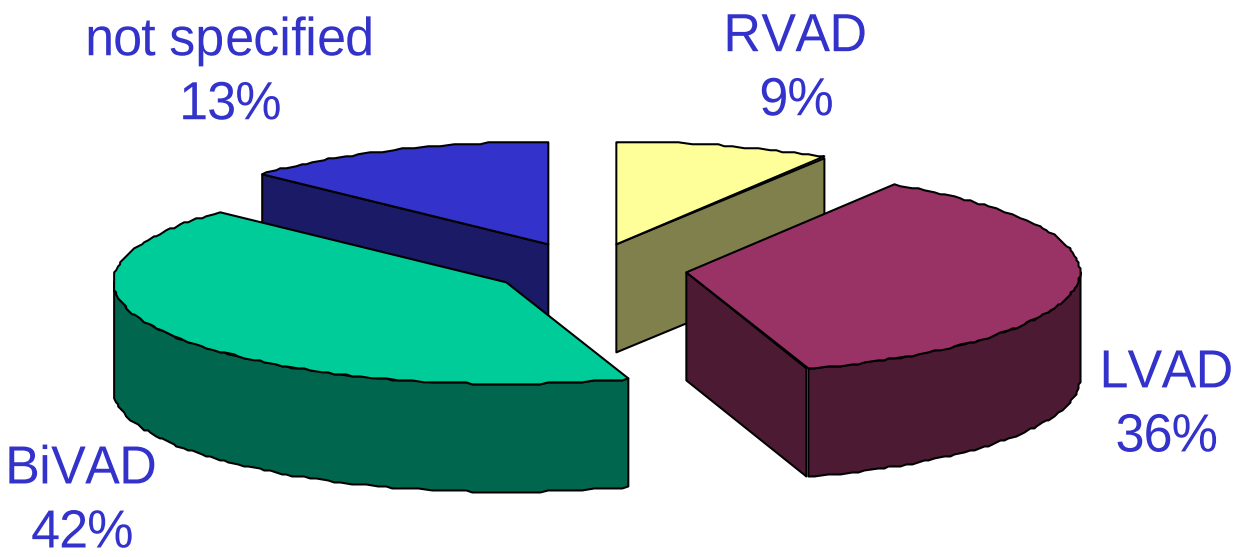
The MEDOS VAD System

support mode



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Analysis of Data I

Patients n=502

321 male

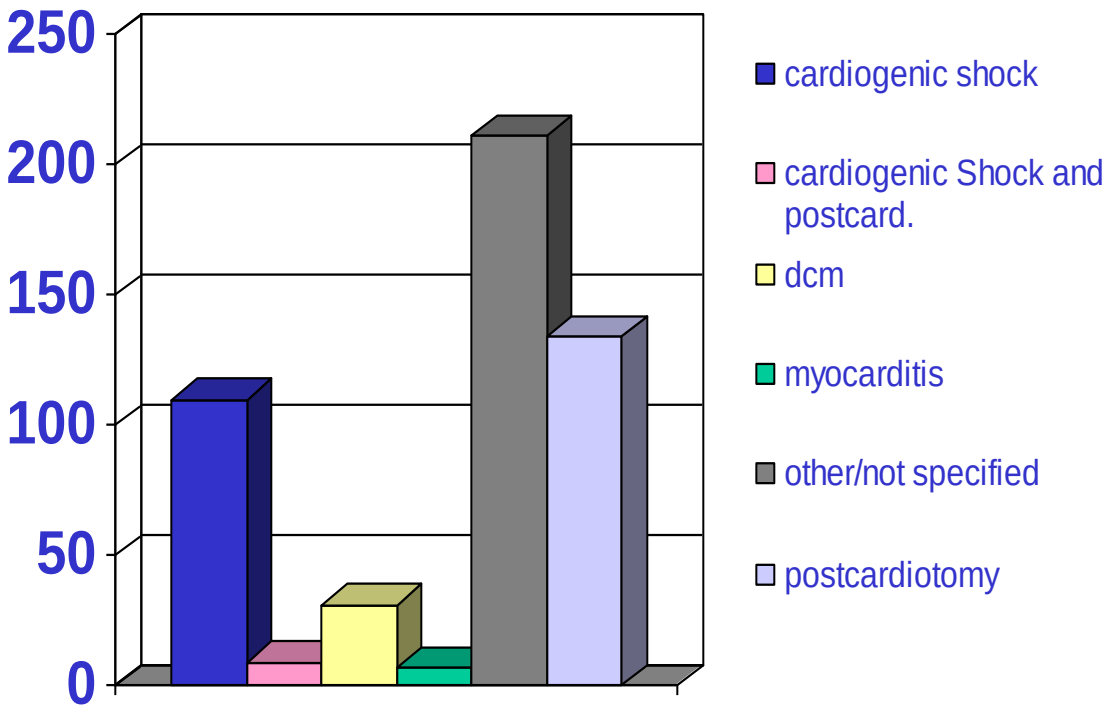
181 female

Age average

42,196 yrs

(0,01 – 67 yrs)

Indications



Analysis of Data II

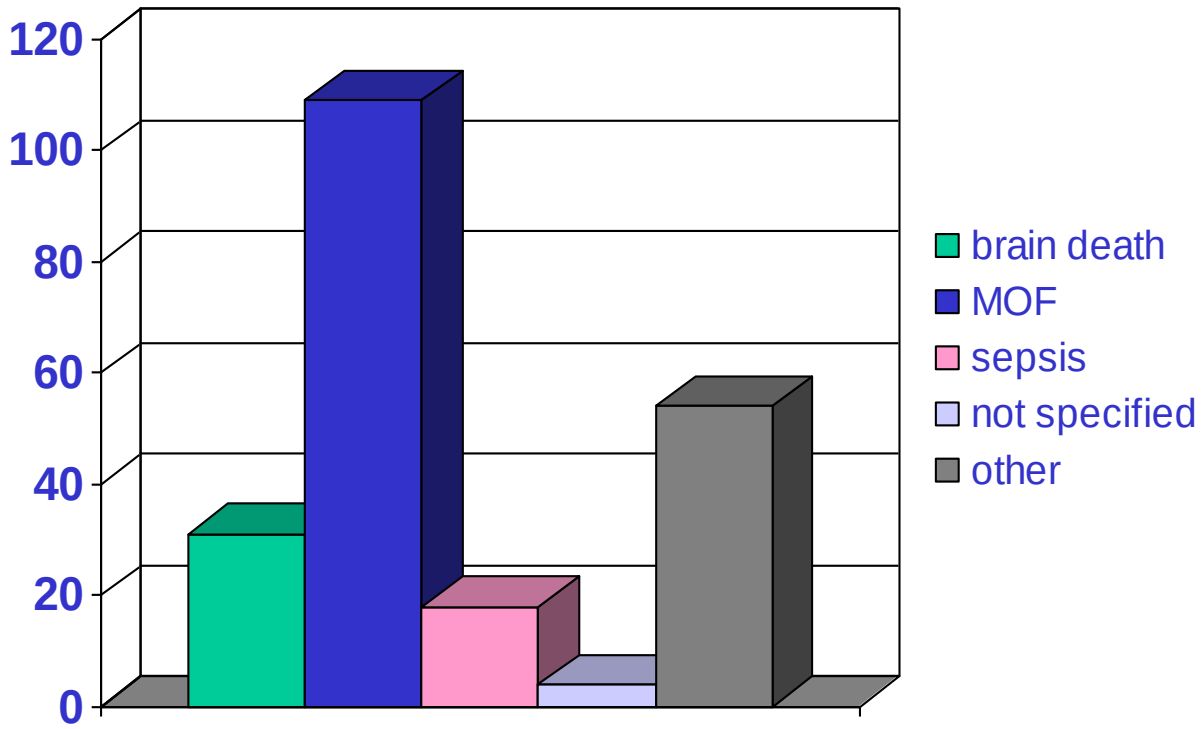
Patients n=502

Purpose:

Transplantation	123
Weaning	230
Not specified	121

Outcome:

Death	216
Weaning	150
Transplantation	135



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the new arterial VAD cannulae

cannula with ePTFE graft

cannula with gelatine coated graft

Katrin Rohde, MEDOS Medizintechnik AG

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Characteristics of the new arterial cannulae

- material: PVC (Polyvinylchlorid)
- Graft of high flexibility by expanted PTFE (Polytetrafluoräthylene) and ring amplification
- Different length and diameters
- Lower end of the cannula closed with lead-through-assistance
- Dacron tissue in lead through area

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clinical experiences

- ✓ already routinely use for dialysis AV shunts
- ✓ artificial substitution of peripheral vessels

animal experiments show the following conclusions:

- ✓ the graft has optimal flexibility
- ✓ Optimal density also at stitch ducts by using stitching material recommended by the manufacturer
- ✓ soft material
- ✓ handling very easy

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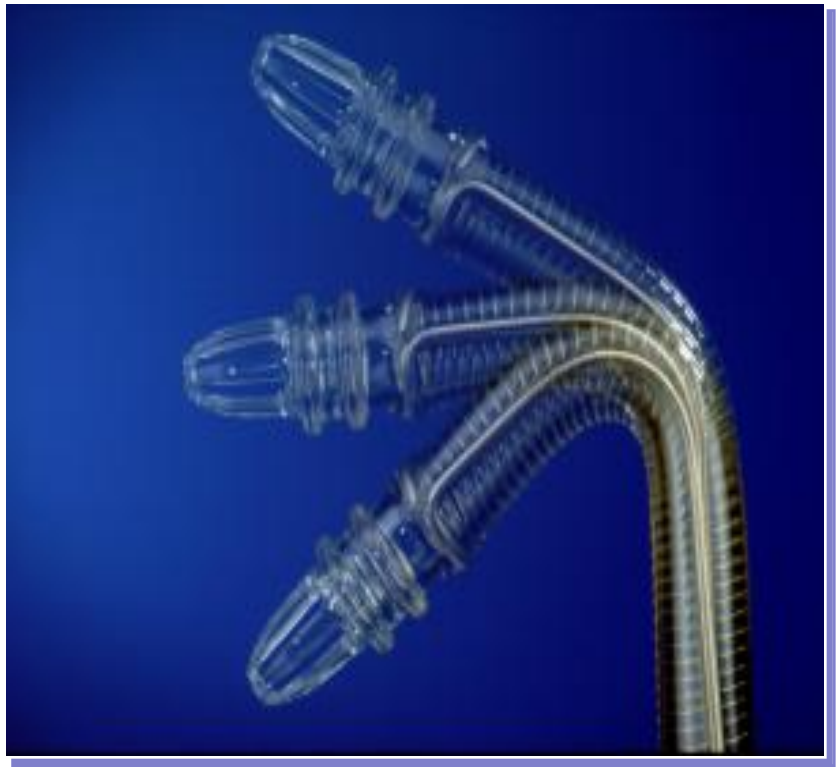
Characteristics of the venous cannulae

- material: PVC (Polyvinylchlorid)
- Wire reinforced upper third
- Different length, diameter and angles (Standard 135°)
- Upper end with blood taking basket as well as seam elevation for fixation by dubble pursestring suture
- Lower end of the cannula closed with lead-through-assistance
- Dacron tissue in lead through area



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avaliability

arterial cannula with ePTFE graft

inner diameter [mm]	article number	connection	for VAD ventricle
5,0	ME 656 B0053	1/4“	9/10 ml
6,0	ME 656 B0063	1/4“	9/10 ml
8,0	ME 656 B0083	1/4“	9/10 ml
8,0	ME 656 B0084	3/8“	22,5/25 ml
10,0	ME 656 B0104	3/8“	22,5/25 ml
10,0	ME 656 B0105	1/2“	54/60 ml 72/80 ml
13,0	ME 656 B0135	1/2“	54/60 ml 72/80 ml

avaliability

arterial cannula with gelatine coated graft

ínner diameter [mm]	article number	connection	for VAD ventricle
6,0	ME 6560S 0063	1/4“	9/10 ml
8,0	ME 6560S 0083	1/4“	9/10 ml
8,0	ME 6560S 0084	3/8“	22,5/25 ml
10,0	ME 6560S 0104	3/8“	22,5/25 ml
12,0	ME 6560S 0125	1/2“	54/60 ml 72/80 ml
14,0	ME 6560S 0145	1/2“	54/60 ml 72/80 ml

Our Future: The MEDOS *HD*$_{eight}$

Katrin Rohde, MEDOS Medizintechnik AG

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specifications of the MEDOS *HD*$_{eight}$

- ✓ mobile drive
- ✓ battery supply up to 4 hours plus emergency energy (about 1 hour)
- ✓ automatic mode via flow measurement
- ✓ improved flow measurement
- ✓ size: 340x315x134 (BTH) weight: 9,8 kg
- ✓ easy data acquisition
- ✓ large touch screen 640x480 integrated into the console

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Conventional drive vs. *HD*$_{eight}$

	Conventional drive	*HD*$_{eight}$
Application	- LVAD, RVAD, BiVAD - Ventricle Size 9 ml to 80/72 ml	- LVAD, RVAD, BiVAD - Ventricle Size 9 ml to 80/72 ml
Operating Mode	- Fixed-rate mode - EKG mode	- Fixed-rate mode - Automatic modus = first fill then empty -> var. rate
Biventricular mode	- push – push operation	- push – push operation - alternating operation
Portability	- emergency battery supply up to 45 minutes - size: 1150x700x750 mm - weight: 115 kg	- - battery supplied up to 4 h plus emergency energy >= 1h - size: 340x315x134 (BxTxH) mm - weight: 9,8 kg - environmental fit: explosion proof - waterproof

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Conventional drive vs. *HD$_{eight}$*

	Conventional drive	*HD$_{eight}$*
Securities	- processor controlled security system with integrated emergency power - optic and acoustic warning signals on fail of functions	- Integrated autonomous backups Moitoring and alarm possibilities: flow, pressure incl. tube buckling - - minimal false handling because of user guide and integrated ventricle typing
Technical Data	- beating frequency: 40 to 180 BPM - beating volume: - pressure left/right: 300 mmHg max - vacuum left/right: -99 mmHg max - battery supplied mode: emergency 45 min max - operating voltage: 2 x 12V intern, DC 24V/ 230 V, others avaliable	- beating frequency: 35 to 130 BPM - beating volume: 160 ml max. - pressure left/right: 400 mmHg max - vacuum left/right: -200 mmHg max - battery supplied mode: 4 h max plus 1h memergency energy - operating voltage: 12V intern, DC 12V / 110-240 VAC extern
User interface	- push – push operation	- push – push operation - alternating operation

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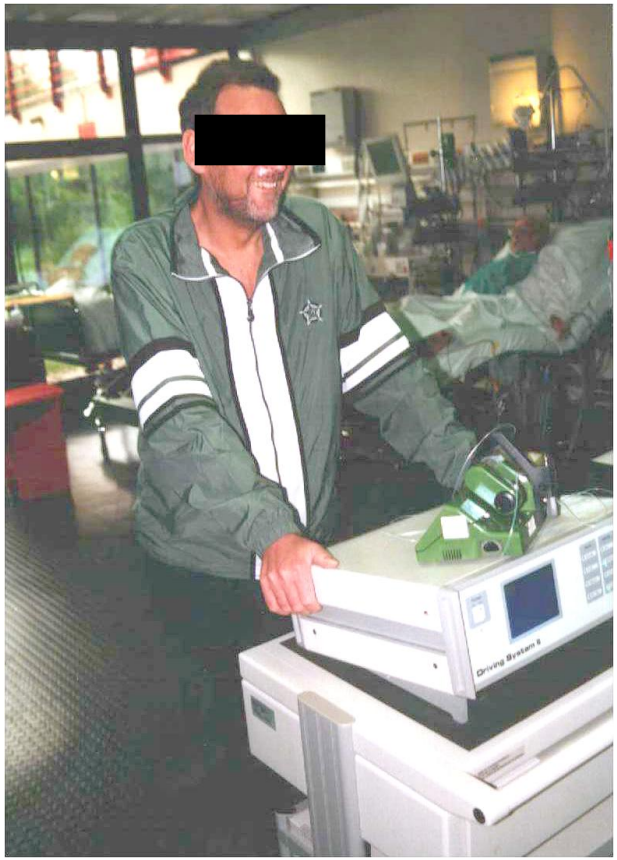

Patient 1:

43 years
cardiogenic shock
60 min. reanimation
Implantation of LVAD
transplantation after 57 days

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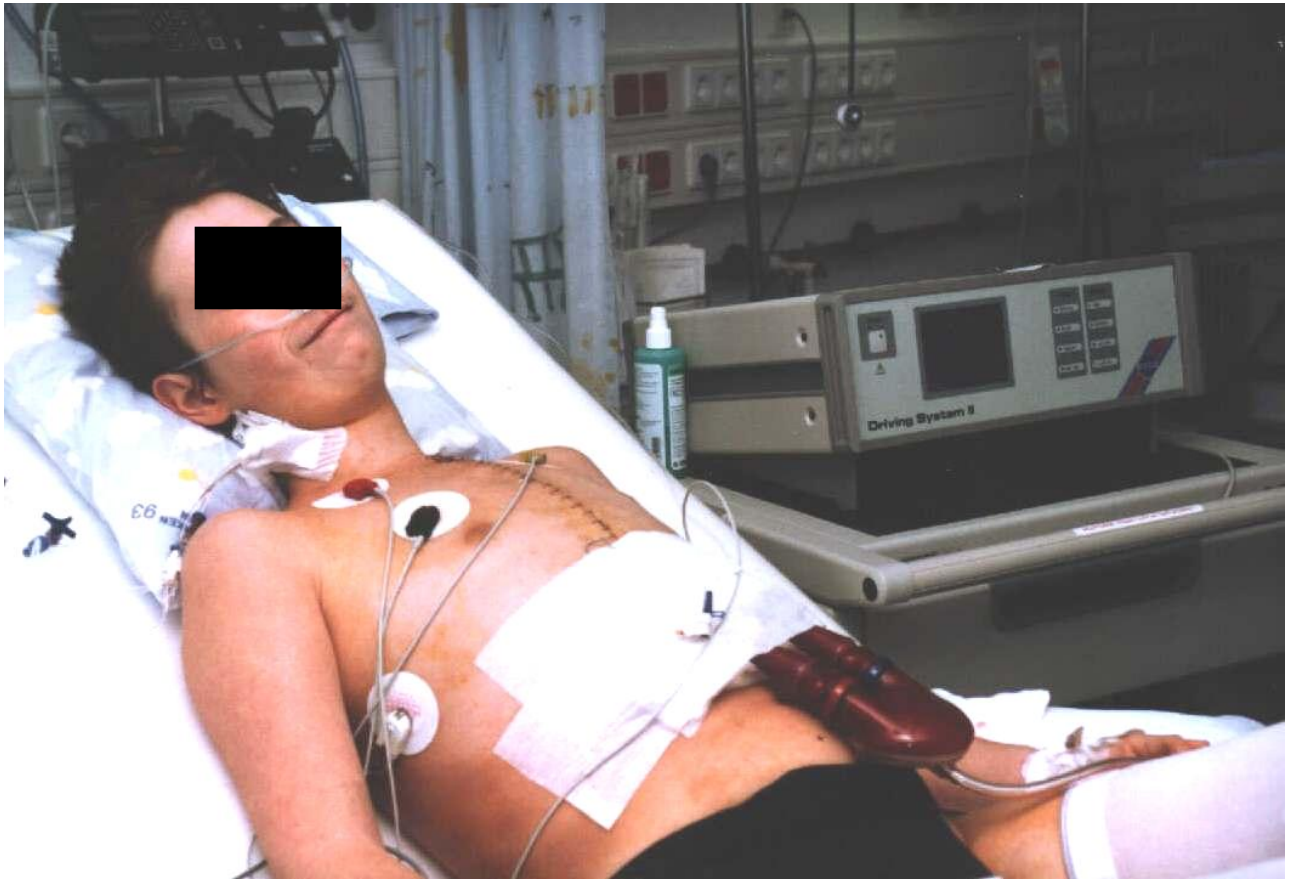

Patient 2:

15 years

DCM

Implantation of LVAD (60ml)

Transplantation after 14 days

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