

**Anesthesia:
Minimizing the damage
to a patient undergoing
a procedure that is
unpleasant**

Anesthesia:

**Minimizing the damage
to a patient undergoing
a procedure that is
unpleasant or worse**

Fighting the Robot

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Robot ?

Czech author Karel Čapek (1921) introduces the word Robot (from Robota: serf laborer)

ISO definition: 'An automatically controlled, reprogrammable, multipurpose, manipulator programmable in three or more axes, which may be either fixed in place or mobile for use in industrial automation applications'

Automaton ?

Automaton: a machine that is capable of performing pre-defined movements, but **NOT** capable to adapt to its surroundings, an automaton.

Cyborg ?

Cyborg: a cybernetic organism that combines biological and artificial (electronic, mechanic, robotic) parts, joined tightly.



Fighting the Robot

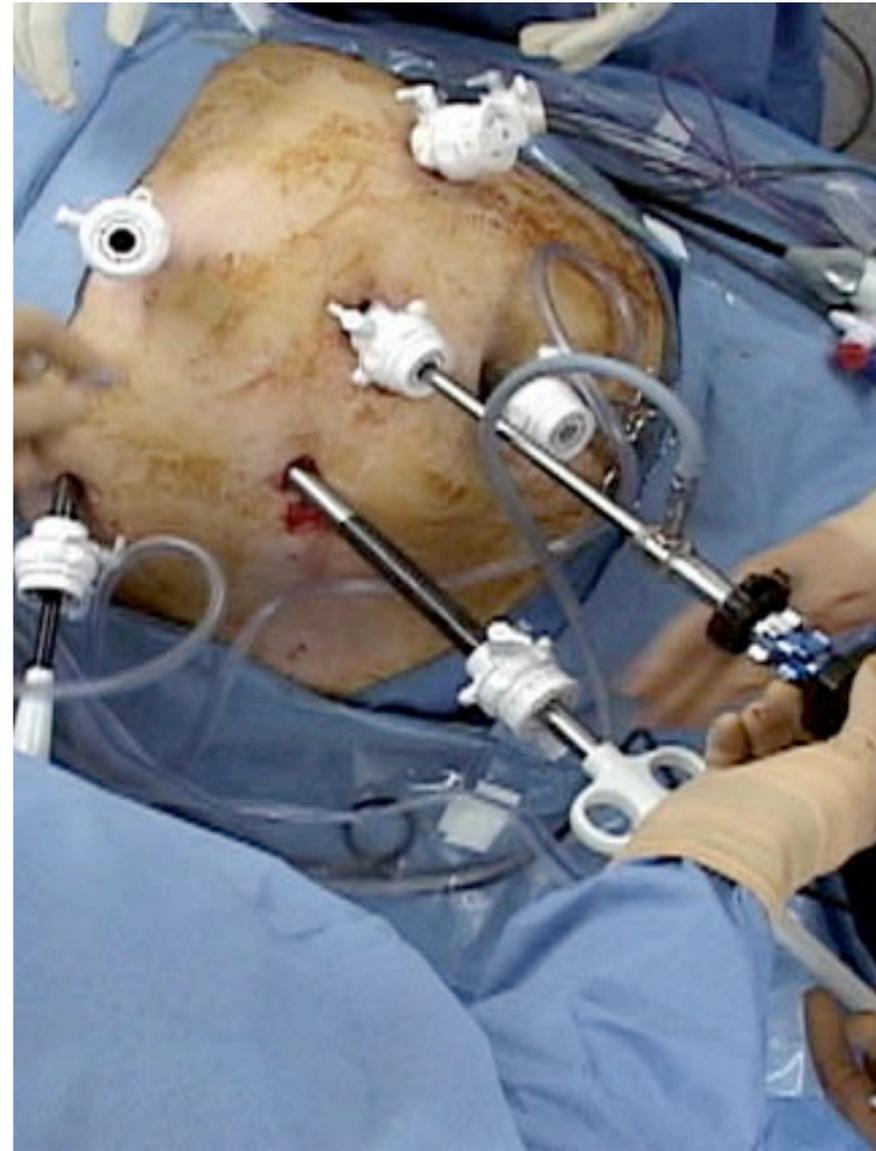
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Fighting the Cyborg

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Minimally Invasive vs Conventional Surgery

- Less pain
- Less bloodloss
- Faster recovery
- Less infections



Minimally Invasive vs Conventional Surgery

- Less pain
 - Less blood loss
 - Faster recovery
 - Less infections
- BUT**



Minimally Invasive vs Conventional Surgery

Abdominal cavity is distended with CO₂ to enable exposure

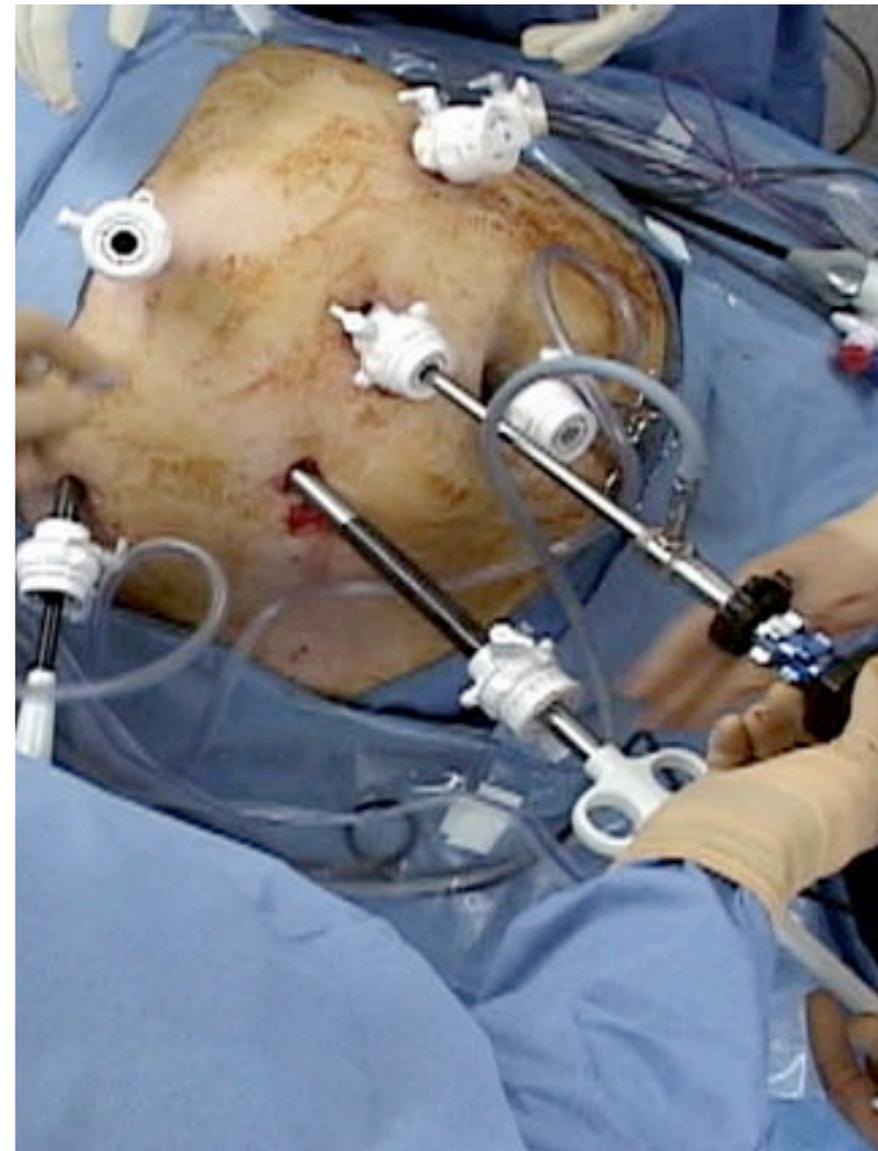
- Breathing gets more difficult
- Preload ↓↓ → BP ↓↓
- Vasodilation → BP ↓↓
- CO₂ absorption 20 - 50 % → breathing still more difficult



Minimally Invasive vs Conventional Surgery

Patient is tilted head down

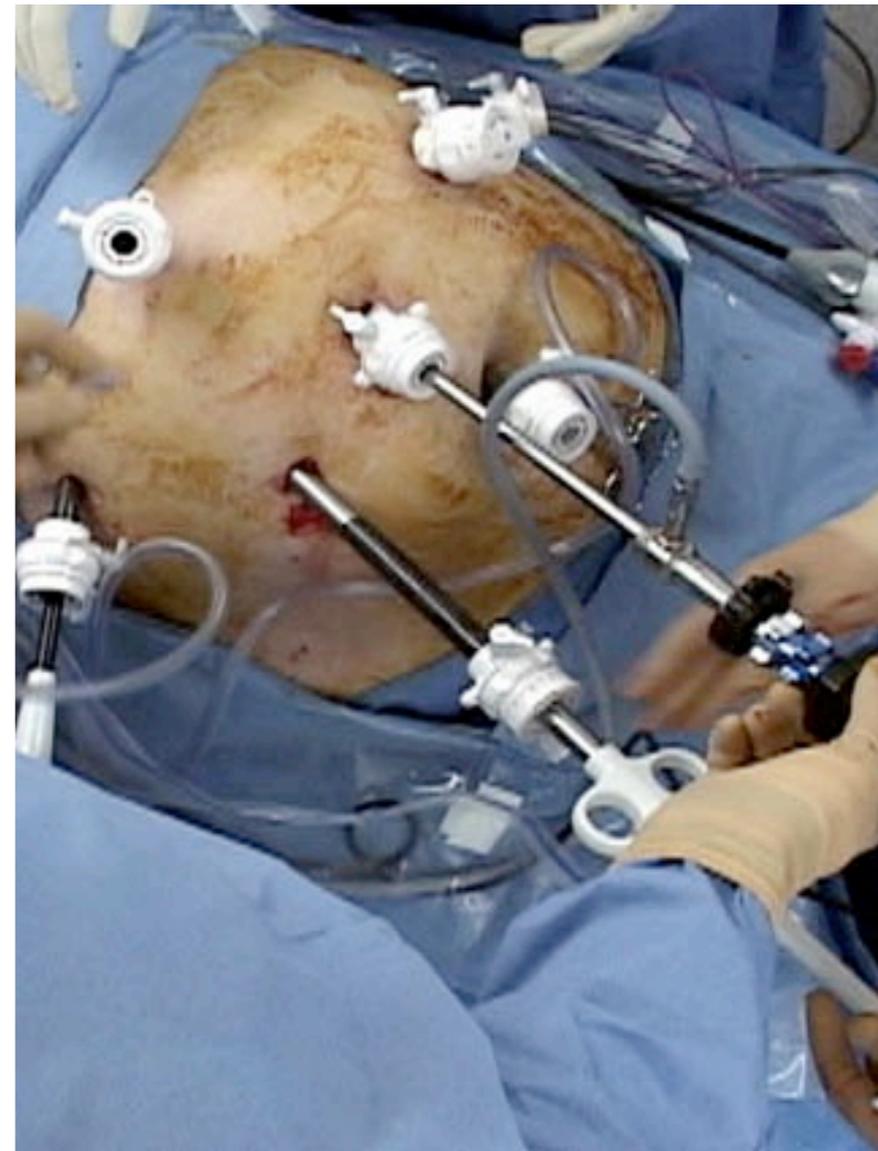
- Breathing yet even more difficult
- Preload ↑↑ → BP ↑↑
- Engorgement of the head
- ICP ↑



Minimally Invasive vs Conventional Surgery

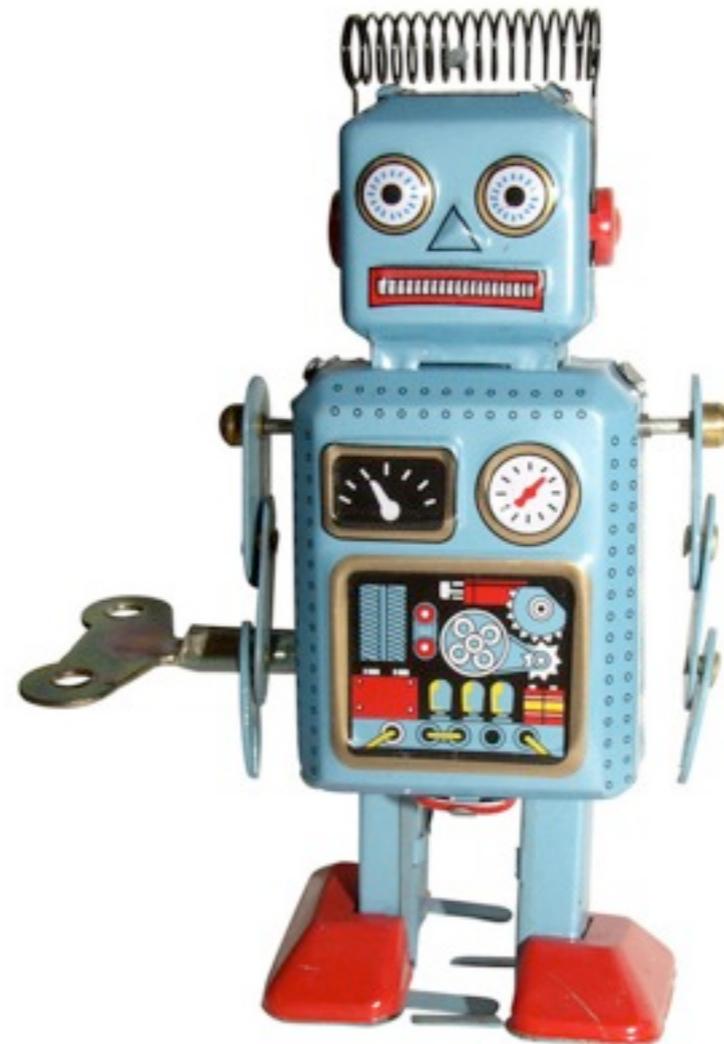
In summary:

- Better for patient post surgery
- Physiologically (far) more demanding than conventional open surgery



Robotically assisted vs Minimally Invasive

- All of this and a lot worse !!!
(and it takes a lot longer too)
- OR bed in extreme
Trendelenburg position
(in Erasmus MC 40°)
How long can this be done?
- And there is no access to the
patient !!



Minimally Invasive vs Robotically Assisted

In summary:

- Less surgeon strain
- Patients love it
- It's really cool



Minimally Invasive vs Robotically Assisted

In summary:

- Less surgeon strain
- Patients love it
- It's really cool
- It sucks big time for Anesthesiologists



Some Friendly Advice

- *“Make sure you don’t get involved. Any pretext will do.”*
- *“If they still put you in the room, call in sick.”*



Some Friendly Advice

- *“It’s a hemodynamic and respiratory disaster zone.”*
- *“Lots of nerve and plexus lesions.”*
- *“Lots of pressure sores.”*
- *“It’s really BAD!”*



Some Friendly Advice

- *“Oh, and by the way. You have no access to the patient. If anything bad happens, you’re f**cked, you can’t do anything about it. You might as well camp out at the coffee room.”*
- *“Don’t argue, you can’t win.
Just call in sick!”*







Friday, October 5, 12



Friday, October 5, 12

Robot assisted surgery: The Issues

- Extreme Trendelenburg
- Mechanical
- Physiologic
- No Access to the patient

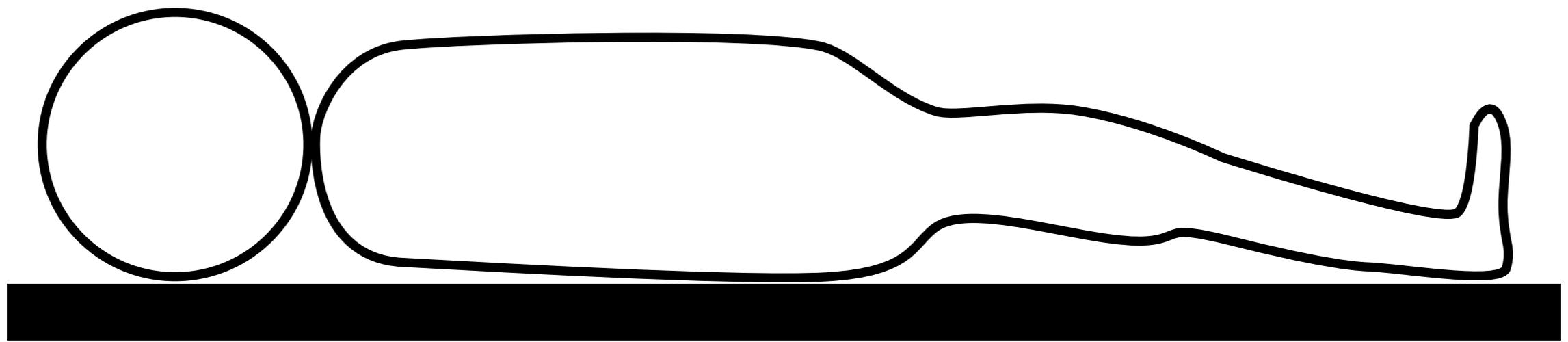


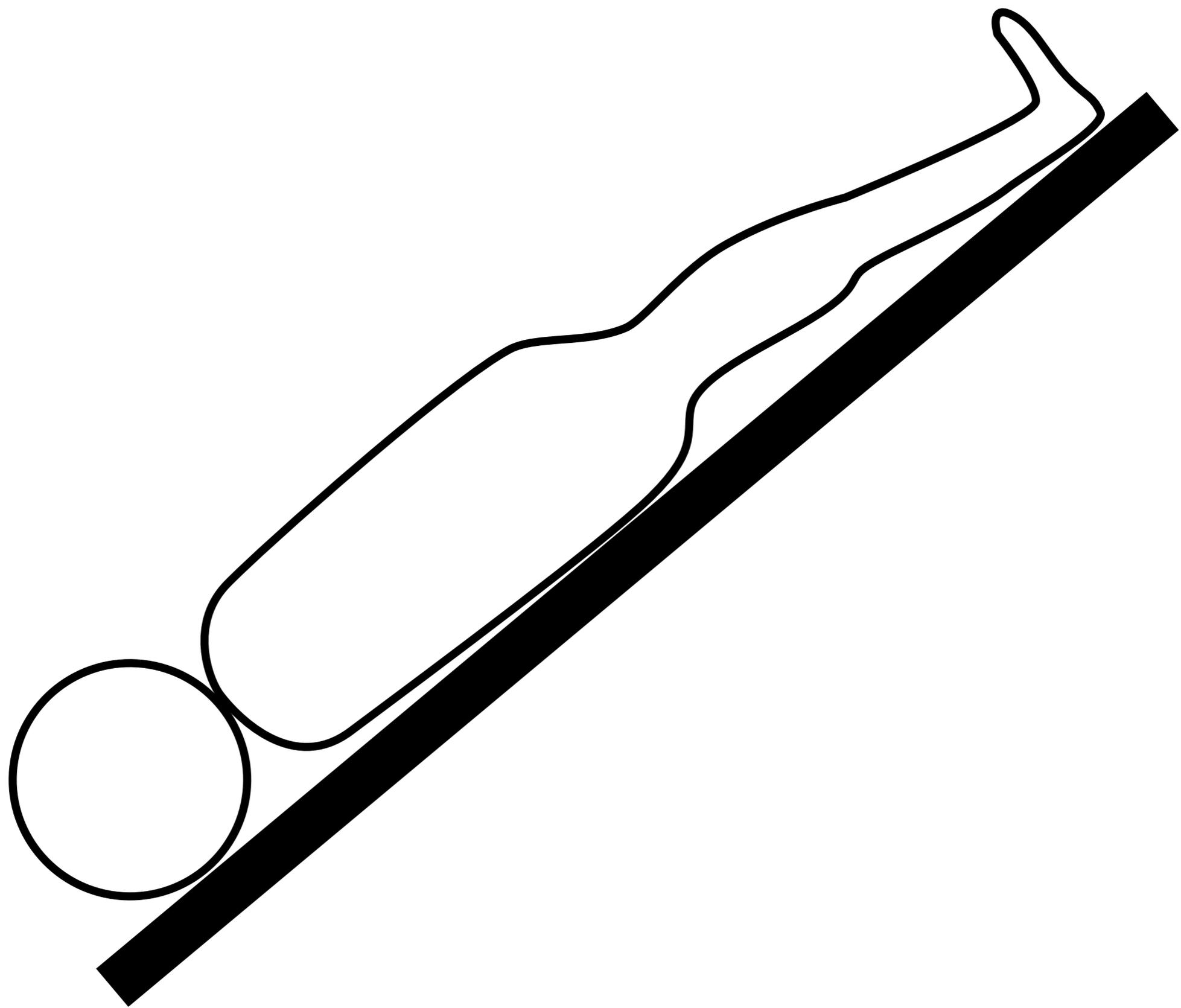


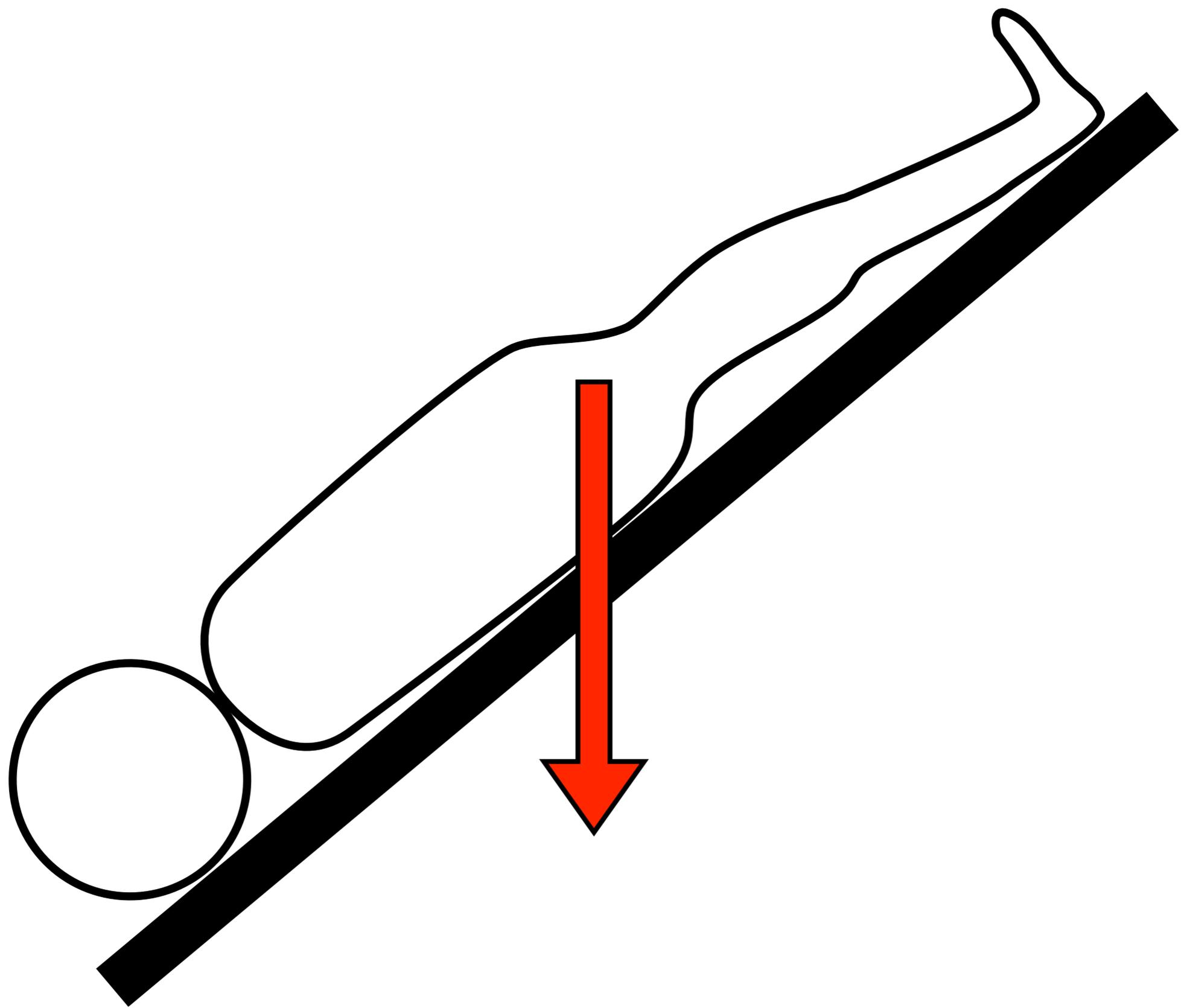
Friday, October 5, 12

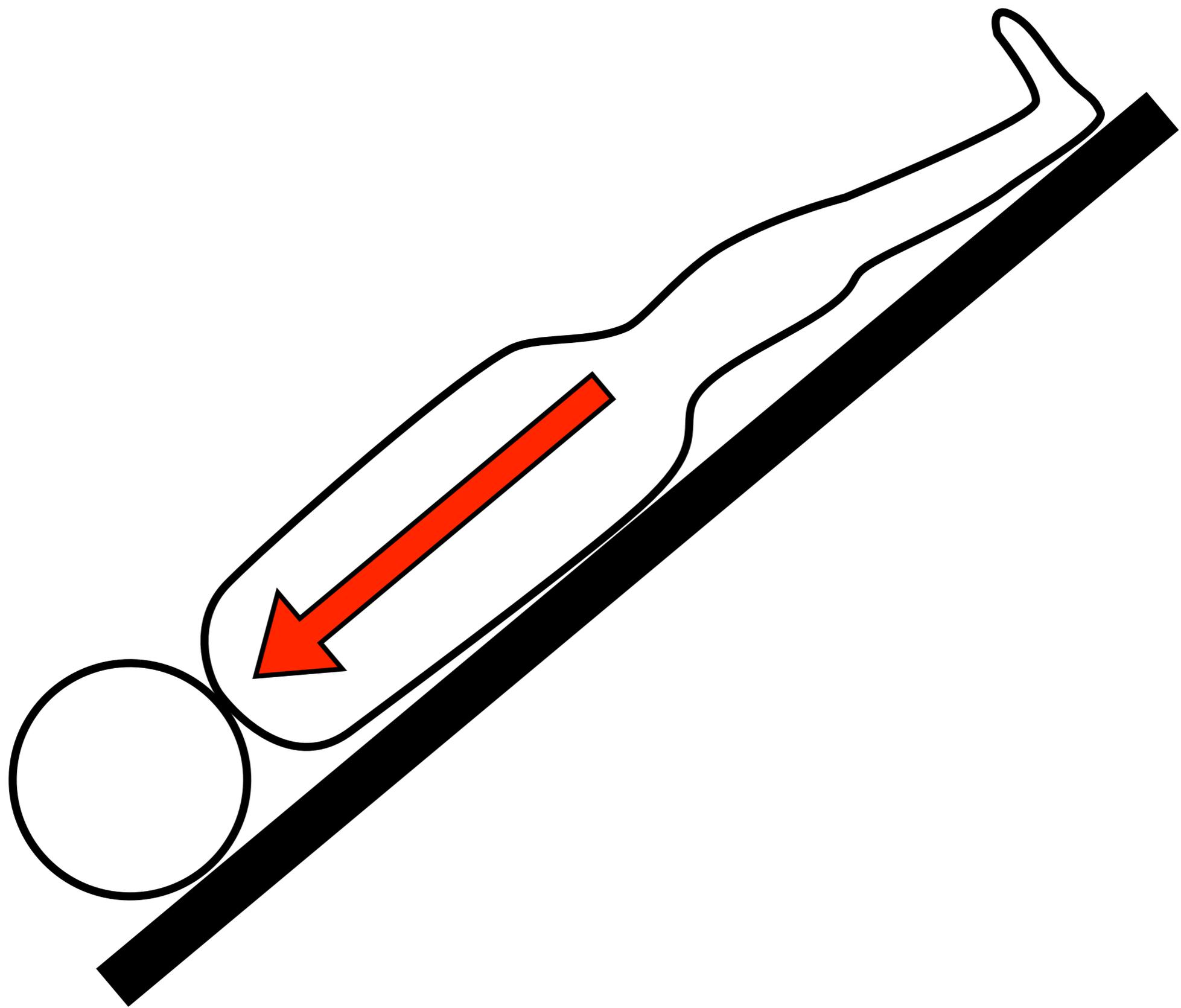
No Access

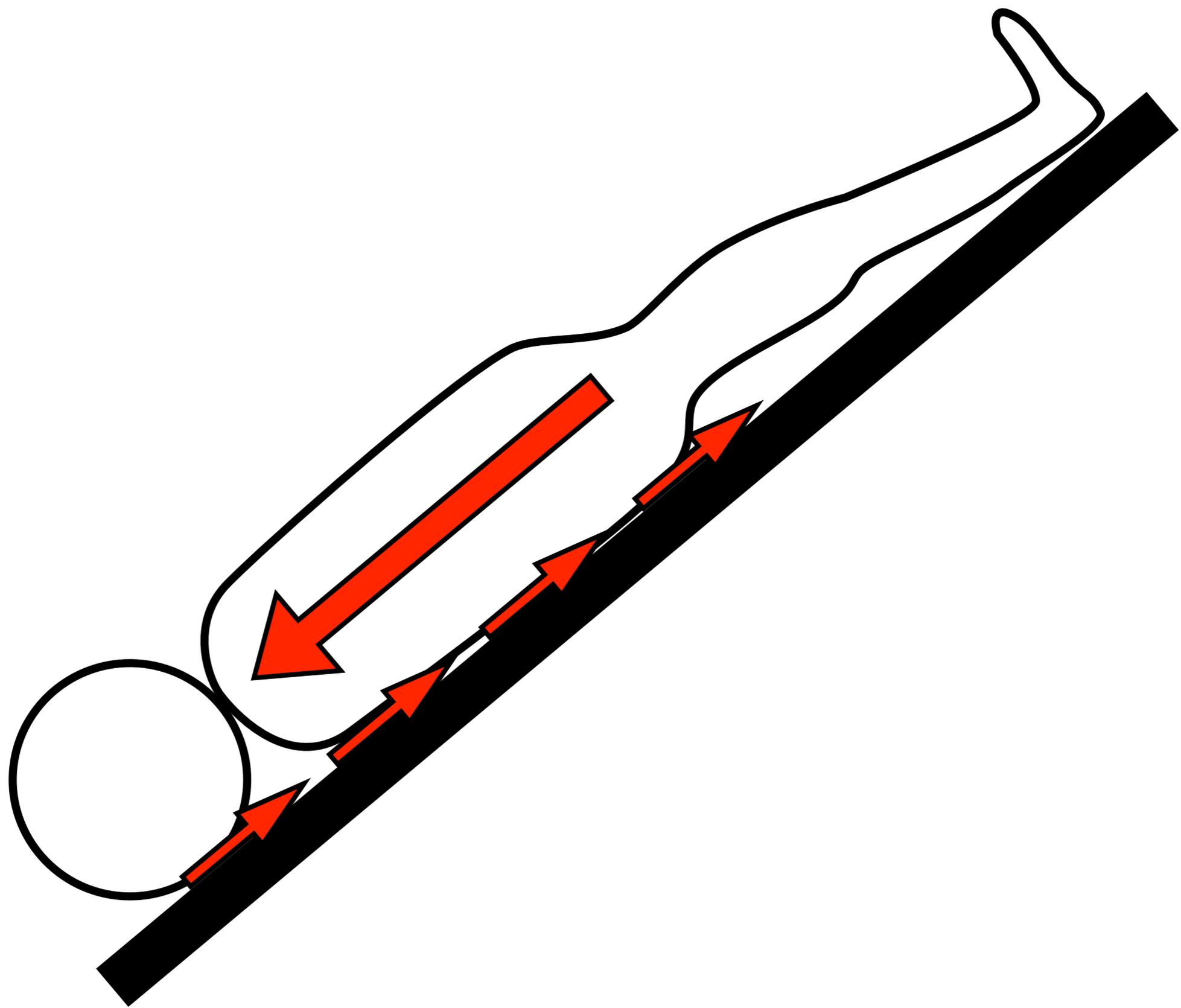
- Consider doubling everything (IV, BP etc)
- Hook up anything you may need before surgery
- Test everything before and after positioning
- Do fire drills to see how long it takes to remove the robot, level the patient and remove drapings

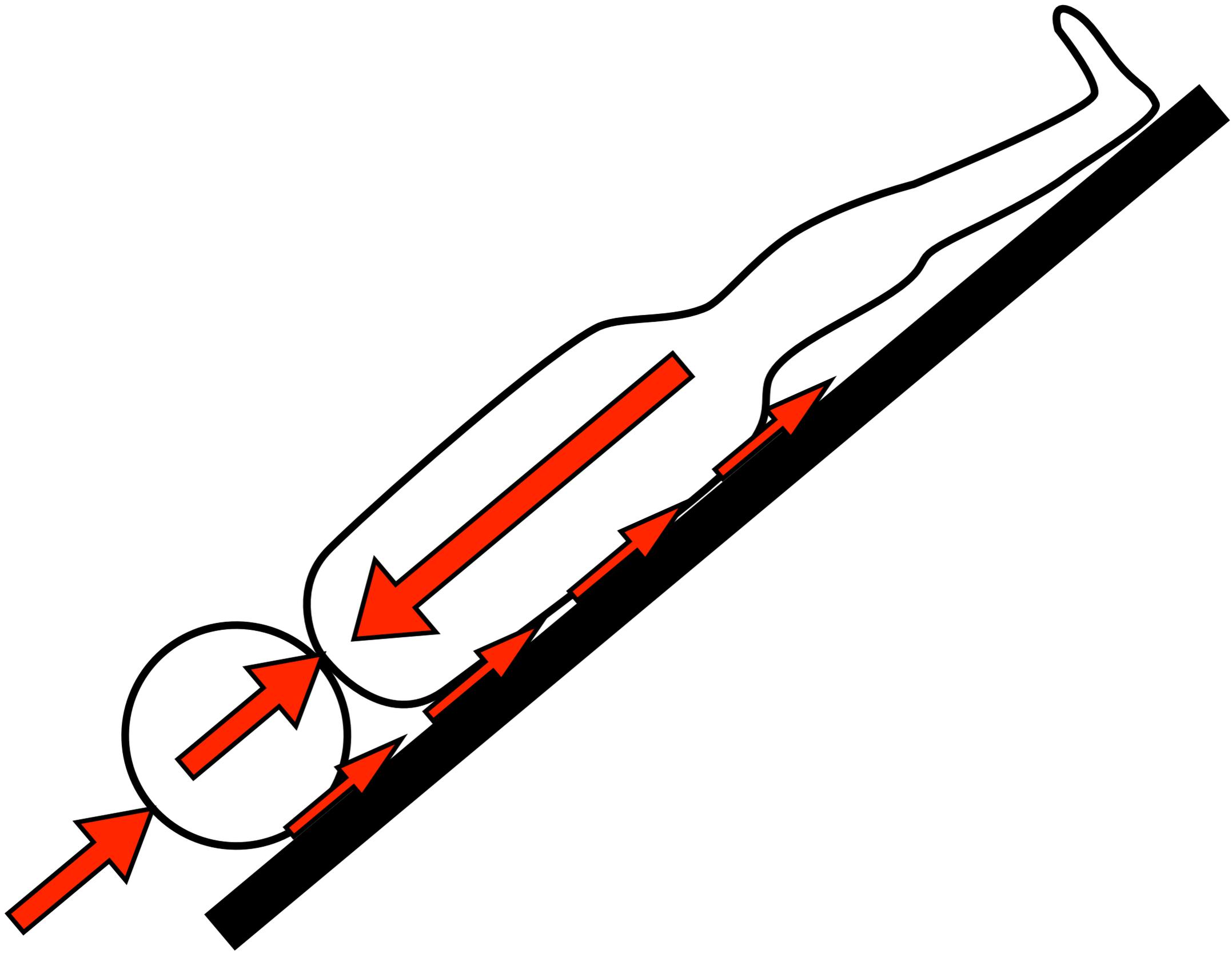


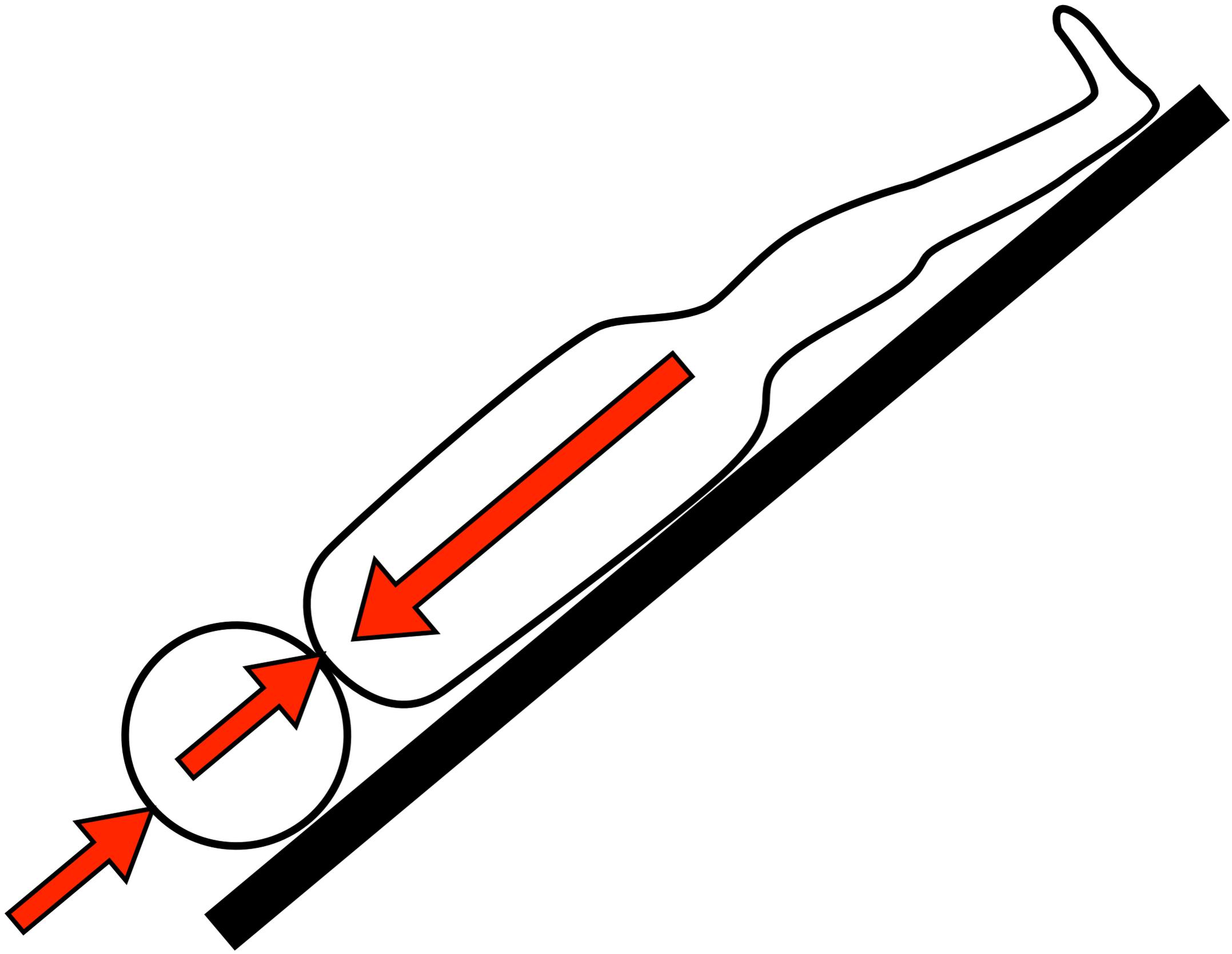


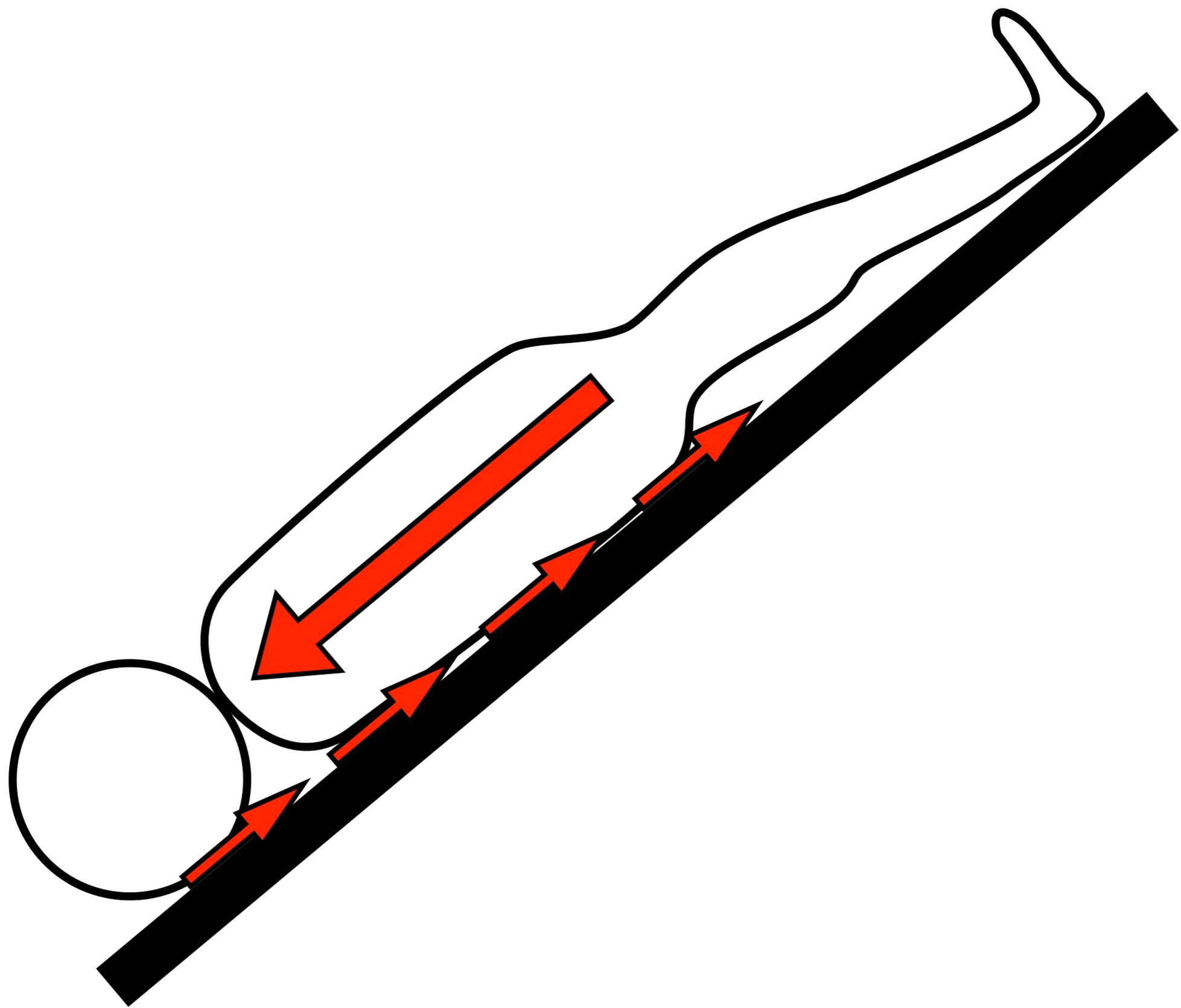


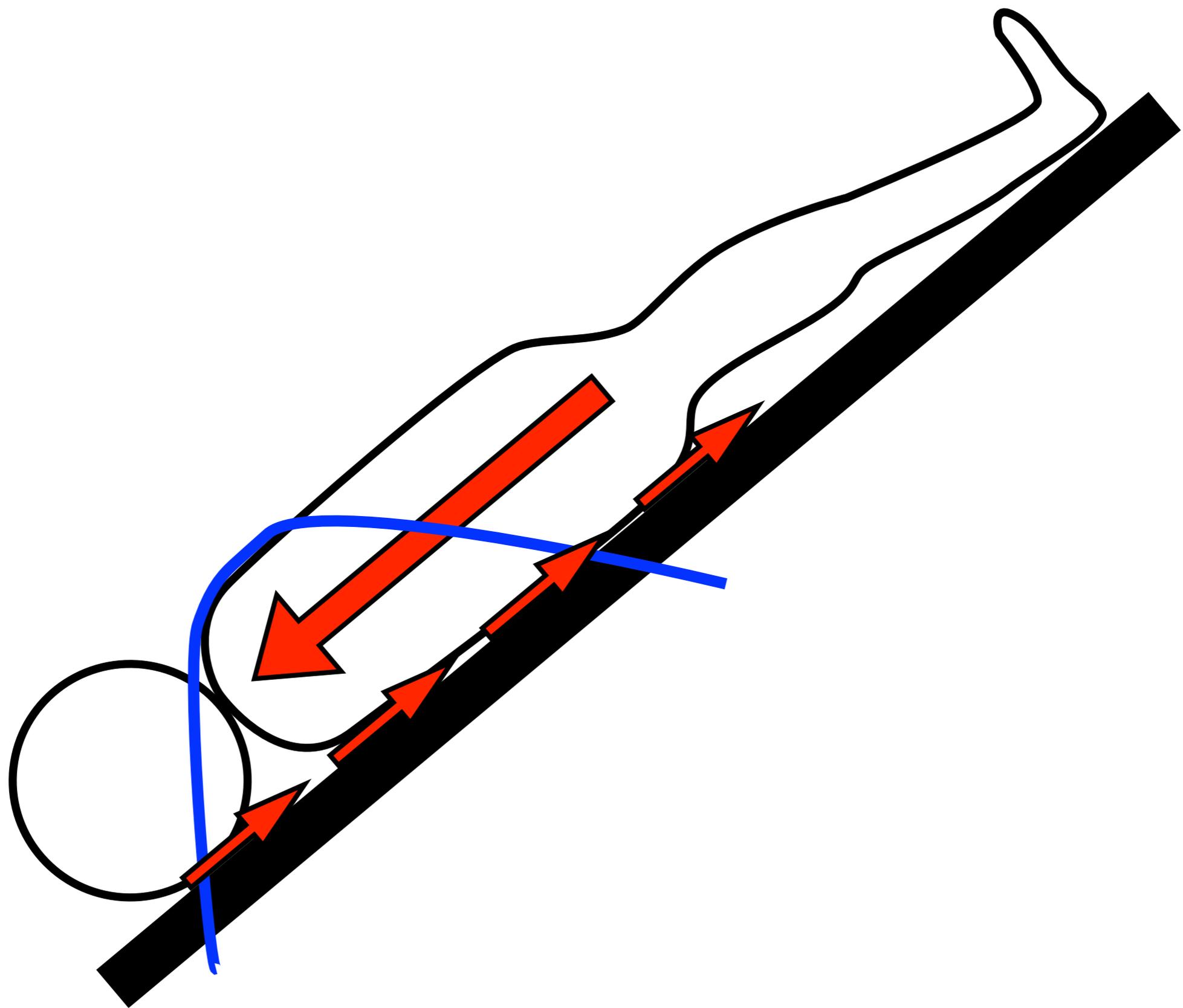


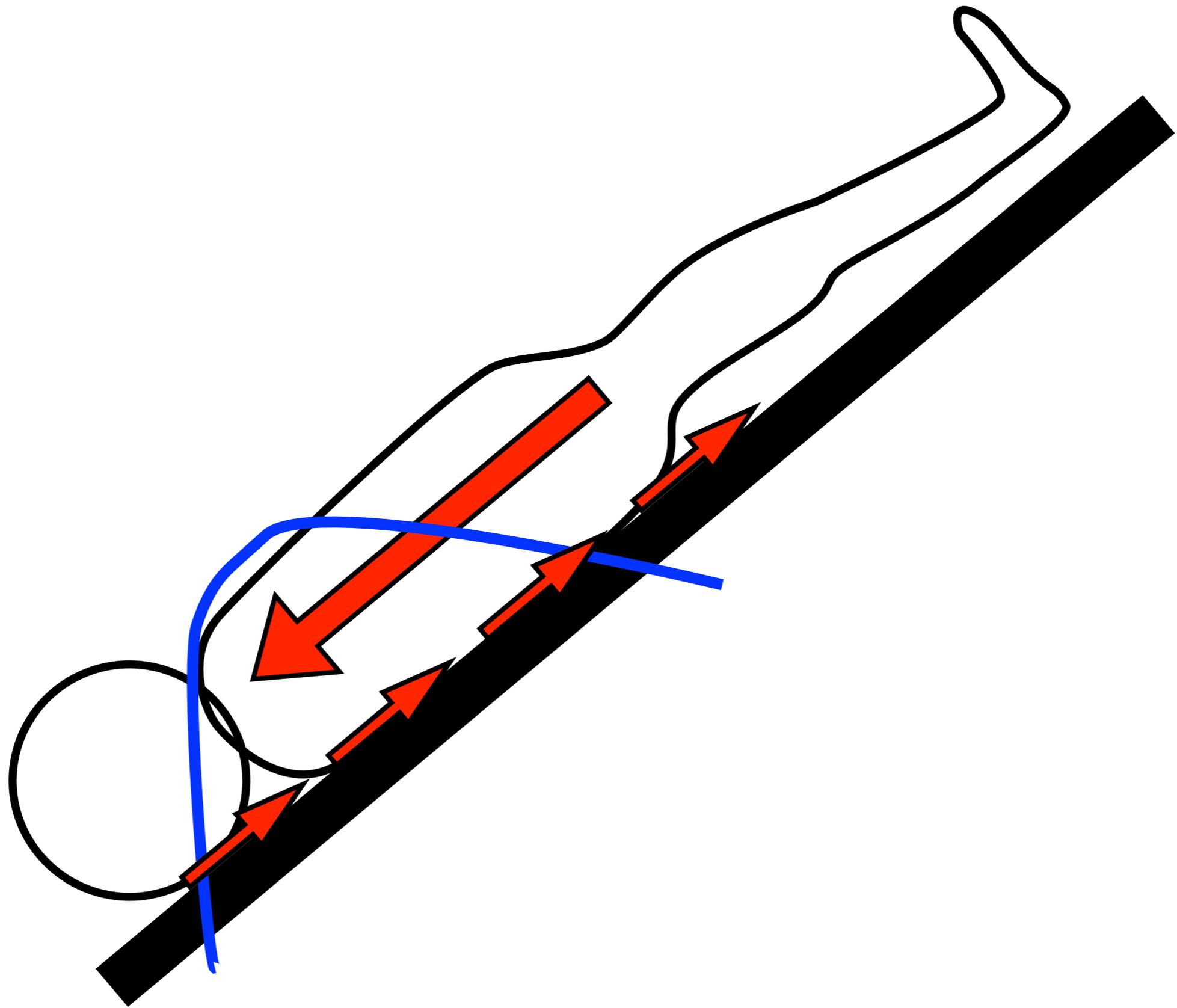


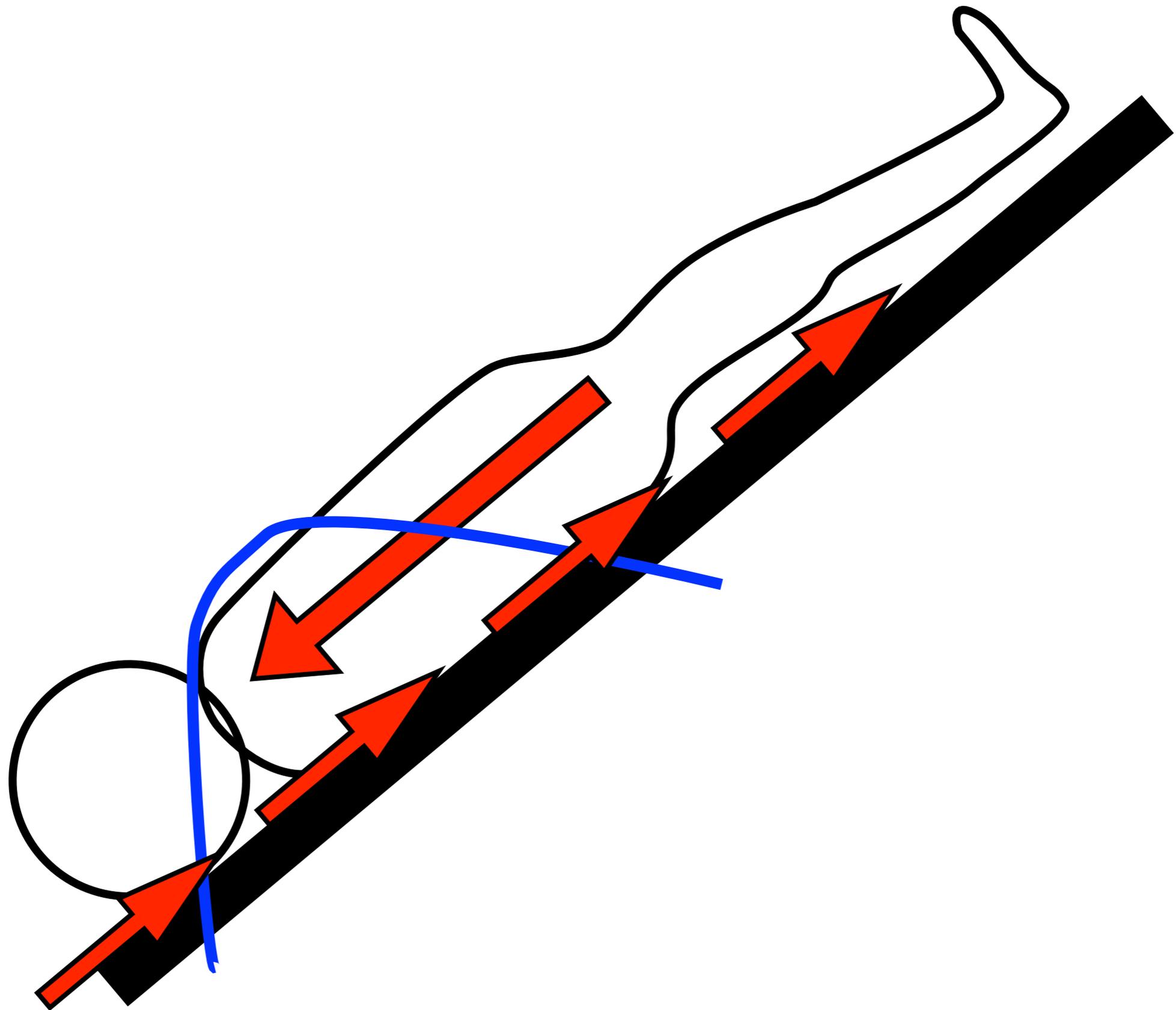


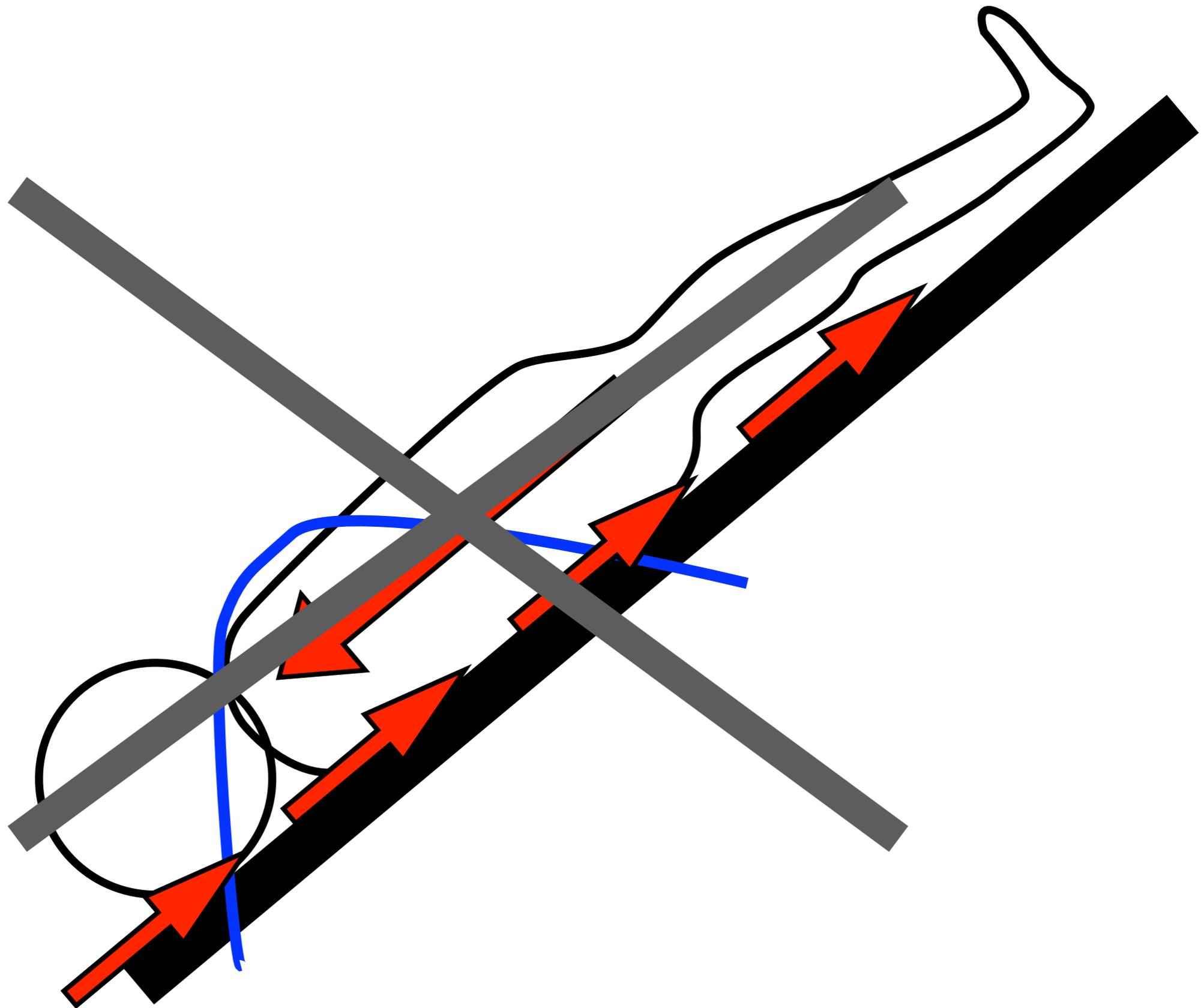


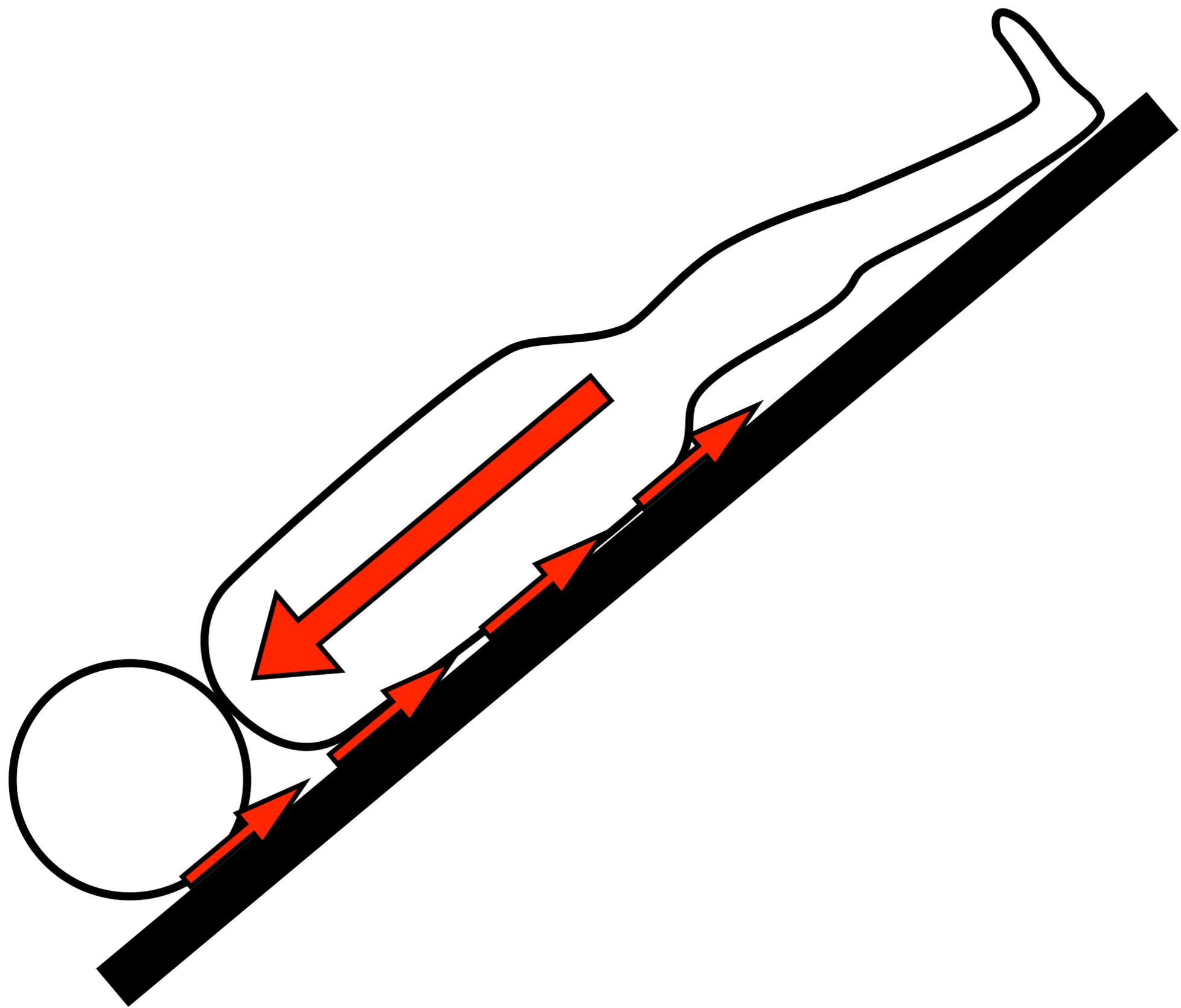


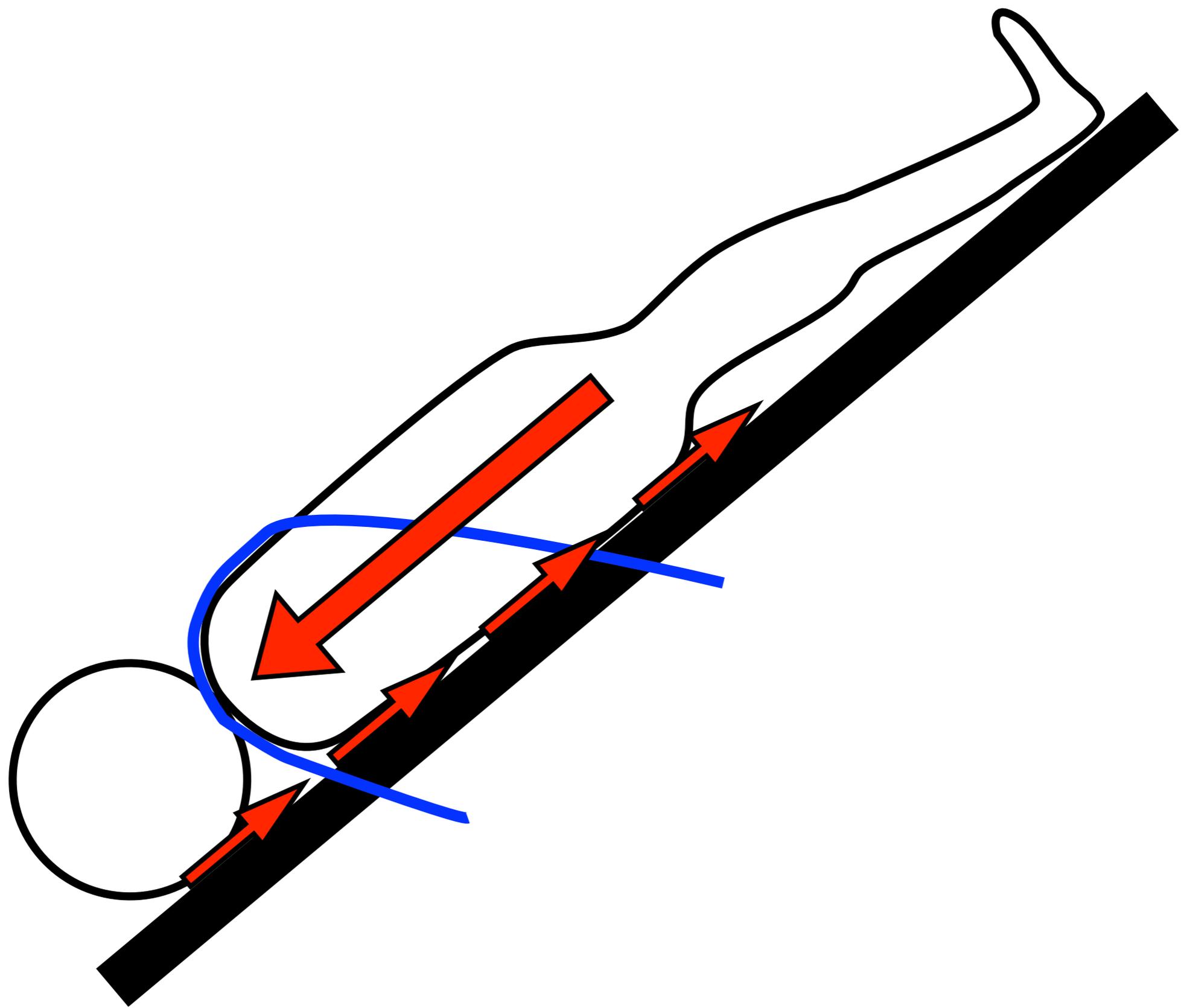


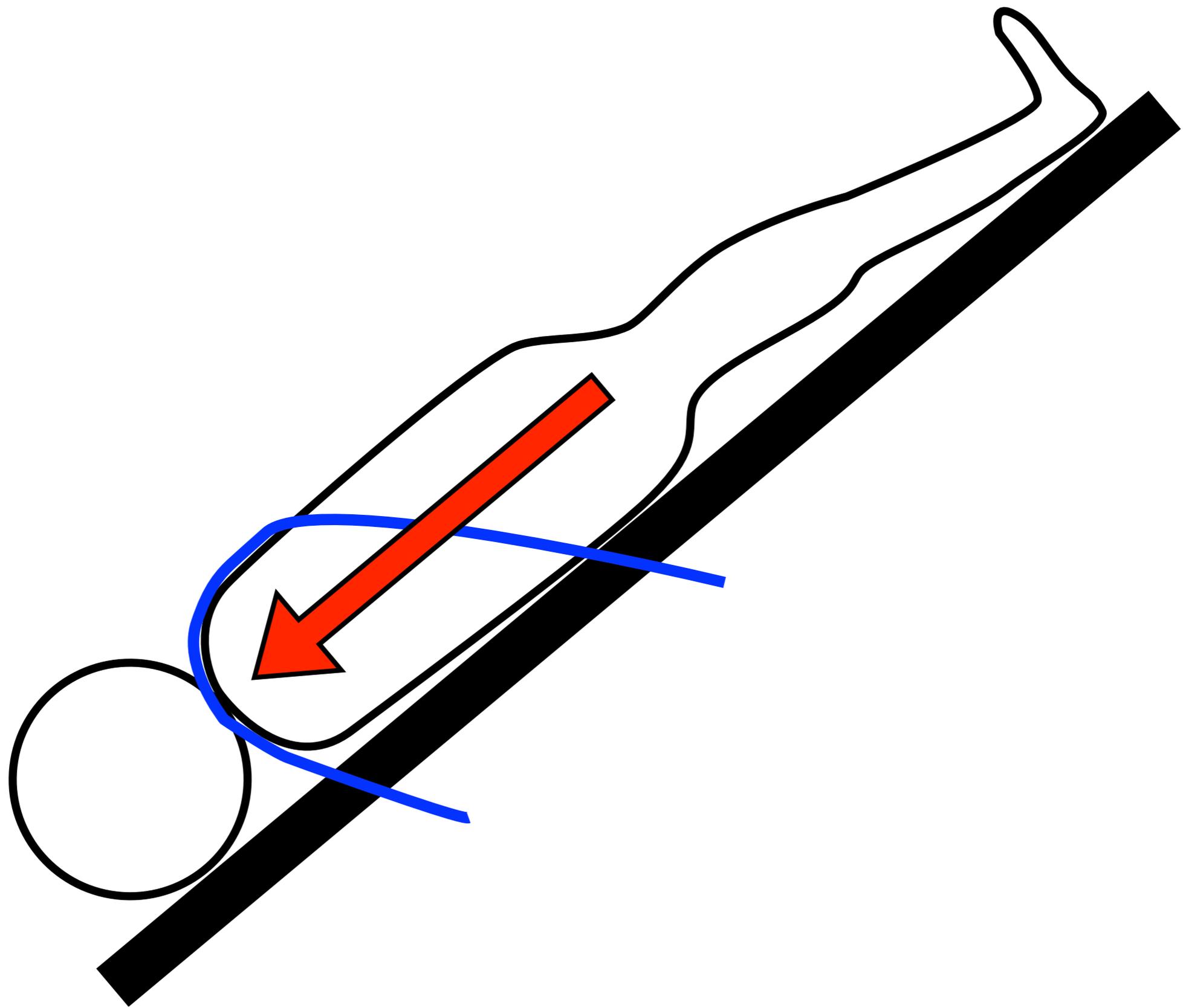


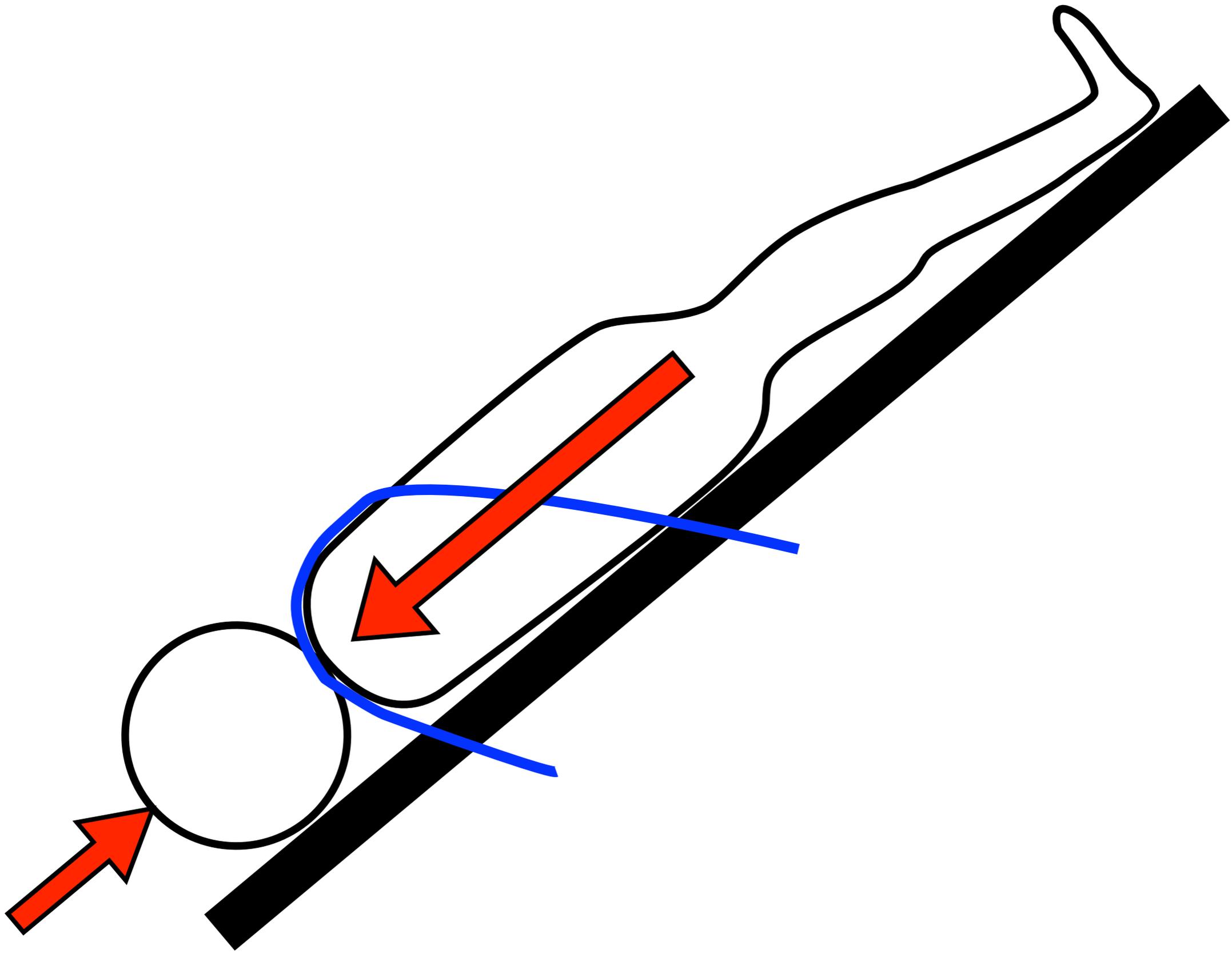










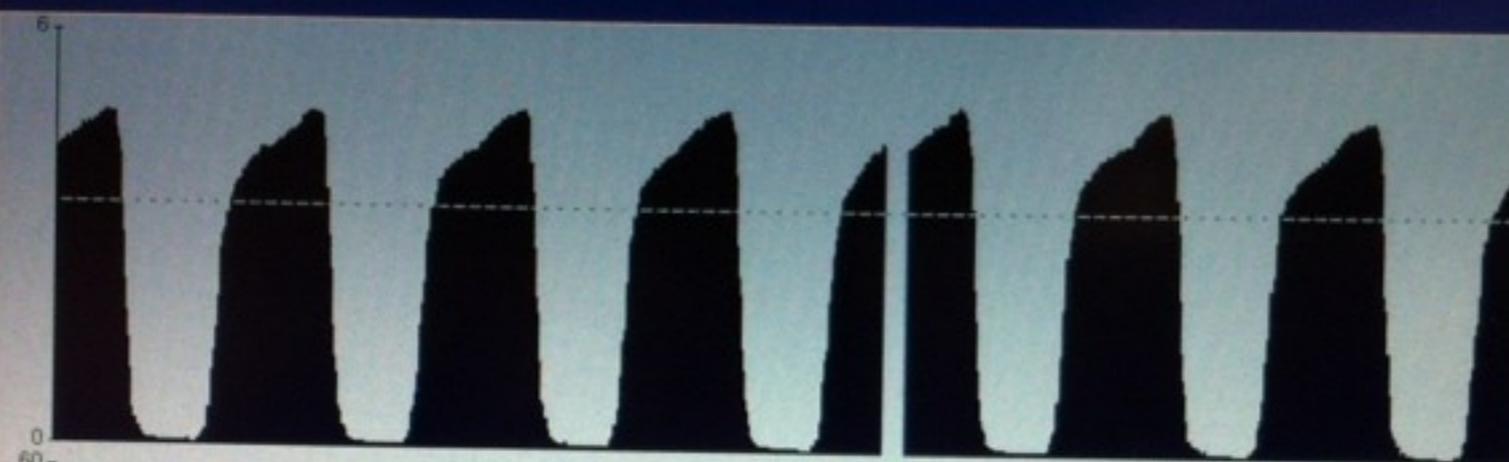
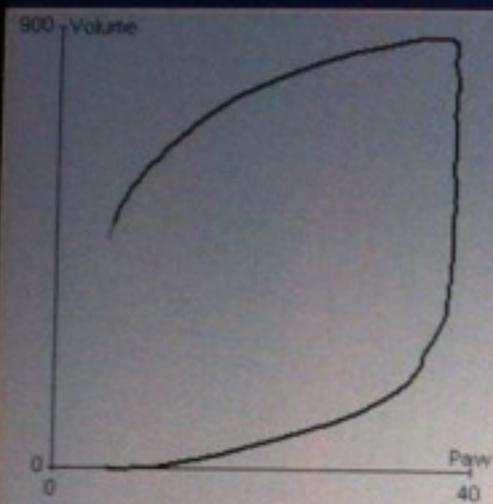




Friday, October 5, 12

Volwassen
180 cm, 40 J, 106.0 kg
Volw. Erasmus MC H-gebouw

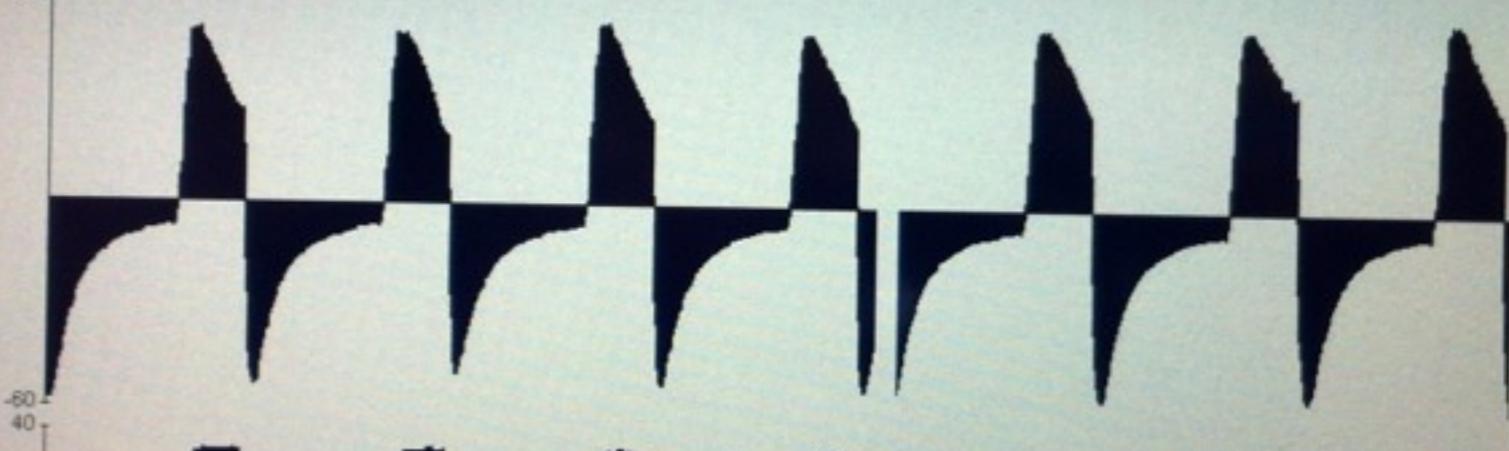
12:38:27
04:16 100%



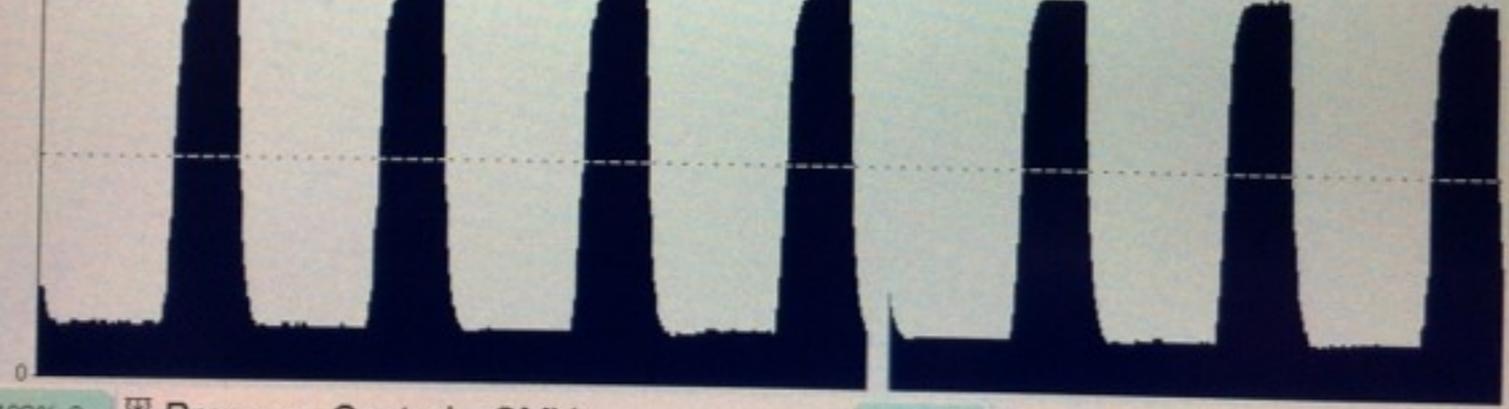
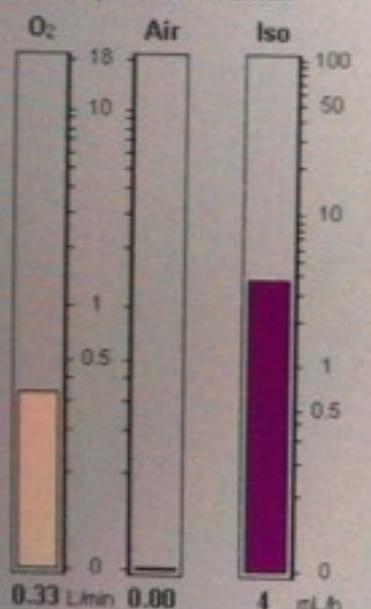
4.8
RR in 13
RR in 0.0

Cdyn 28 R 16
mL/mbar mbar/L/s

System gesloten
O₂ uptake 328 mL/min



12.6
VTe RR 850
RR 14



38
Pmean 16
PEEP 5

Auto dosering

100% O₂

Pressure Control - CMV

MAN/SPON O₂ %

IE=1.0:2.0

Iso%SL xMAC

50
FiO₂

Flush flow

1.4
etiso

38
Pinsp

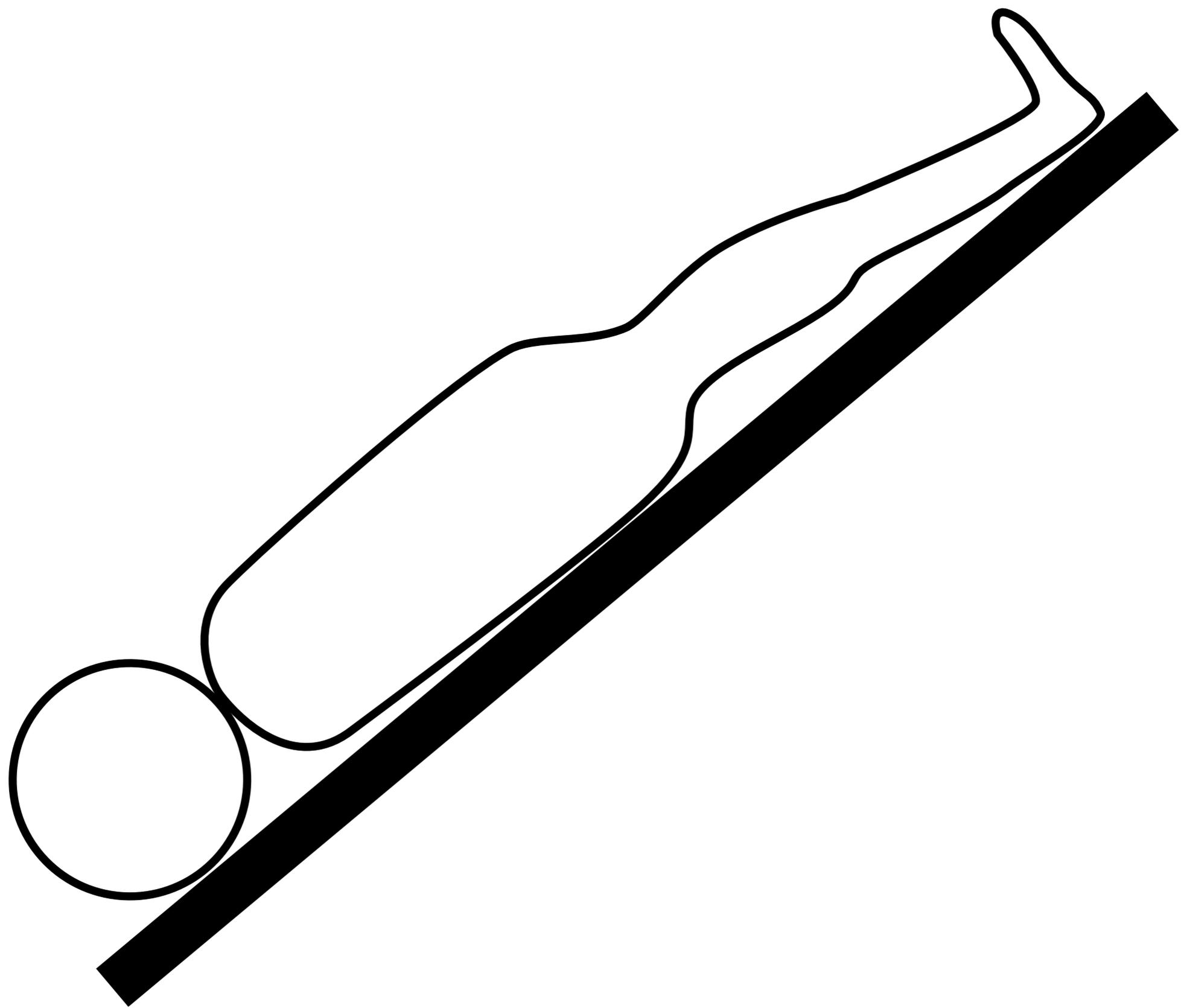
14
RR

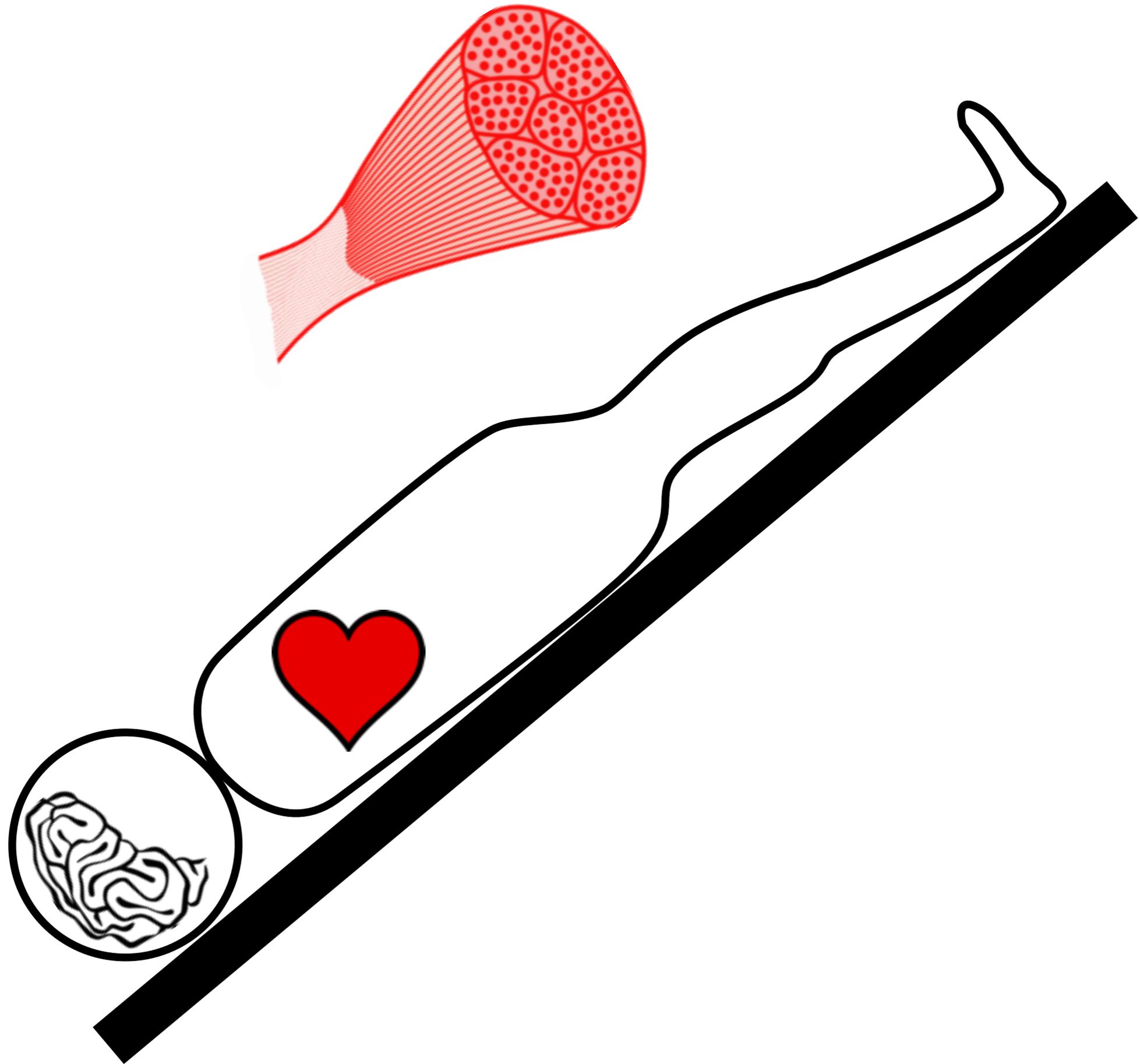
5
PEEP

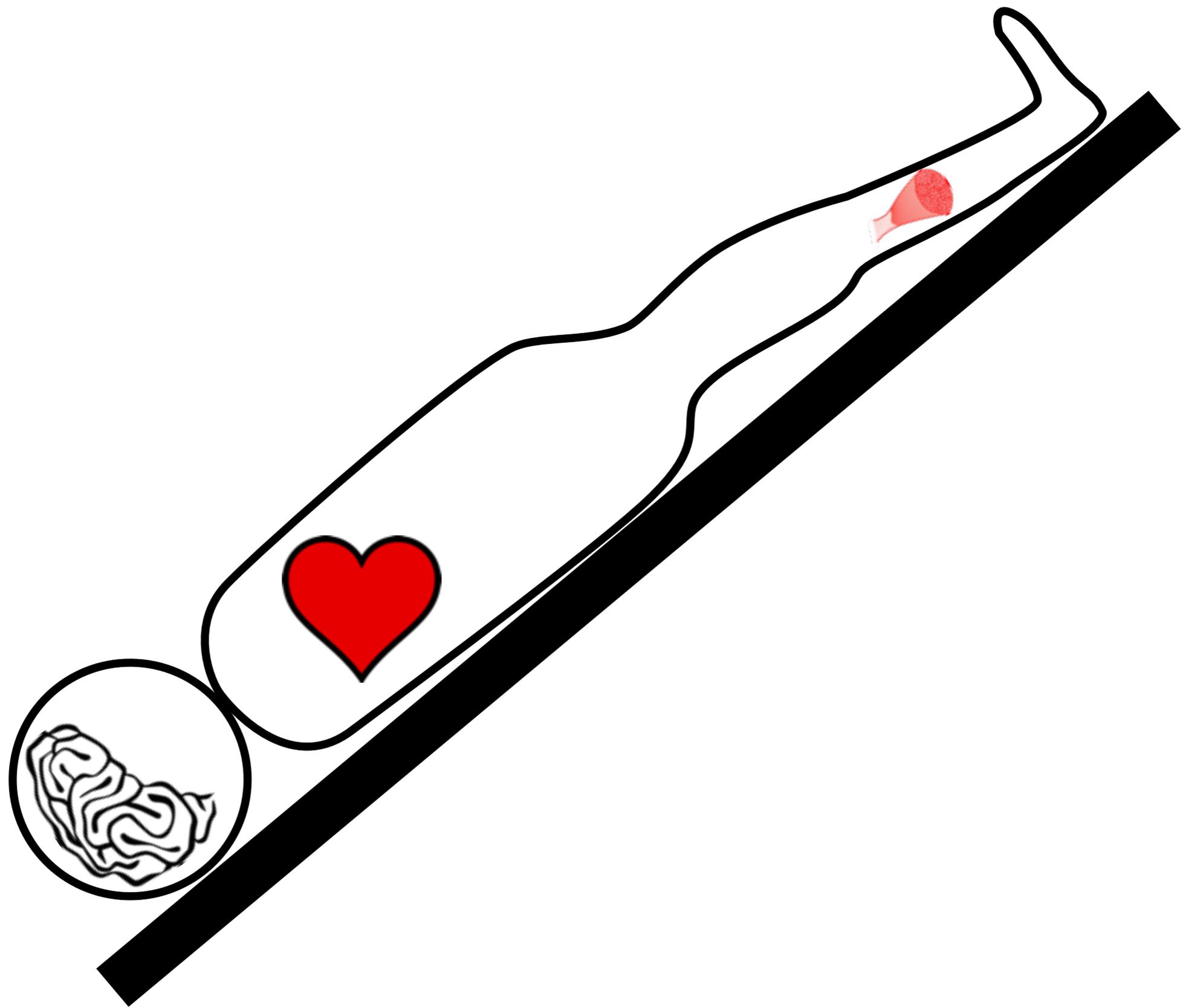
in 50
et 44

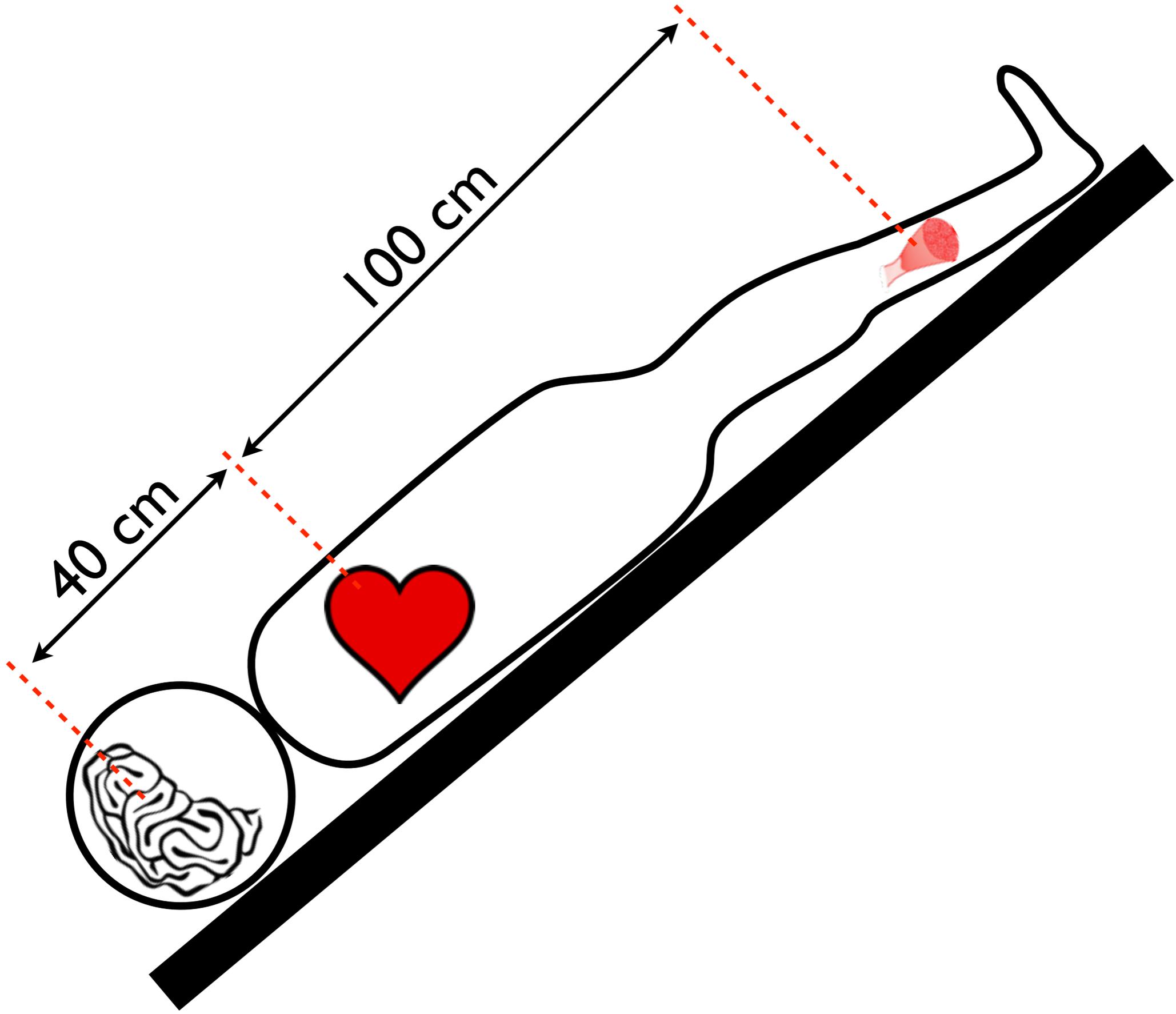
in 1.6
et 1.4 1.2

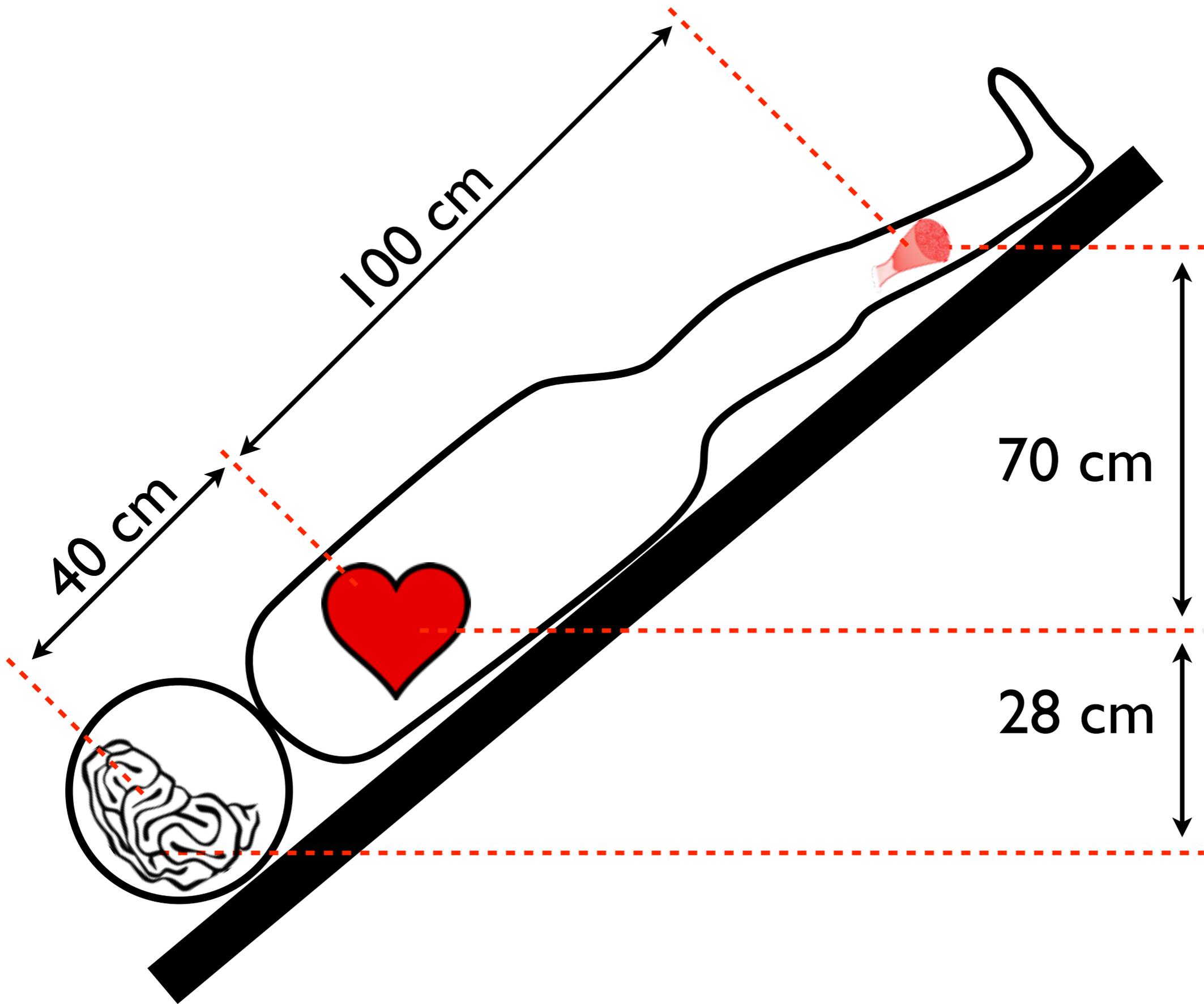
Zeus uitschakelen.
Druk kort op de aan/uit toets

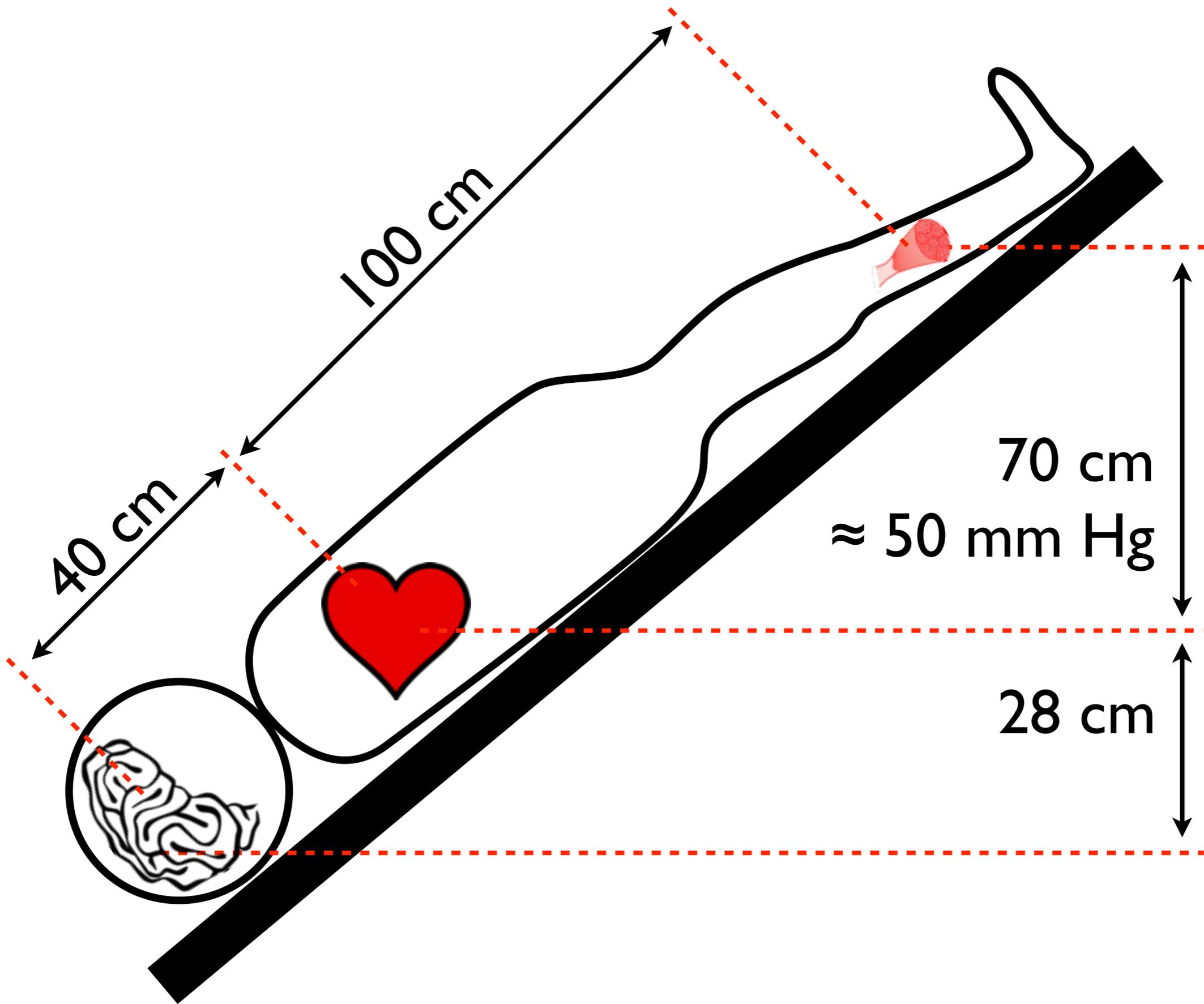








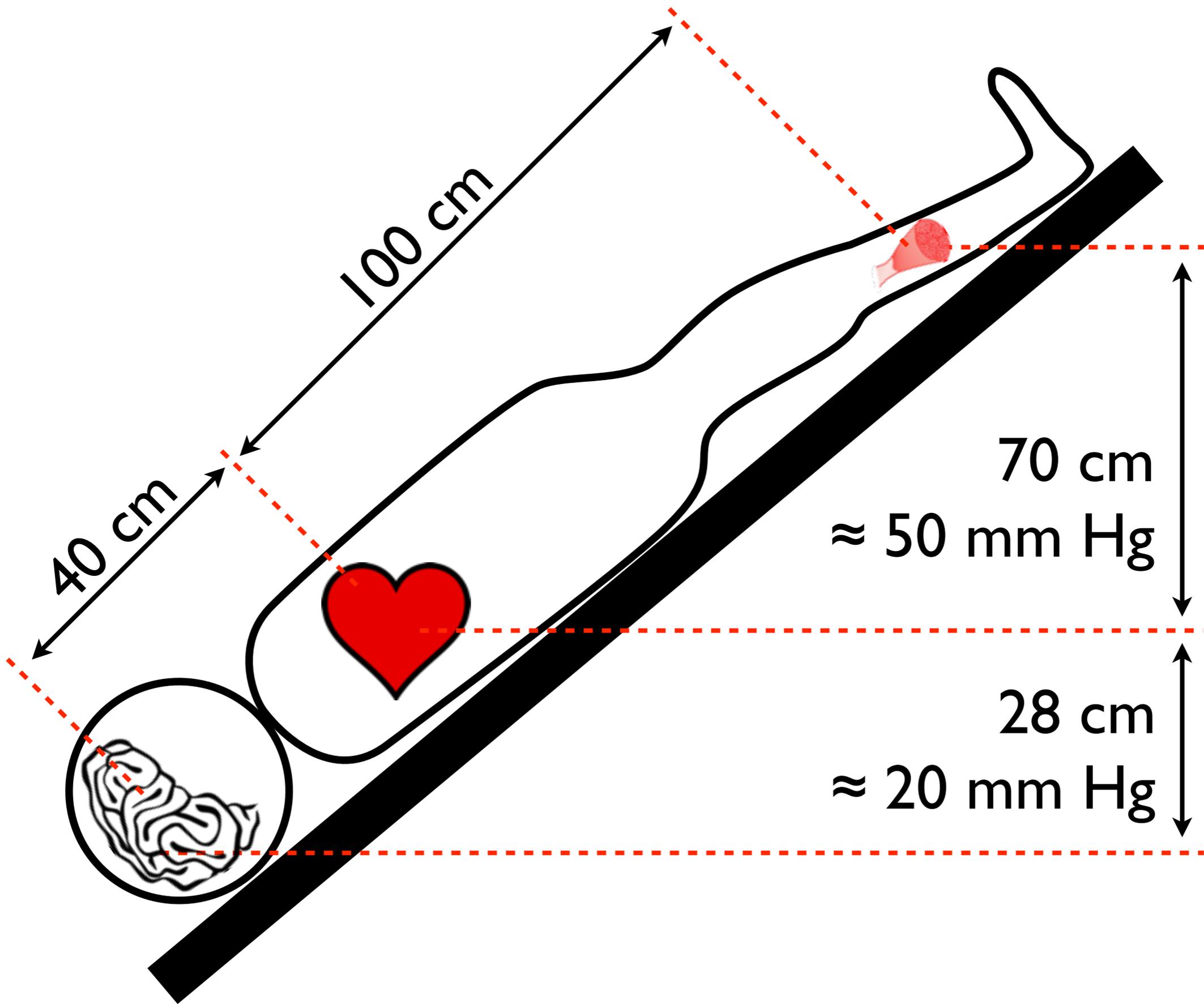


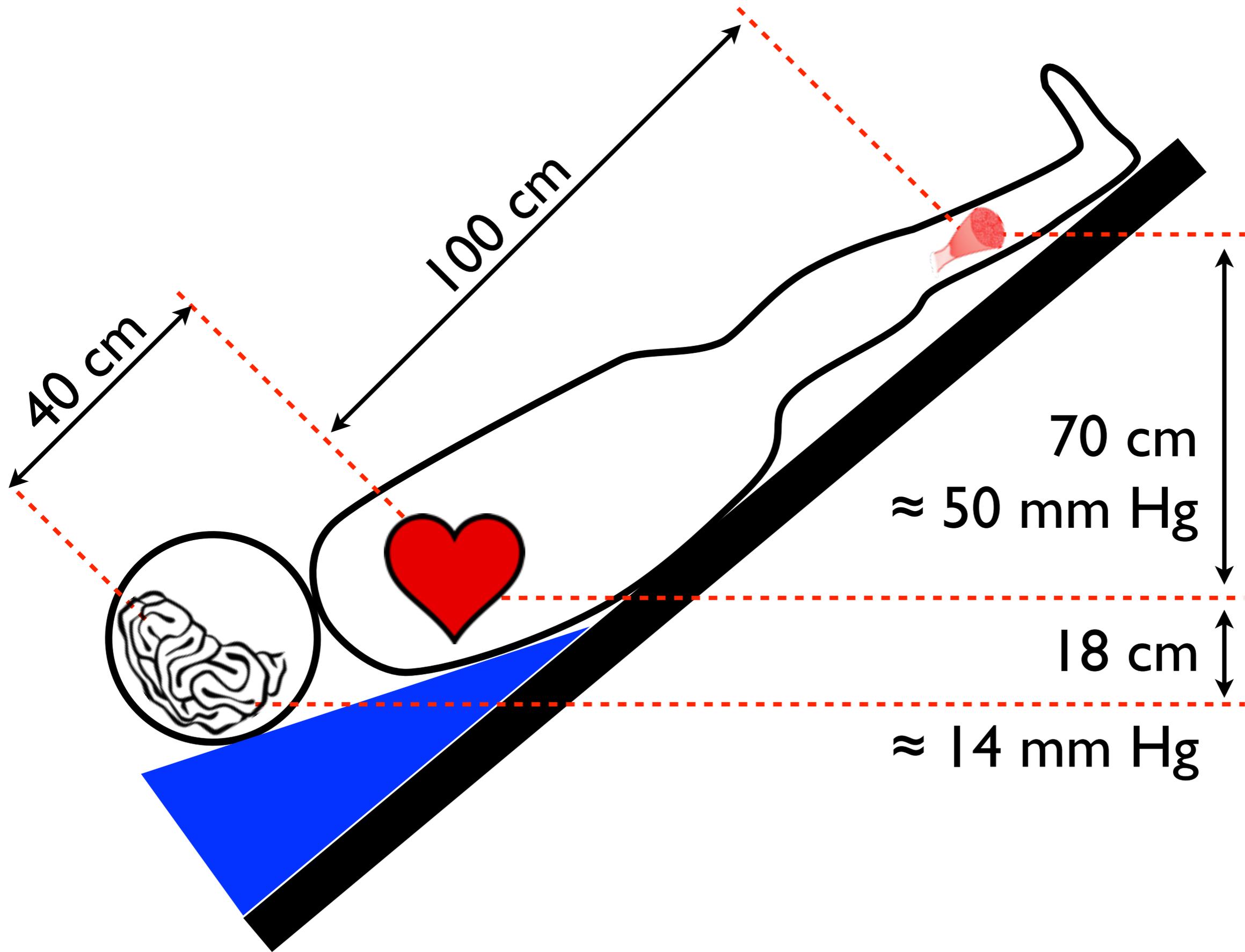


70 cm
≈ 50 mm Hg

28 cm







Where is the heart???



Where is the heart???



Where is the heart???

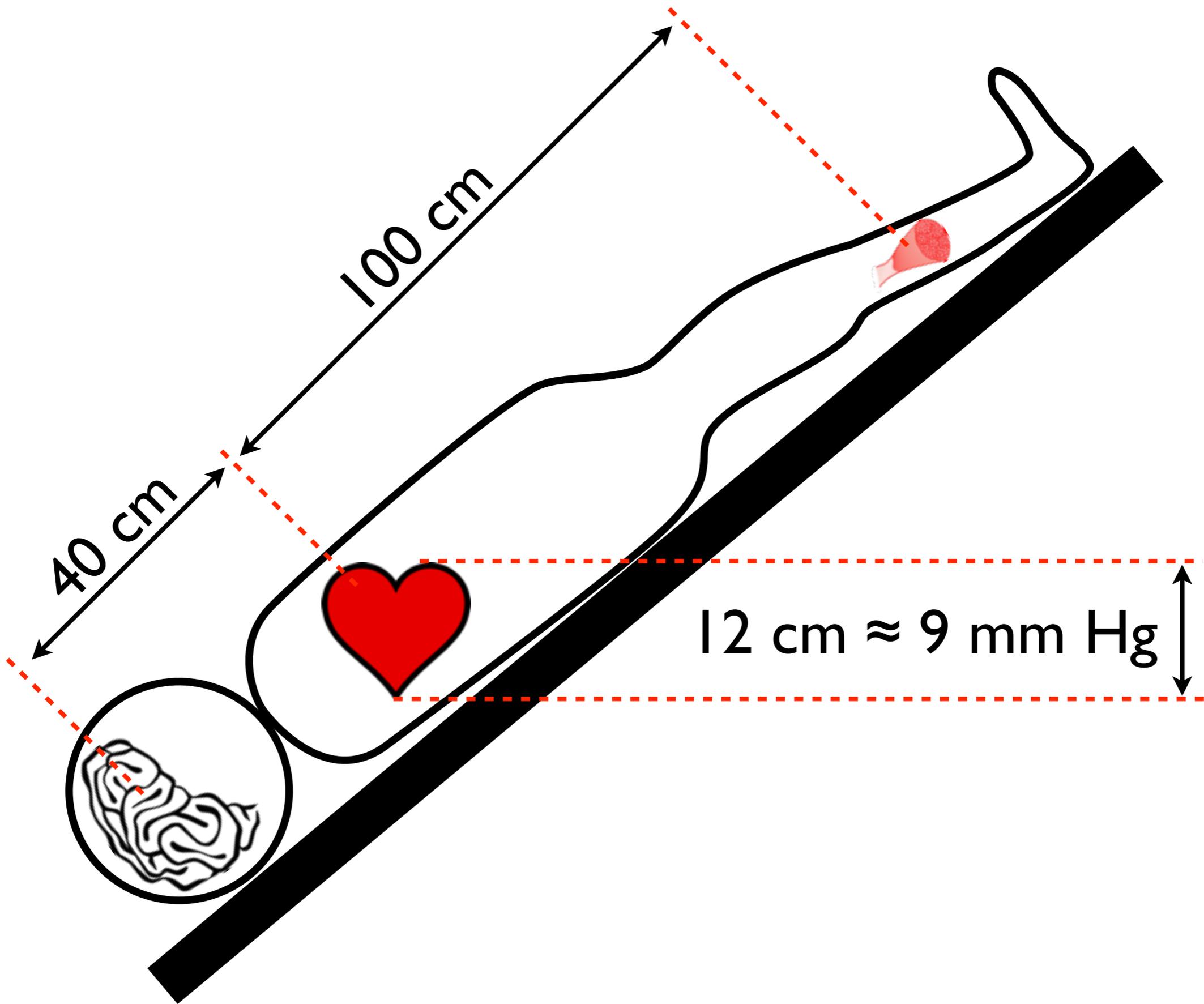


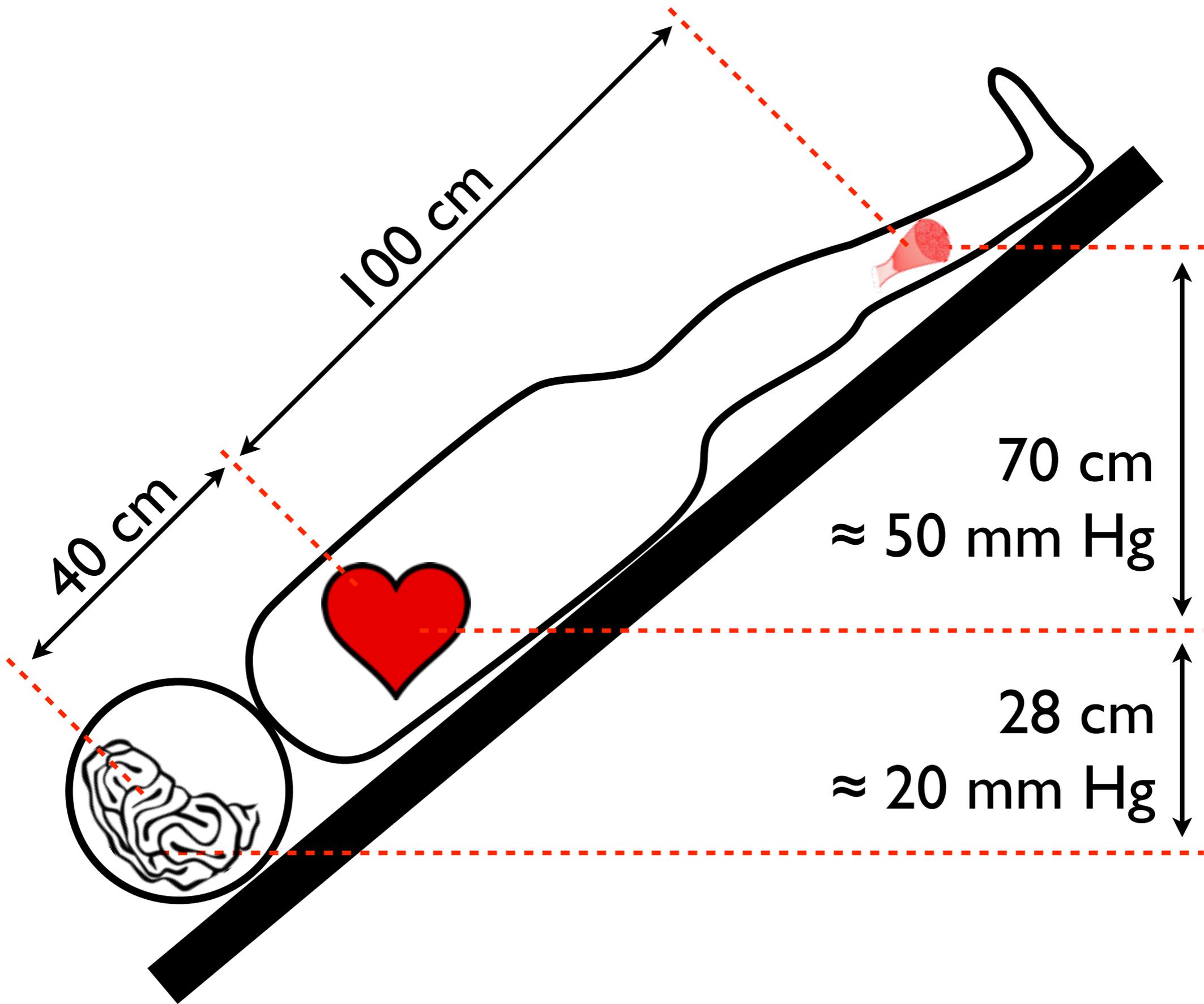
Where is the heart???





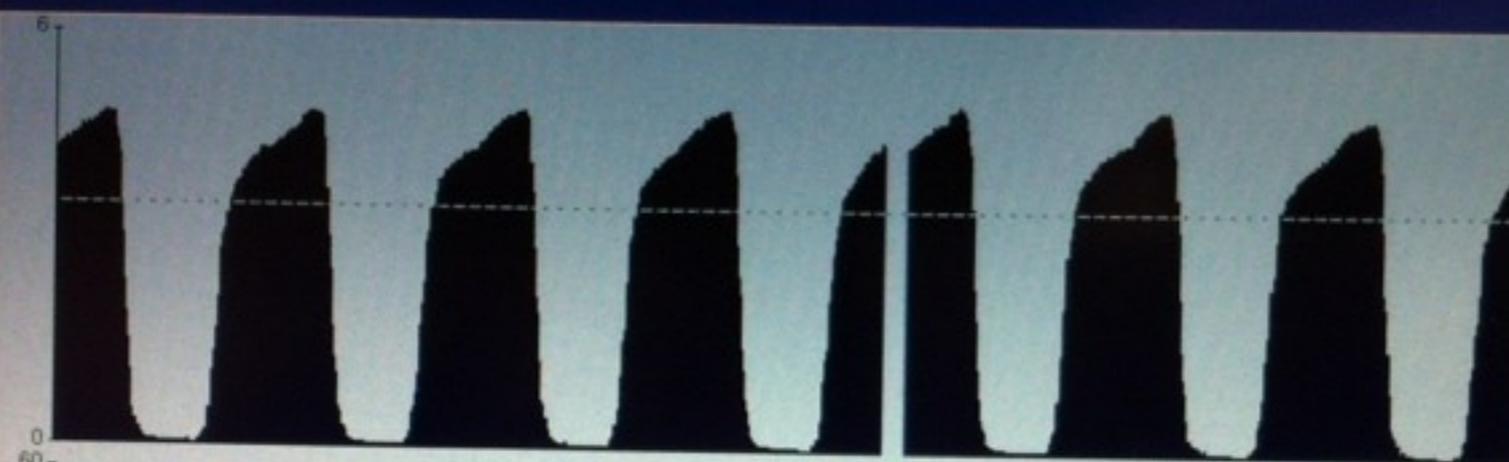
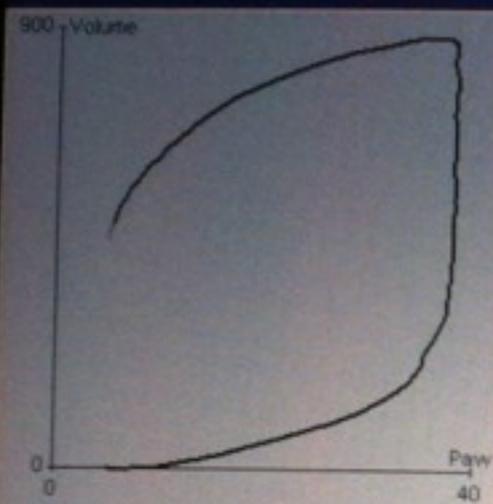
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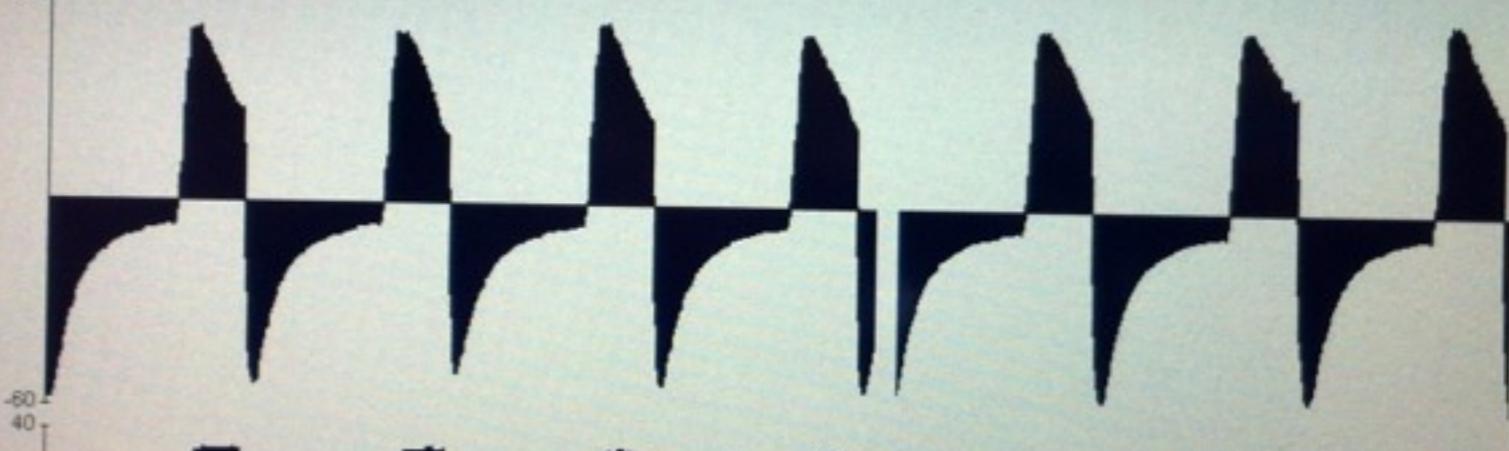
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12:38:27
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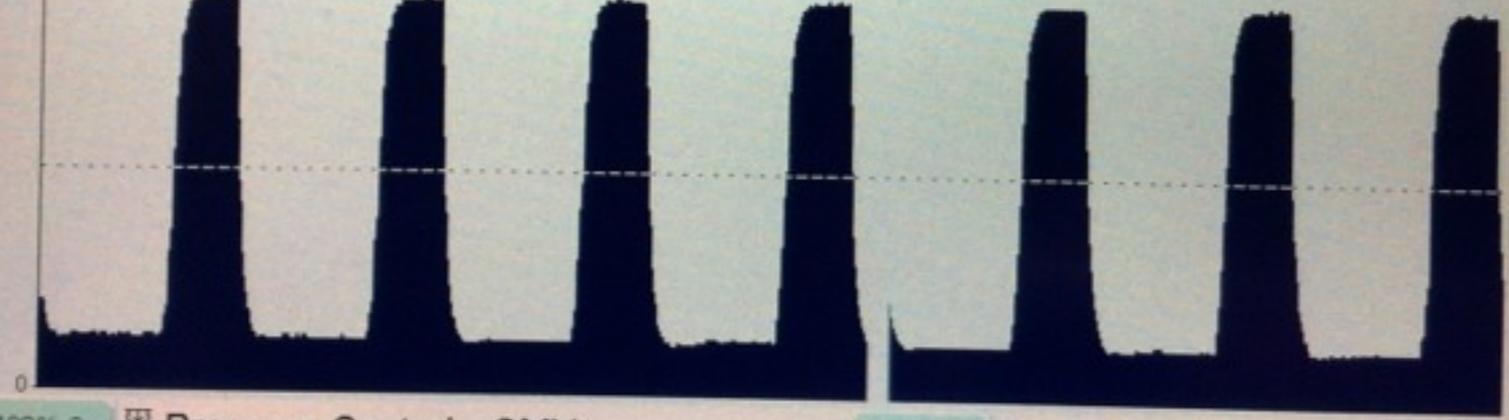
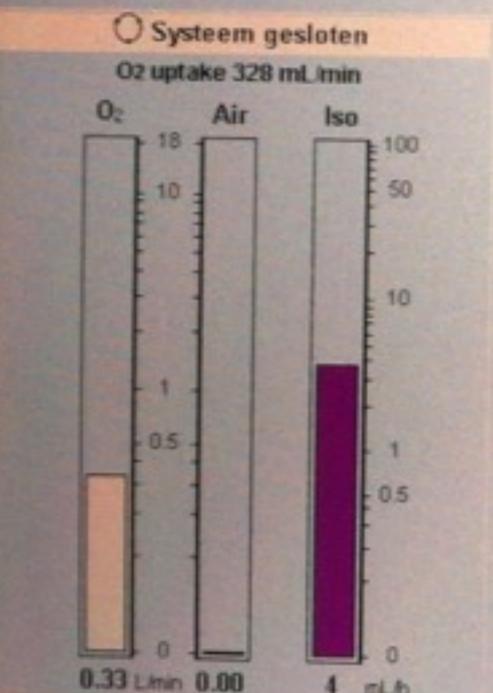


CO₂ et kPa
4.8
RR in 13
RR out 0.0

C_{dyn} 28 mL/mbar
R 16 mbar/L/s



Vol MV L/min
12.6
V_{Te} RR 850
RR 14



Paw PIP mbar
38
P_{mean} **16**
PEEP **5**

Auto dosering
O₂+Air

100% O₂ Pressure Control - CMV

MAN/SPON O₂ %

50 FiO₂
1.4 etiso

38 P_{insp}
14 RR
5 PEEP

IE=1.0:2.0
in 50
et 44

Iso%SL xMAC
in 1.6
et 1.4 1.2

Zeus uitschakelen.
Druk kort op de aan/uit toets

Cerebral Venous Pressure...

...is at least 30 mm Hg !







**Is prolonged extreme
Trendelenburg position
deleterious?**

**Is prolonged extreme
Trendelenburg position
deleterious?**

Short answer: I don't really know

**Is prolonged extreme
Trendelenburg position
deleterious?**

Short answer: I don't really know

Longer answer: Probably

Anesthesia:

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to a patient undergoing
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Questions ???

