



<http://rniito.org>

Comprehensive Designation of External Fixation (CDEF)

Prof. L.N.Solomin

**«Basic principles of external skeletal fixation. Temporary fixation
and treatment of fractures according to Ilizarov»**
St.Petersburg, 2022

~~Closed comminuted spiral
fracture of the distal third of the
femur with displacement of bone
fragments~~

or **32-B1**



Play!

if you will be able

Gently:

The Key 7 - 0.5 sec., key 9 - 0.25 sec.,
keys 7, 11 and 15 - 0.25 sec., key 12 - 0.5 sec.,
key 11 - 1 sec., key 8 - 0.5 sec., keys 13 and
15 - 0.25 sec.s, key 5 - 0.5 sec. The Key 15
-0.3 sec., key 7 - 0.25 sec., keys 15, 19 and
-22 - 0.25 sec., key 30 - 0.5 sec., key 16 - 1
-sec., key 8 - 0.5 sec., keys 13 and 15 - 0.25
-sec., key 5 - 0.5 sec.

The Key 18 - 0.25 sec., key 9 - 0.25 sec., keys 7, 11 and 15 - 0.25 sec., key 12 -
0.5 sec., key 11 - 1 sec., key 8 - 0.5 sec., keys 13 and 15 - 0.25 sec.s, key 5 -
0.5 sec. The Key 15 - 0.3 sec., key 7 - 0.25 sec., keys 15, 19 and 22 - 0.25 sec.,
key 30 - 0.5 sec., key 16 - 1 sec., key 8 - 0.5 sec., keys 13 and 15 - 0.25 sec.,
key 5 - 0.5 sec.

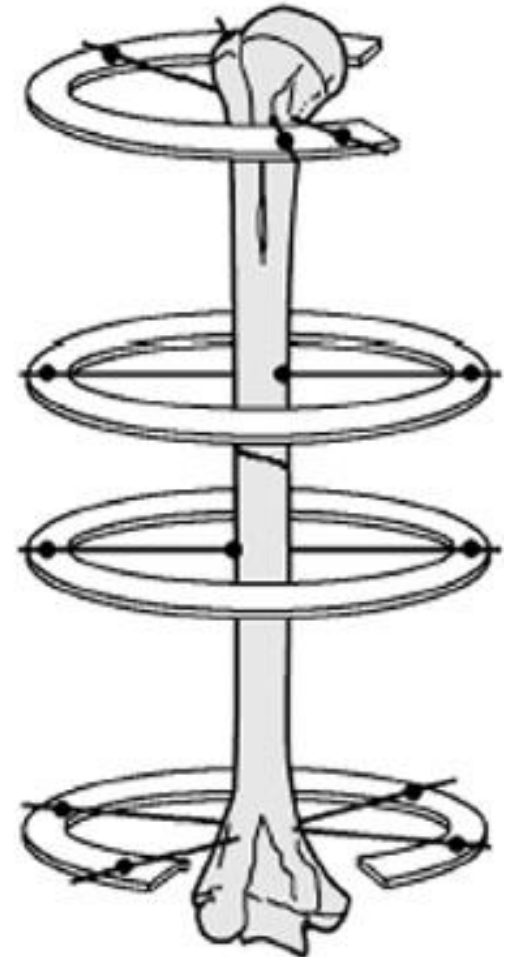
The Key 7 - 0.5 sec., key 9 - 0.25 sec., keys 7, 11 and 15 - 0.25 sec., key 12 -
0.5 sec., key 11 - 1 sec., key 8 - 0.5 sec., keys 13 and 15 - 0.25 sec.s, key 5 -
0.5 sec. The Key 15 - 0.3 sec., key 7 - 0.25 sec., keys 15, 19 and 22 - 0.25 sec.,
key 30 - 0.5 sec., key 16 - 1 sec., key 8 - 0.5 sec., keys 13 and 15 - 0.25 sec.,
key 5 - 0.5 sec.



Assemble!

if you will be able

“K-wire with the olive was inserted through the proximal metaphysis of the humeral bone, at right angle to the long axis of the segment, and oriented at an angle 75° to the frontal plane, from posterior-anteriorly. The second K-wire was passed in the same plane with the first one, and inserted at an angle 30° to it. Two K-wires were passed through the epicondylar region of the humerus, at right angle to the long bone axis, in the transversal plane, oriented at 30° to each other (the angle in opened outside). The Ilizarov's device was mounted using three supports with the diameter 130mm and one (proximal) support with the diameter 140mm. In such case the marginal supports of the device are geometrically mounted as $3/4$ of the circle length. Then, considering the residual displacement of the fragments, two K-wires with the olive were inserted in the frontal plane at right angle to the long axis of the segment: the first one - at the border of the upper and middle thirds of the humeral diaphysis, in the direction inside-outside; the second one - at the level of the border of the middle and lower thirds of the segment in the direction outside-inside. The interfragmental compression was given.”



ExFix

CDEF

**Comprehensive
Designation of External
Fixation**

ExFix

CDEF

Слова Э. УСПЕНСКОГО

Музыка В. ШАЙНСКОГО

Умеренно *tr* C_m G_7

1. Я был когда-то странной игрушкой безымянной, к которой вмагали не ни кто не подойдет. Теперь я Чебурашка, мне каждая дворняжка при встрече сразу лапу подаст. Те.

C_m E_s B B_7 E_s C F_m7 B_7 E_s E_{dim} F_m C_m G_7 C_m

A_m *mf* E

1. Висит на заборе, колышется ветром, колышется ветром бумажный листок: "Пропала собака! Пропала собака!"

A_7 D_m D_m A_m E

Пропала собака! Пропала собака! Пропала собака! Пропала собака!

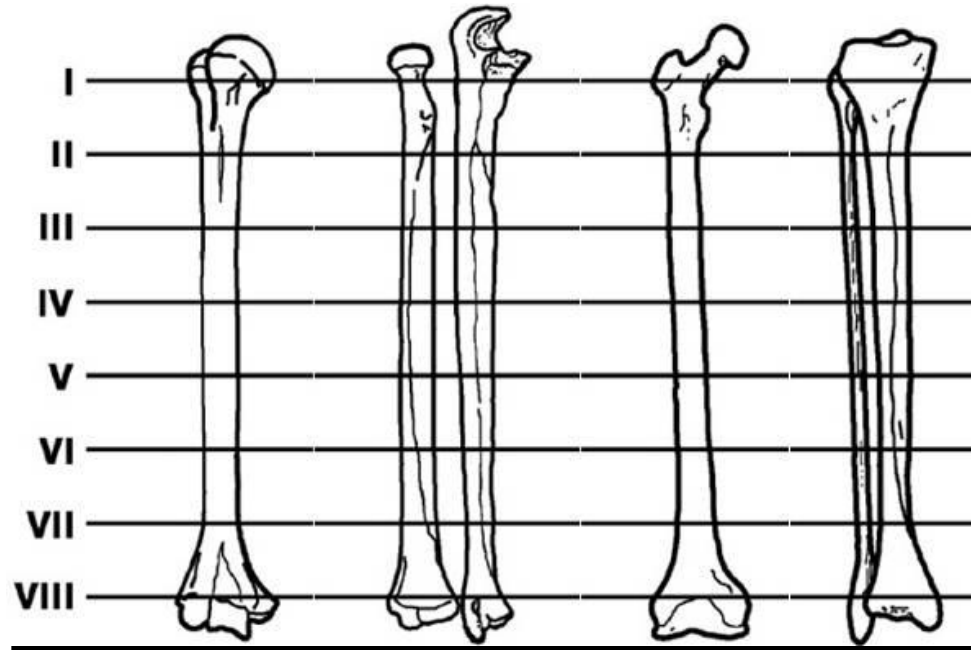
A_m E A_m E A_m

по кличке Дружок!" по кличке Дружок!"

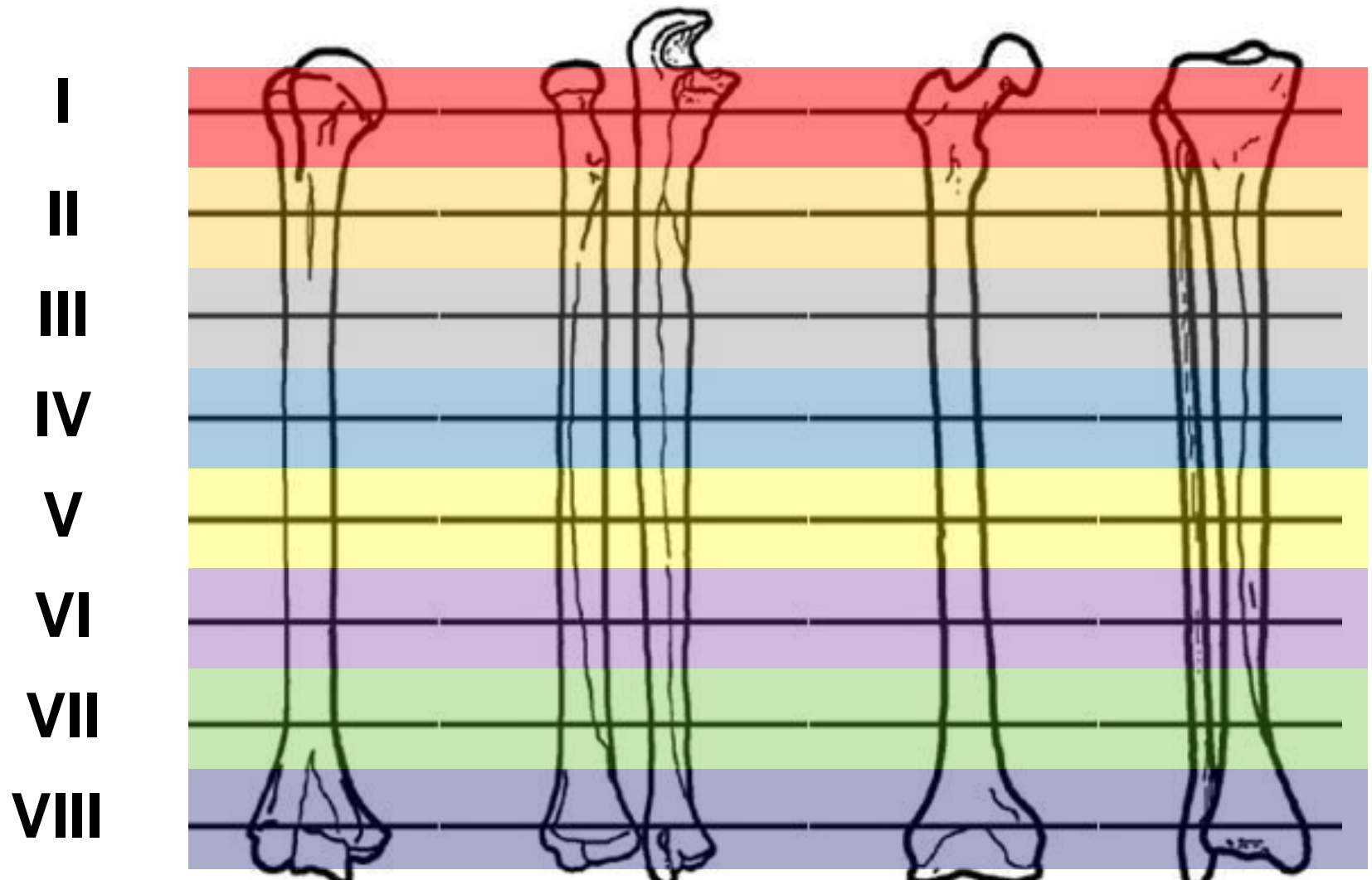
1. Висит на заборе, колышется ветром, Колышется ветром бумажный листок: "Пропала собака! Пропала собака!"

Coordinates

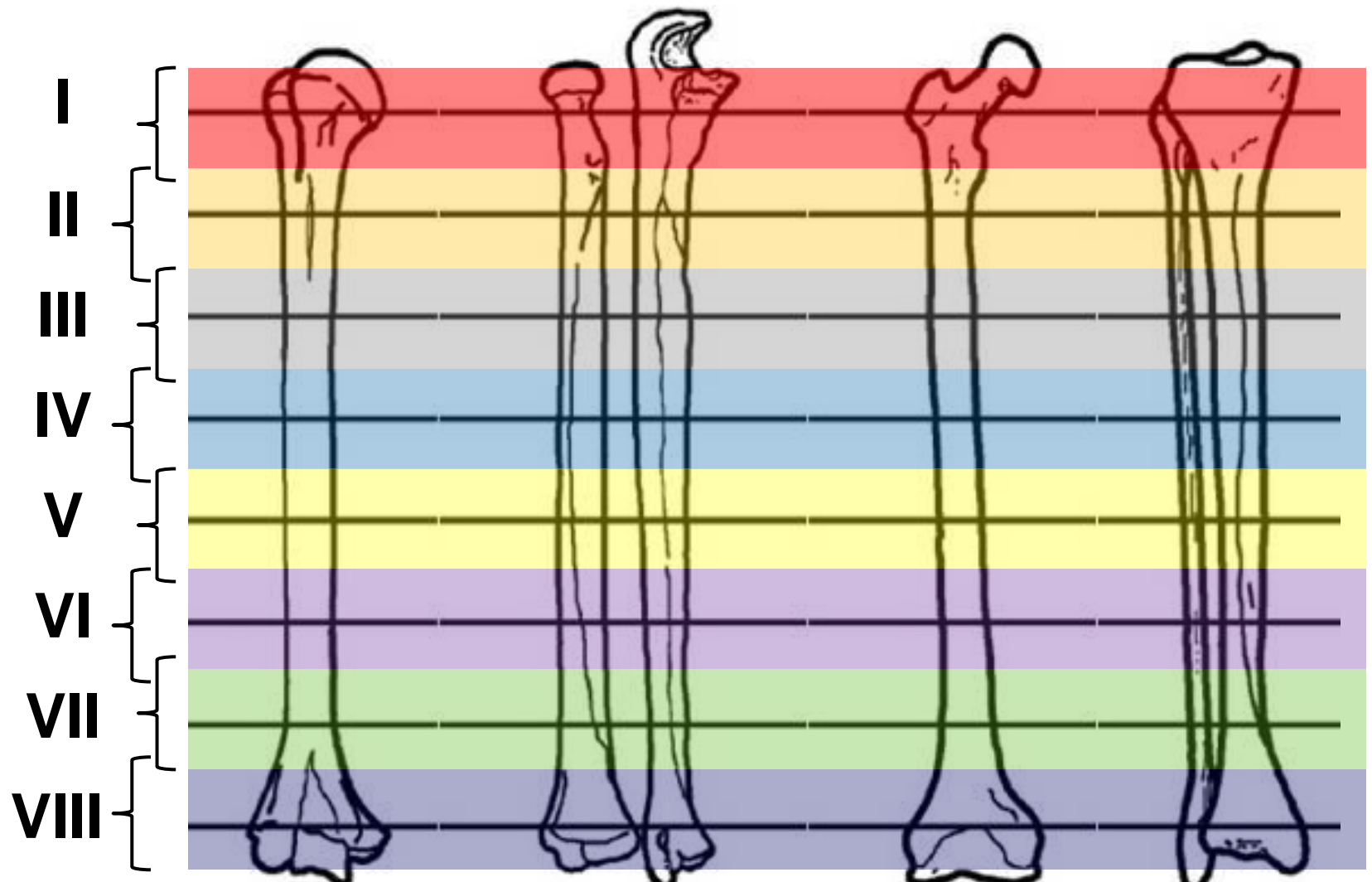
Levels



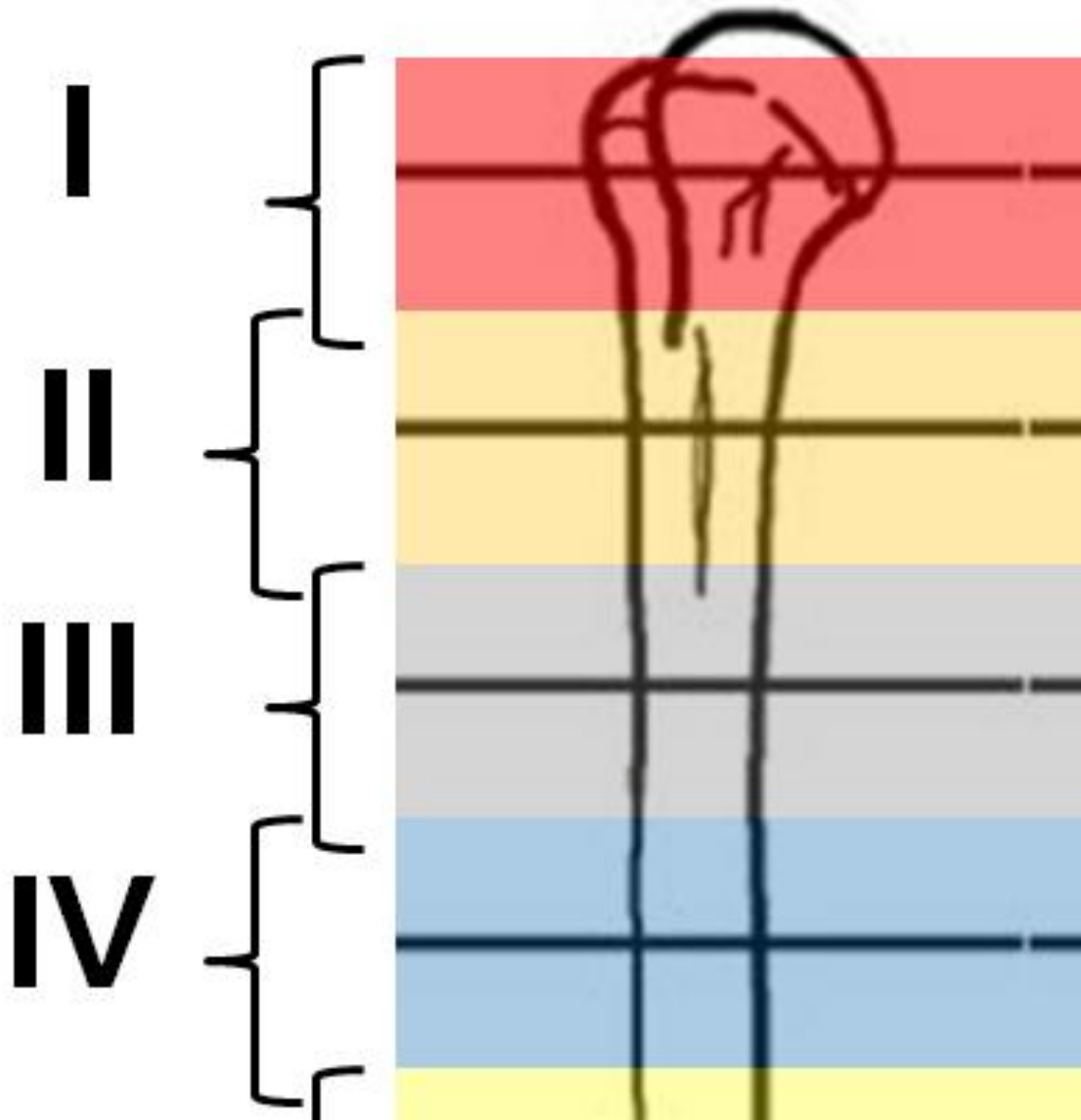
Coordinates: levels



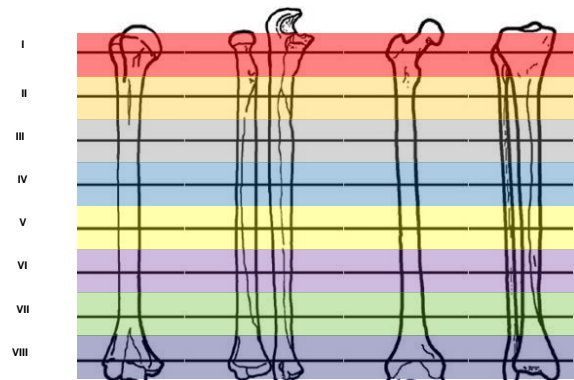
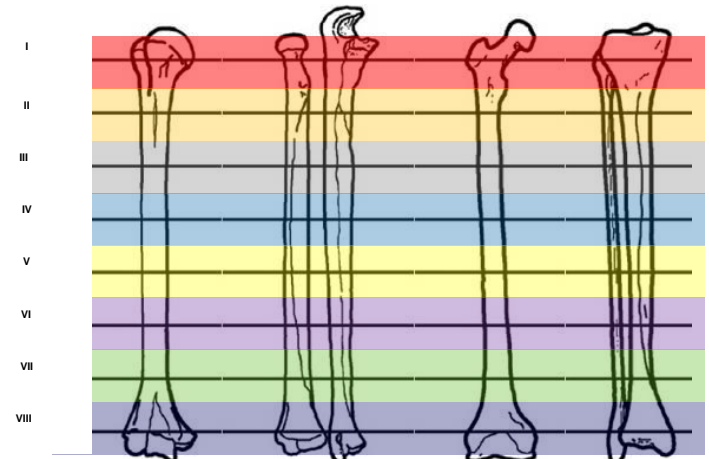
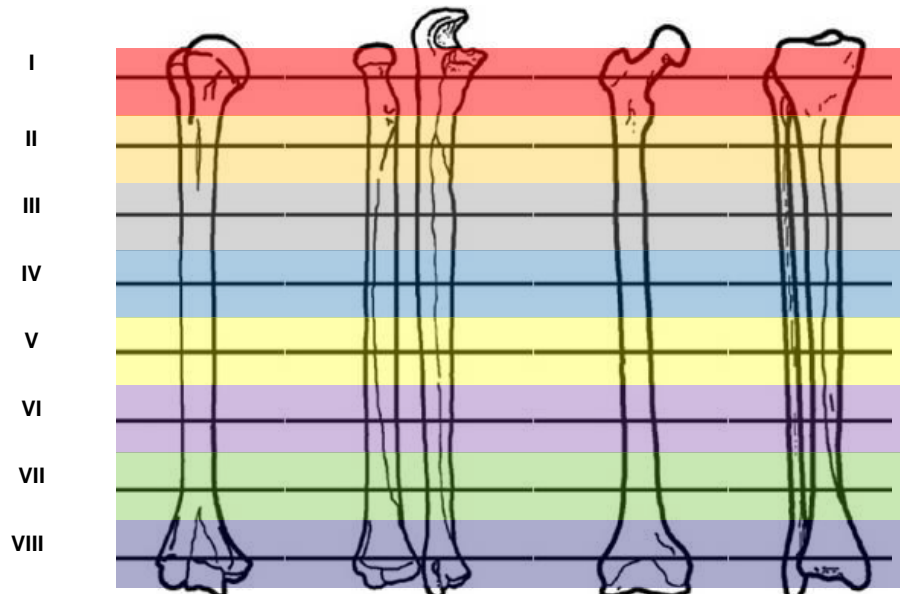
Coordinates: levels



Coordinates: levels

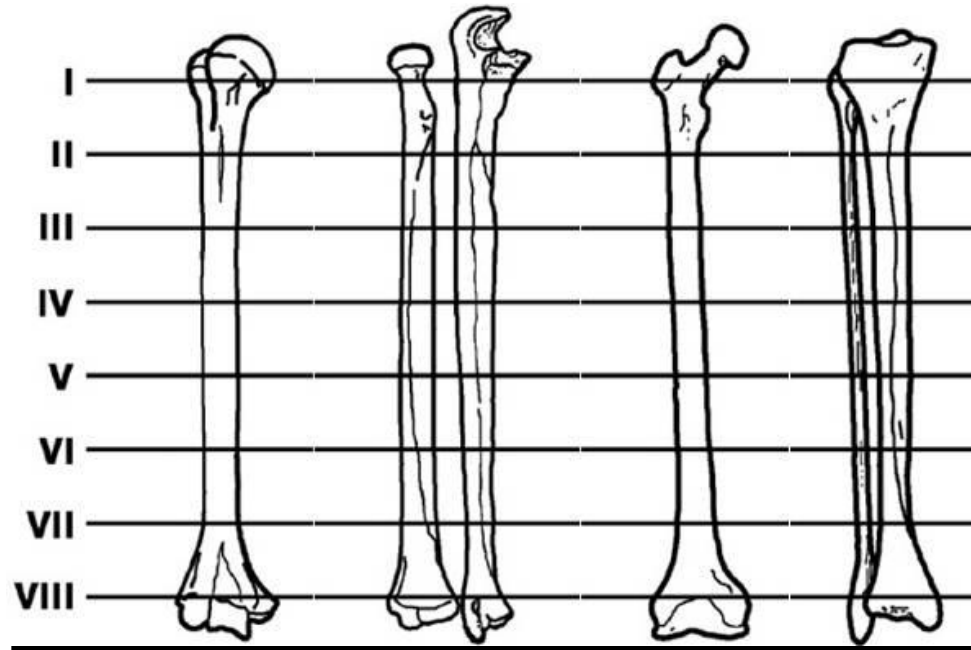


Coordinates: distance between levels



Coordinates

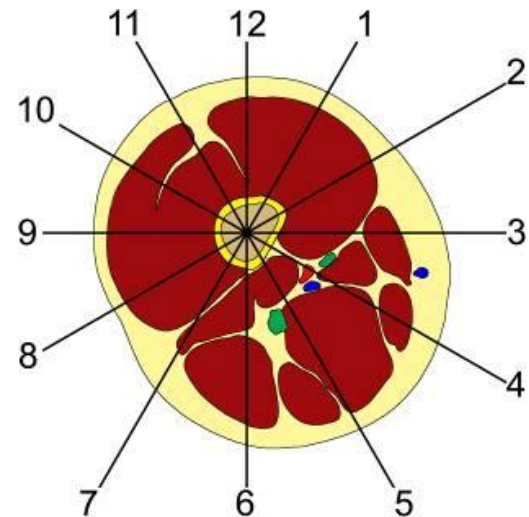
Levels



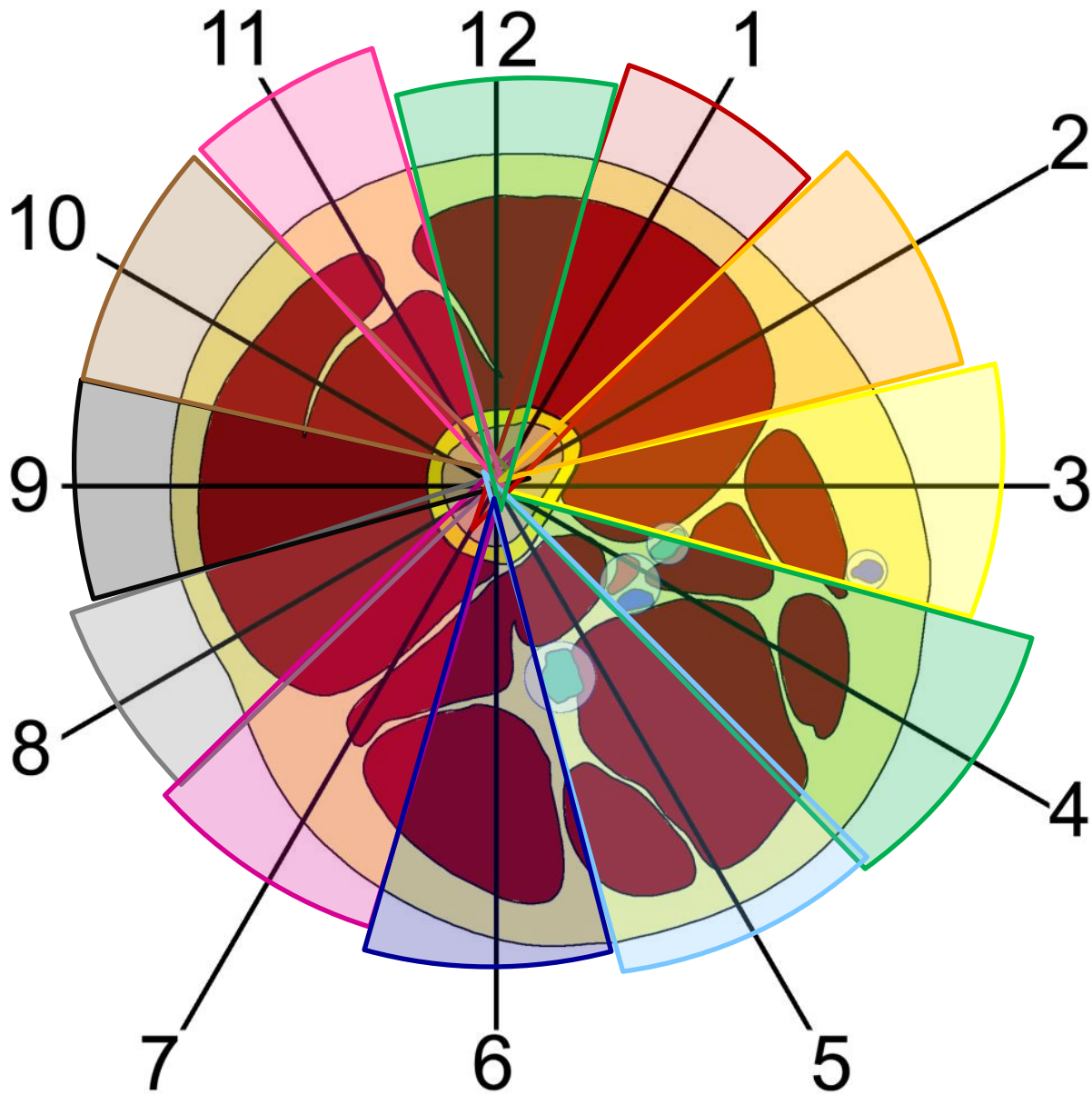
Positions

3 – medially

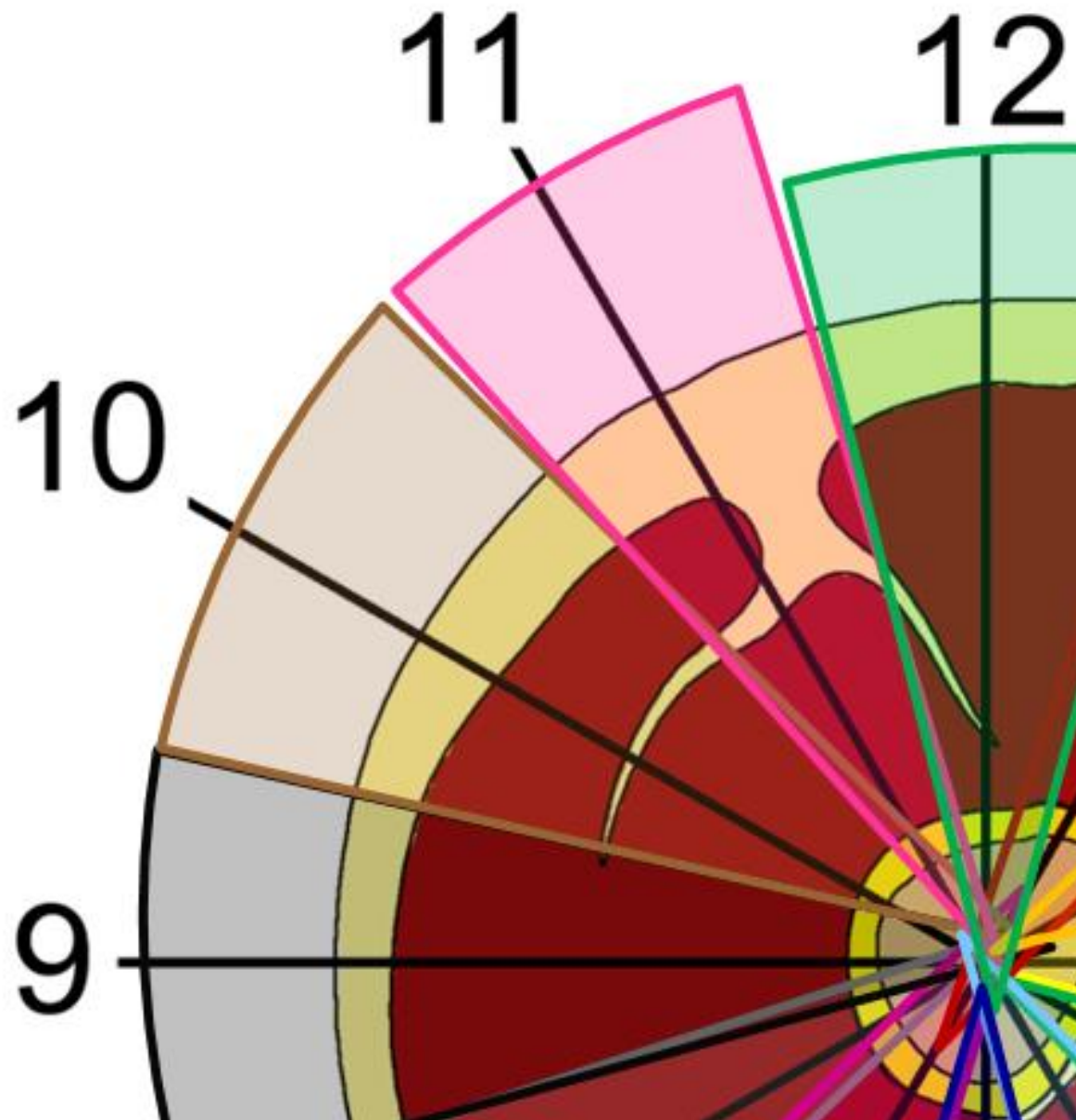
12 – anteriorly



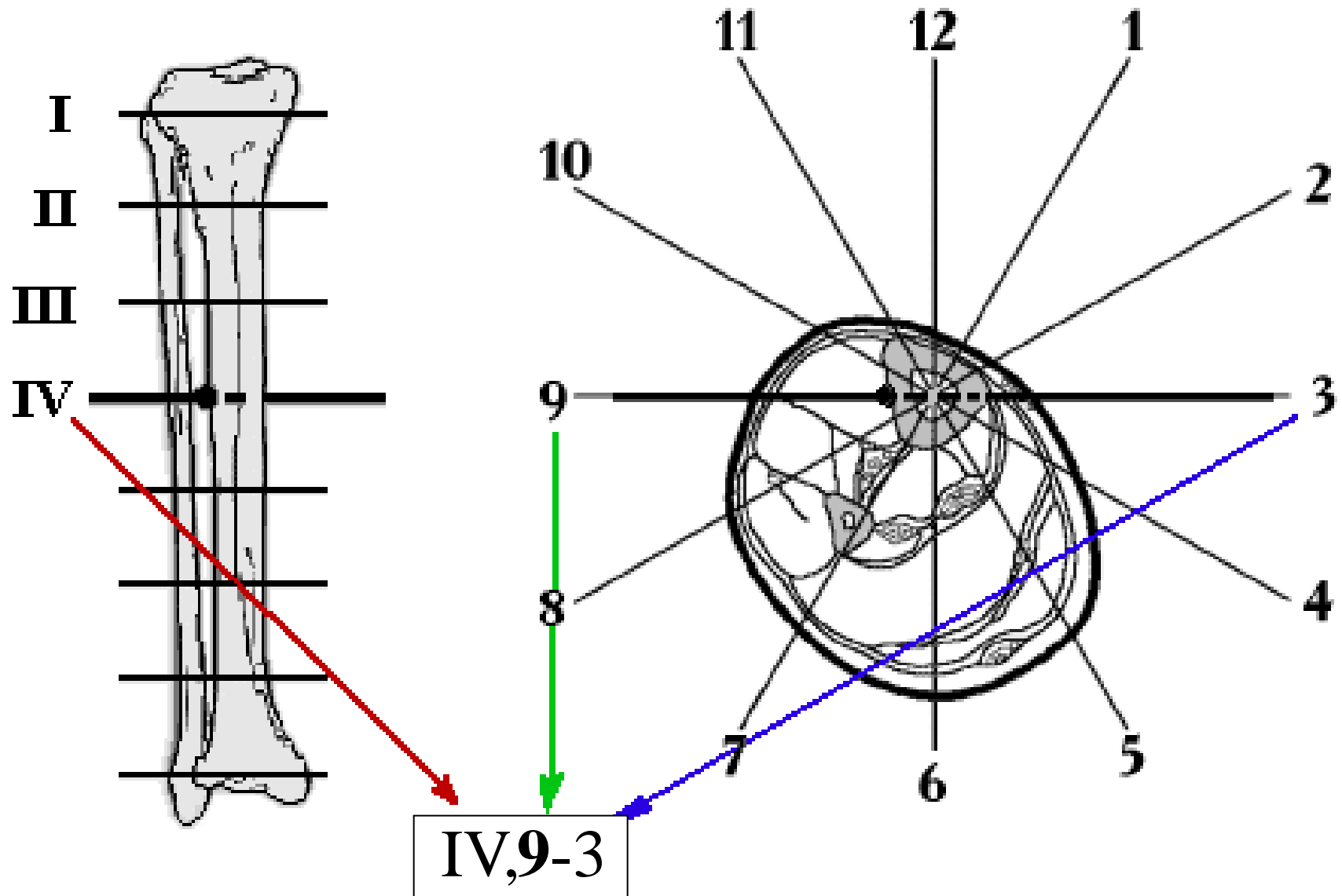
Coordinates: positions



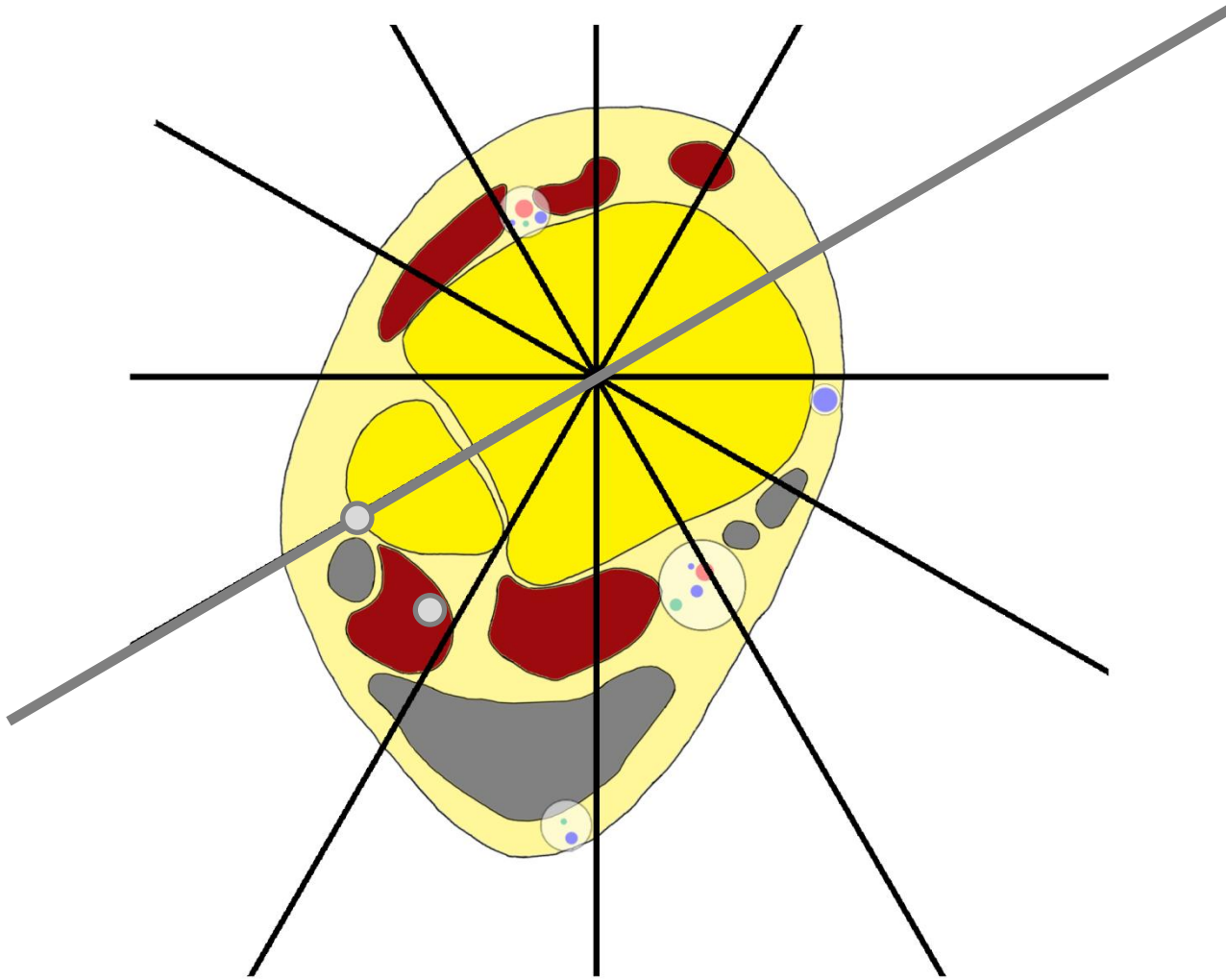
Coordinates: positions



Designation of K-wires

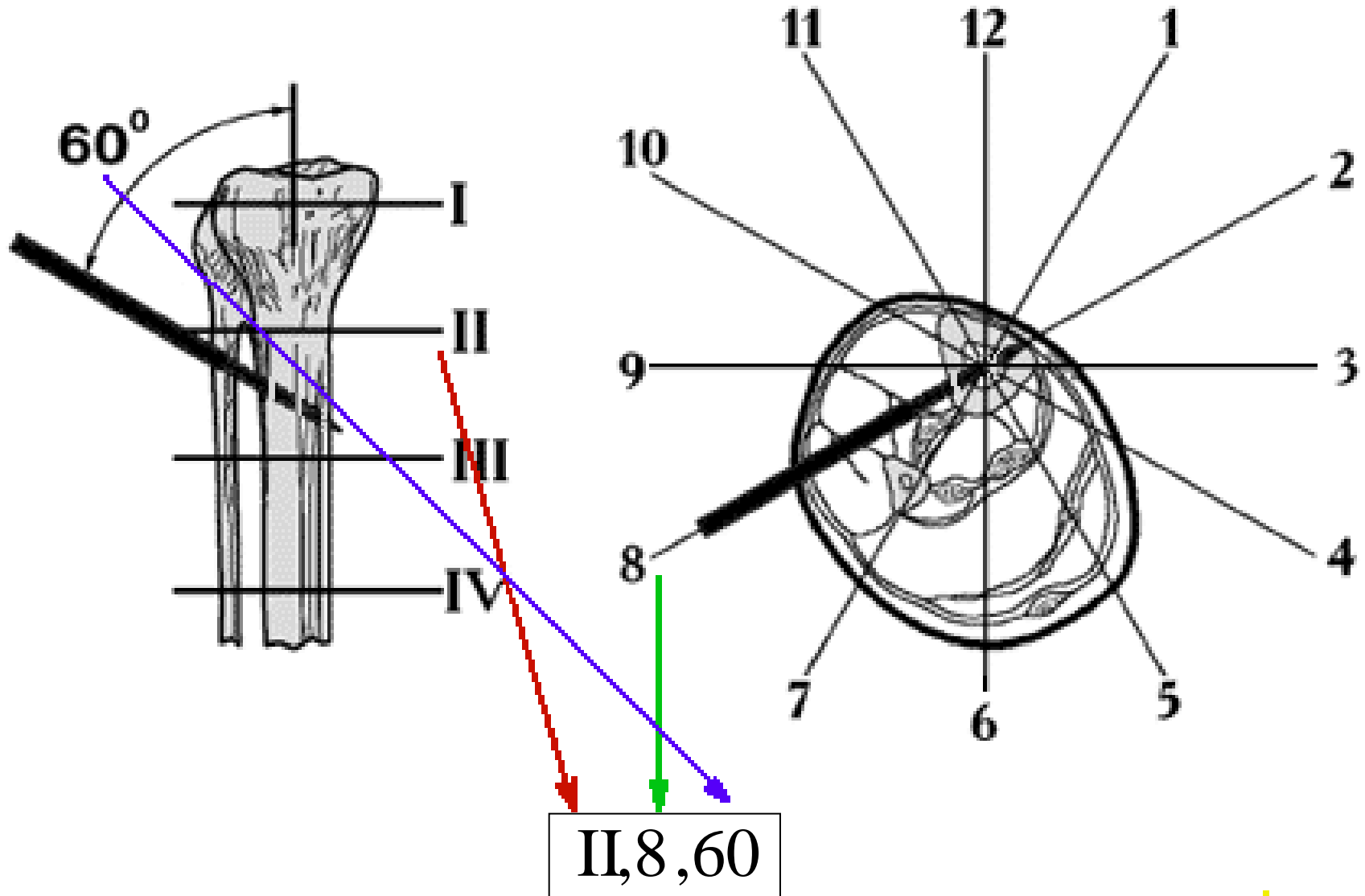


Designation of K-wires

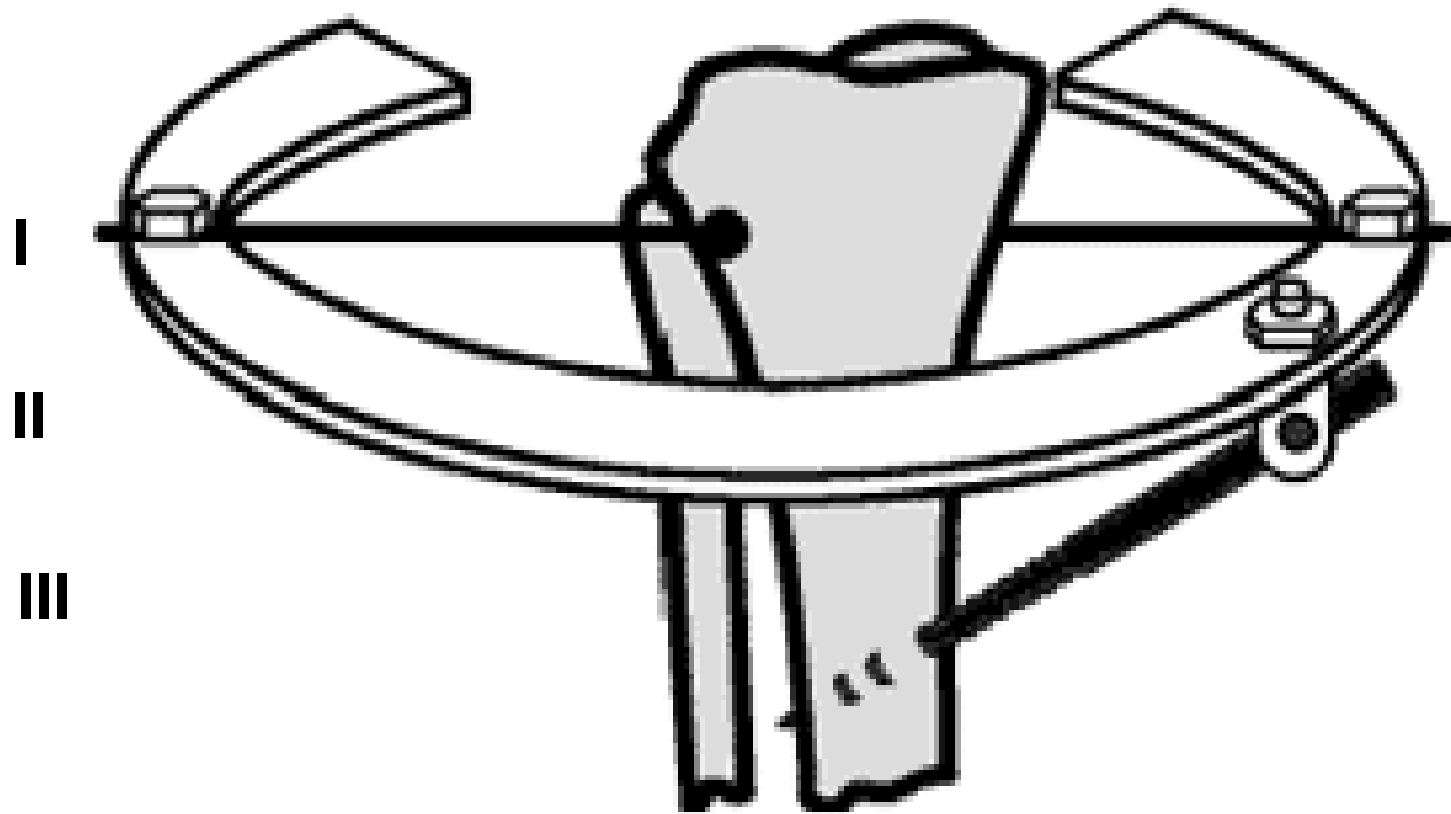


(VIII,8-2)VIII,8-2 or VIII,(8-2)8-2

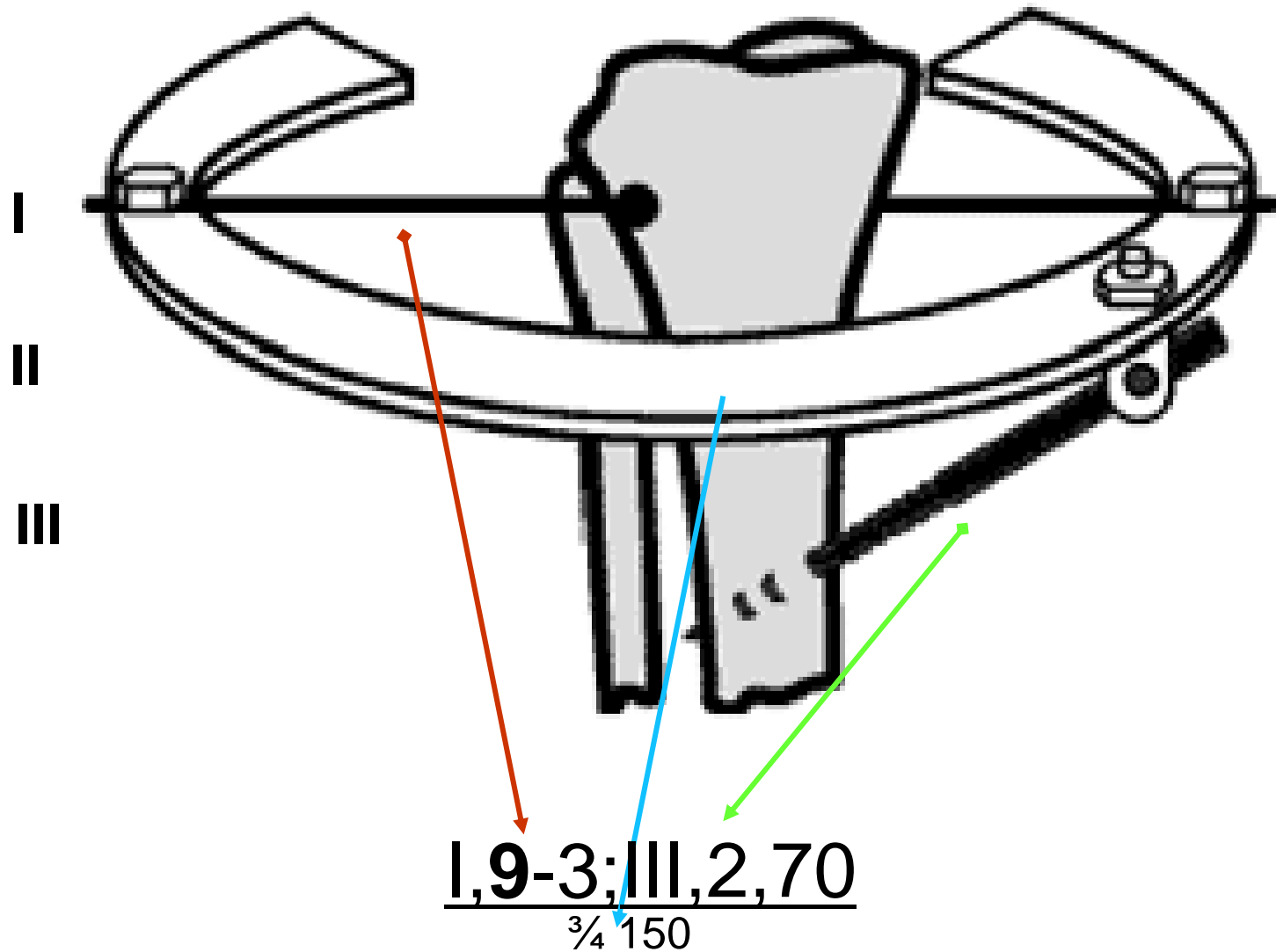
Designation of threaded pins



Ring designation



Ring designation



Ring designation

$$\frac{\text{I,9-3;III,2,70}}{\frac{3}{4} 150}$$

Frame designation

- - neutral
- ← - compression
- ↔ - distraction
- - hinge
- ←○→ - distraction hinge
- hex— - hexapod



I,3-9; I,4-10; I,8-2 — III,9-3; III,4-10 →← V,9-3; V,4-10 — VIII,3-9; VIII,4-10; VIII,8-2
 160 160 160 160

Frame designation

- - neutral
- ← - compression
- ↔ - distraction
- - hinge
- ←●→ - distraction hinge
- hex— - hexapod

I,3-9; I,4-10; I,8-2 — III,9-3; III,4-10 →← V,9-3; V,4-10 — VIII,3-9; VIII,4-10; VIII,8-2
 160 160 160 160

Frame designation

- | | |
|-------|---------------------|
| — | - neutral |
| →← | - compression |
| ↔ | - distraction |
| —○— | - hinge |
| ↔○↔ | - distraction hinge |
| —hex— | - hexapod |



II,2,120; III,9-3; III,12,90; IV,10,90 – o – V,10,90; VI,12,90; VII,1,90
160 160

Frame designation

II,2,120; III,**9**-3; III,12,90; IV,10,90 – o – V,10,90; VI,12,90; VII,1,90
160 160

Frame designation

- - neutral
- ← - compression
- ↔ - distraction
- - hinge
- ←○→ - distraction hinge
- hex— - hexapod



I,3-9; I,4-3; III,1,70; VI,11,100; VII,12,90
mon

Frame designation

—	- neutral
→←	- compression
↔	- distraction
—○—	- hinge
↔○↔	- distraction hinge
—hex—	- hexapod

I,3-9; I,4-3; III,1,70; VI,11,100; VII,12,90

mon



Frame? Which frame?



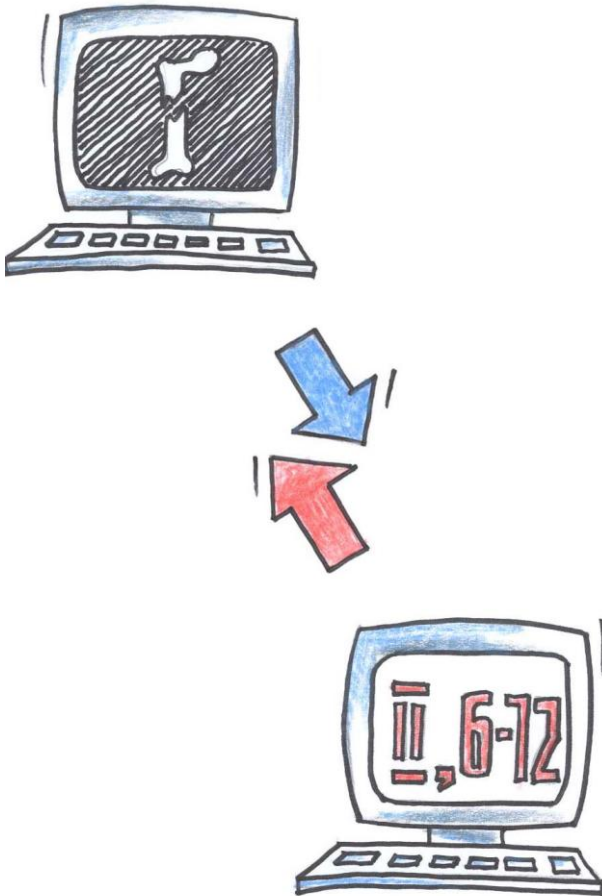
¹
II, 8, 120; III, **2**-8 ³
 140 — ² ⁴ ⁵
VII, **3**-9; VIII, 4, 110; VIII, 8, 110
 3/4 140

CDEF:

- ✓ accuracy of the described technique
- ✓ follow proper algorithm of the procedure
- ✓ avoid mistakes



CDEF:

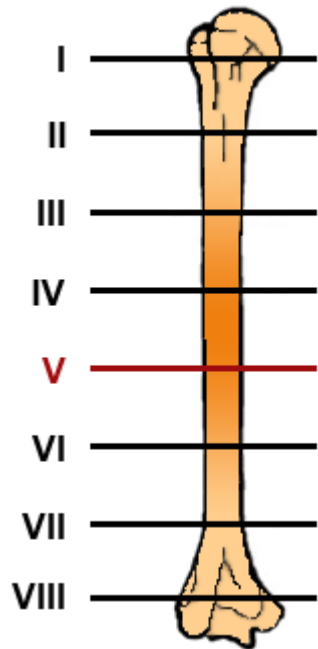


✓ comprehensiveness of the information delivery

✓ sending and receiving accurate frame description

✓ application of external fixation for each specific case

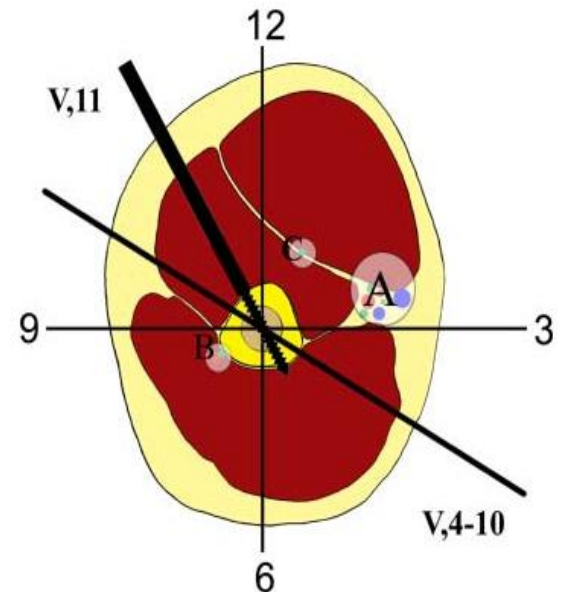
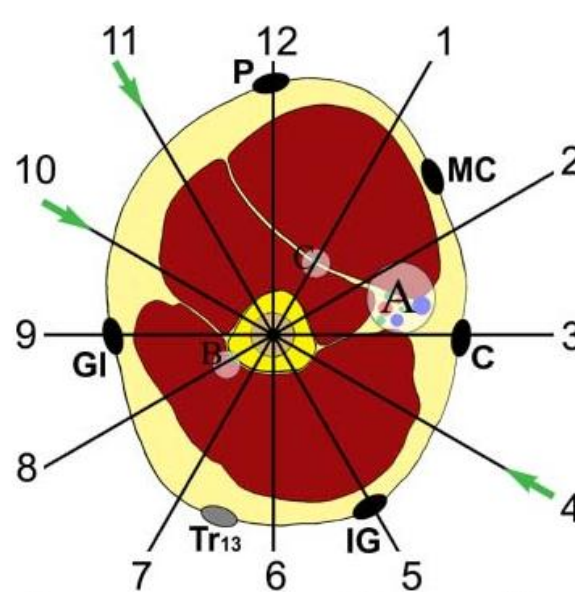
CDEF:



Forbidden positions: 1, 2, 3, 7, 8, 9.

Safe positions: 4, 5, 6, 10, 11, 12.

Reference positions: 4, 10, 11.



Basis for Atlas of bone components insertion

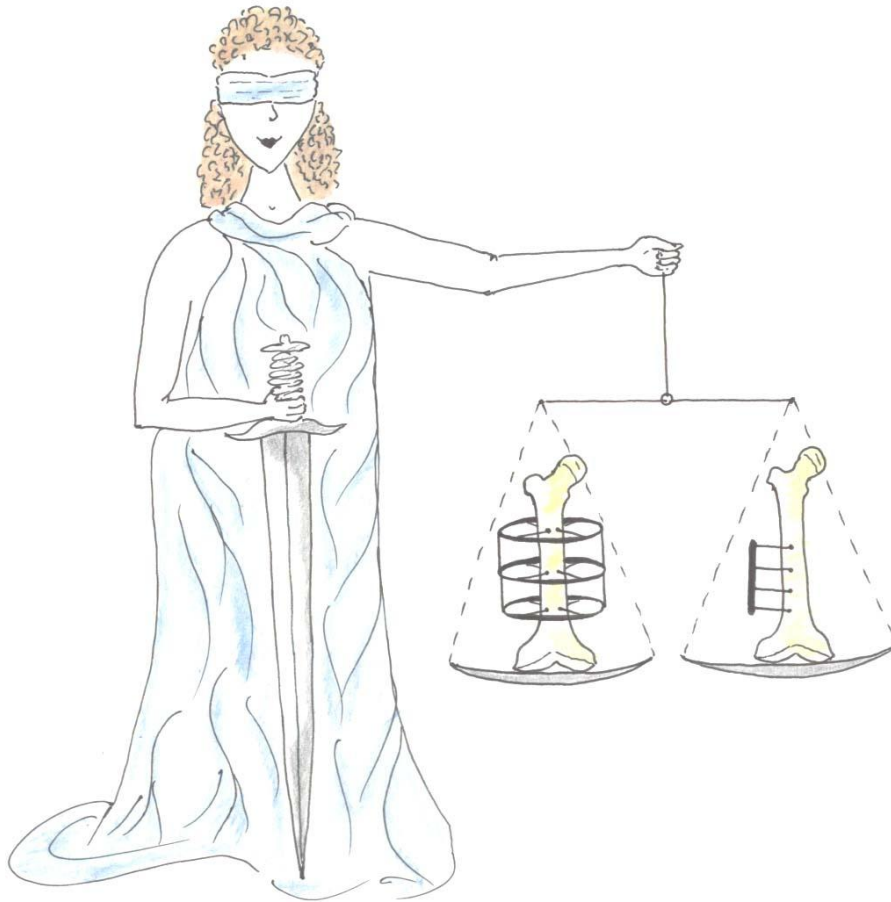
CDEF



Opportunity to analyze and to detail *complications*

MUDEF

$\frac{I,4-10; I,2-8}{70} - \frac{II,3-9}{70} - \frac{VII,3-9}{70} - \frac{VIII,4-10; VIII,2-8}{70}$



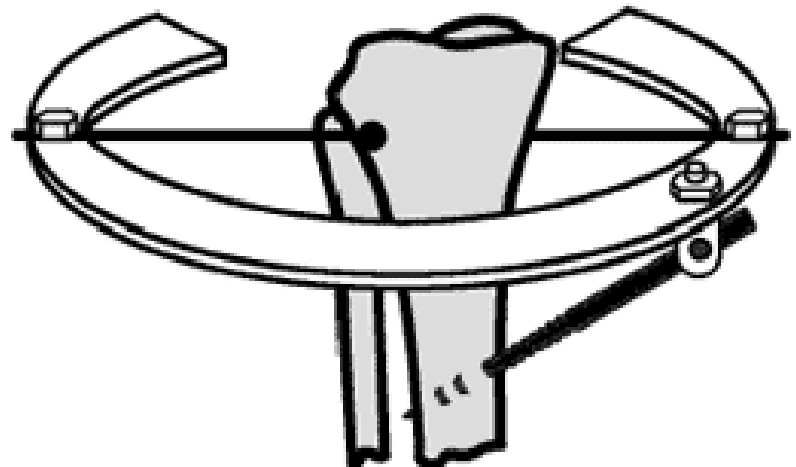
Frames comparison, experimental studies

MUDEF



Basis for ExFix Register

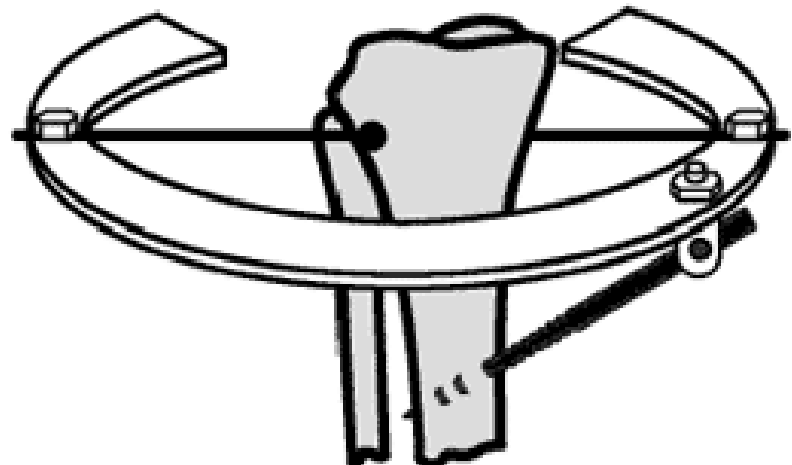
Take-home message



Take-home message

42-A2.2

I,9-3; III,2,70
 $\frac{3}{4}$ 150



Take-home message

42-A2.2

I,9-3; III,2,70
 $\frac{3}{4}$ 150