

# EXTREMITY AND EYE LENS DOSES FOR VERTEBROPLASTY AND KYPHOPLASTY PROCEDURES IN BELGIUM

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- The Belgian ExDos project
- Vertebroplasty and kyphoplasty procedures
- Extremity and eye lens doses for vertebroplasty and kyphoplasty procedures
- Extrapolation to annual doses
- Conclusions

## The Belgian ExDos project

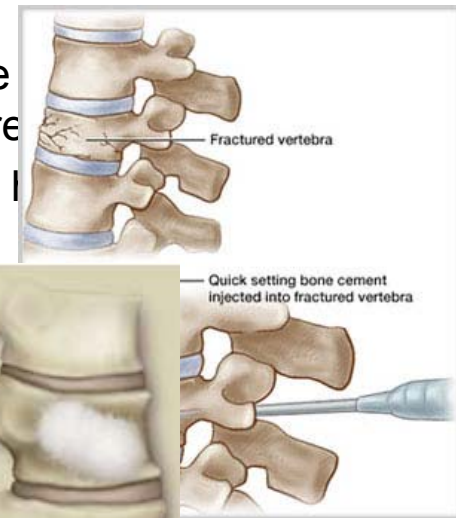
- In routine practice, no monitoring is performed on
  - Extremity doses
  - Eye lens doses
- Collecting dosimetry data for medical staff for interventional procedures
  - ORAMED: measurements in 3 Belgian hospitals
  - ExDos: Extension of number of hospitals up to 10
- Same measurement protocol as for ORAMED, all data included in ORAMED analysis
- Measurements performed from June 2009 until October 2010

- Interventional procedures within ExDos
  - Cardiac procedures
    - CA&PTCA
    - RF ablations
    - PM & ICD implantations
  - ERCP procedures
  - Excluded: radiology procedures  
(measurement campaign performed in a previous Belgian project)
  - Added: vertebroplasty and kyphoplasty procedures
- Poster on global ExDos results

*An overview of extremity and eye lens doses for interventional procedures and nuclear medicine in Belgium: The EXDOS project*  
S. Krim et al.

# Vertebroplasty and kyphoplasty

- Minimally invasive procedures for vertebral compression fractures (fractures in the vertebra)
- Vertebroplasty:
  - Injection of a special cement mixture through a hollow needle into the fractured bone
- Kyphoplasty:
  - Insertion of a balloon through the hole where the bone is compressed



## Extremity and eye lens doses

- Measurements performed in 5 hospitals
- Total of 50 measurements
- 2 kind of systems involved

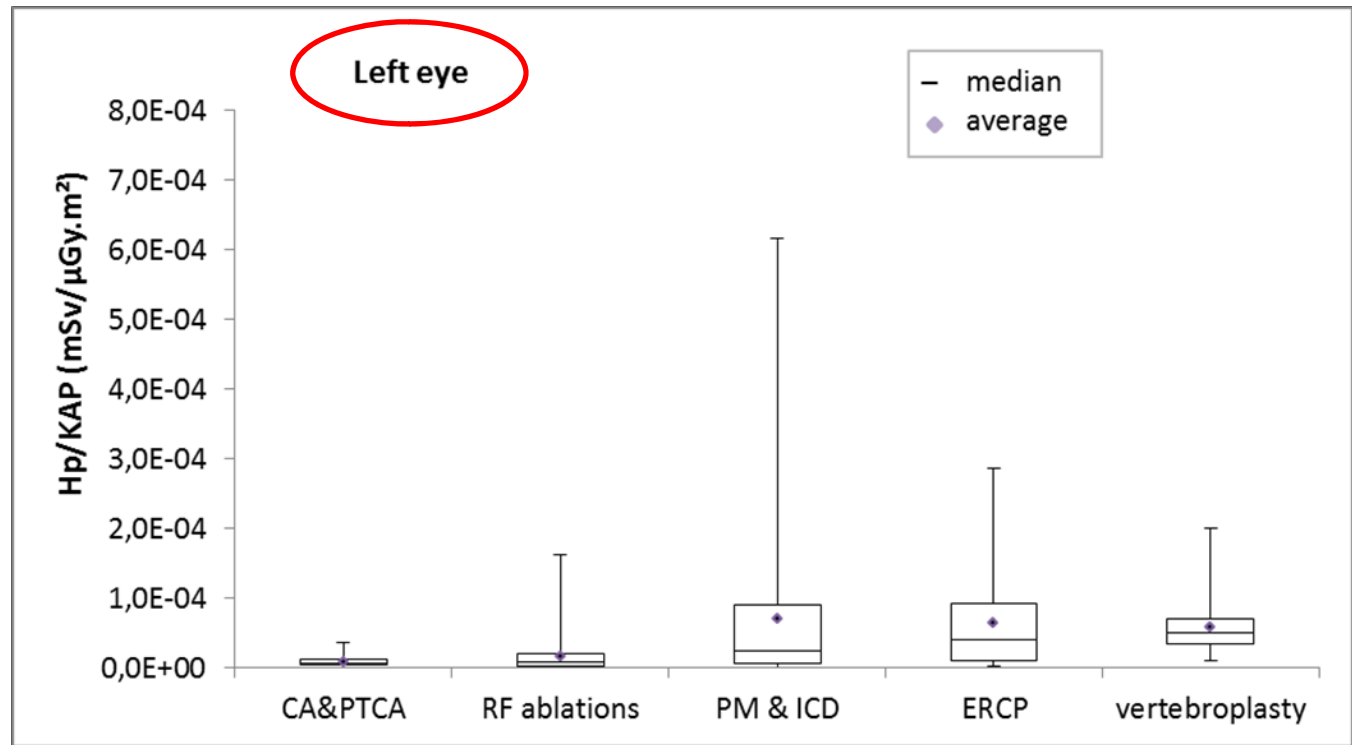
C-arm flat panel  
fluorescence

	Hospital E	Hospital K	Hospital L	Hospital M	Hospital N
<b># measurements</b>	9	10 + 10	8	4	9
<b>X-ray system</b>	C-arm	C-arm	O-arm	C-arm	O-arm



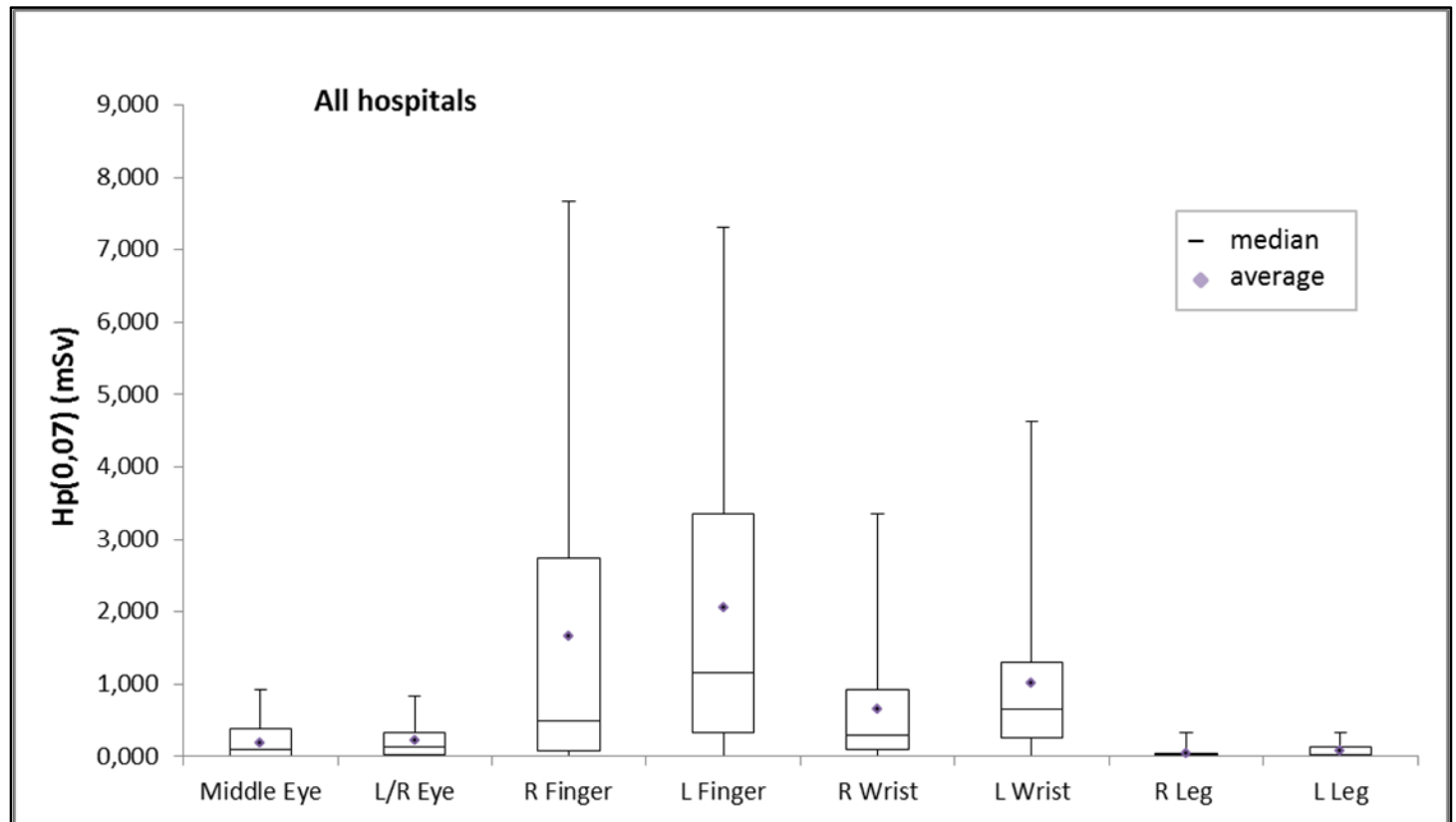
## Extremity and eye lens doses

- Comparison with other procedures → Hp(0,07) / KAP



## Extremity and eye lens doses

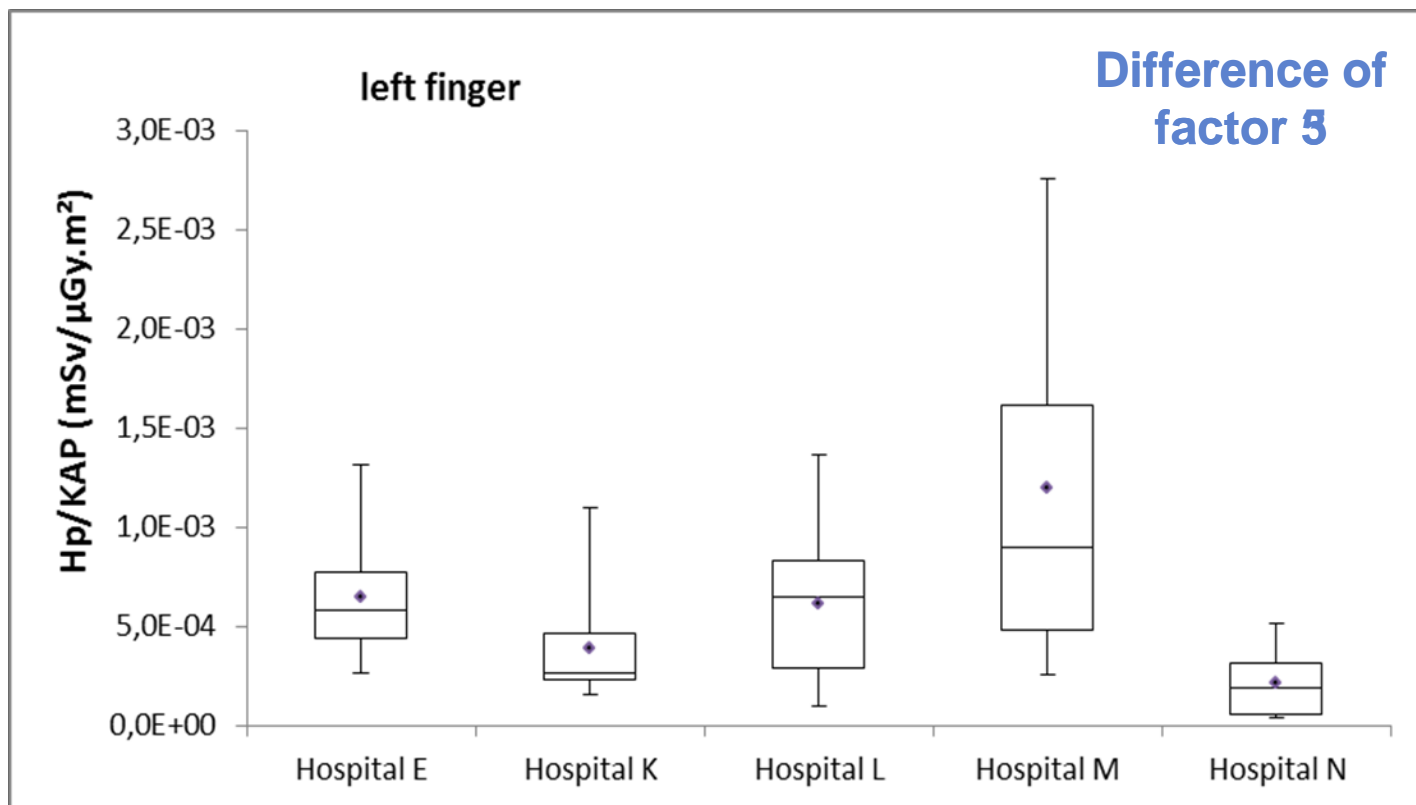
- Comparison of monitored locations → Hp(0,07) / KAP





## Extremity and eye lens doses

- Comparison of hospitals →  $H_p(0,07) / KAP$



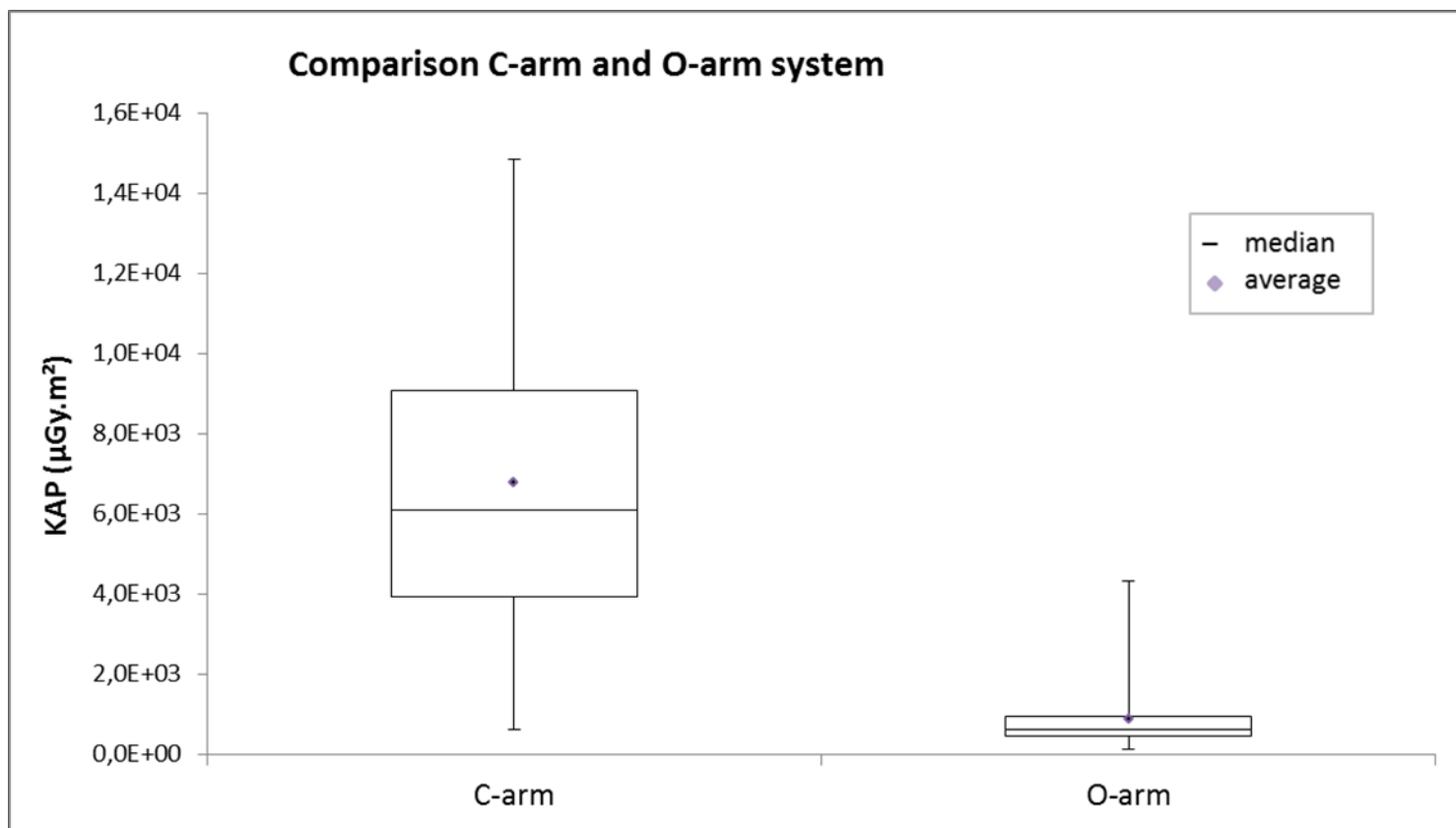
## Extremity and eye lens doses

- Highest doses to the hands
  - Hands are regularly in primary beam
  - No protective equipment to protect hands and eyes



## Extremity and eye lens doses

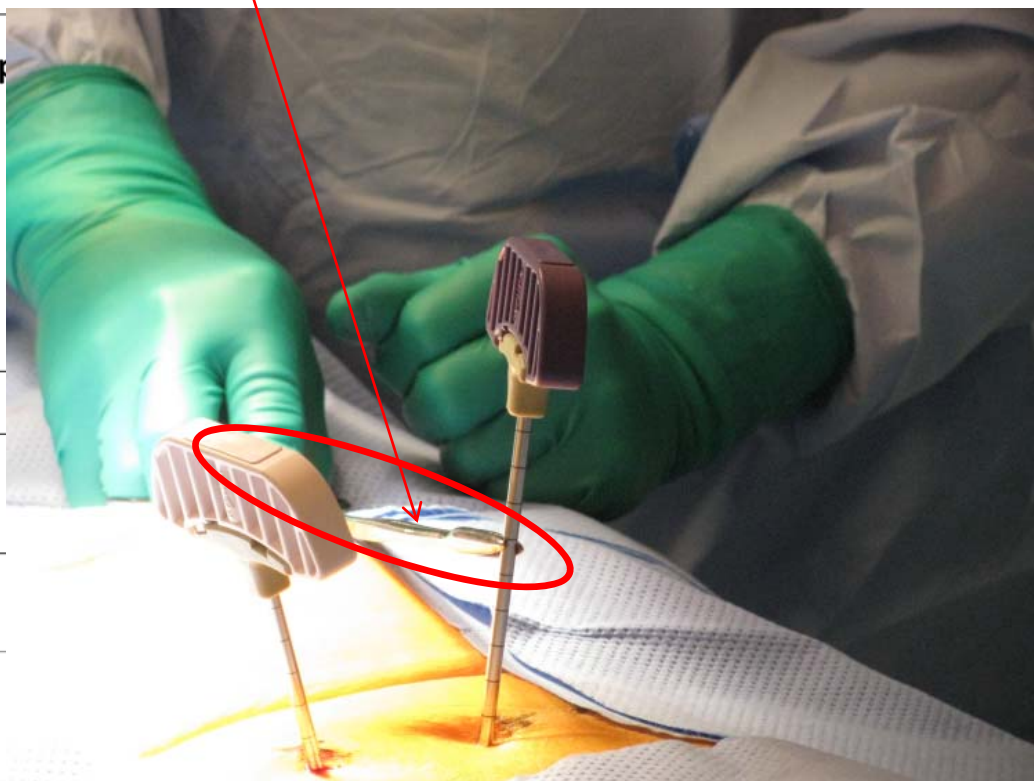
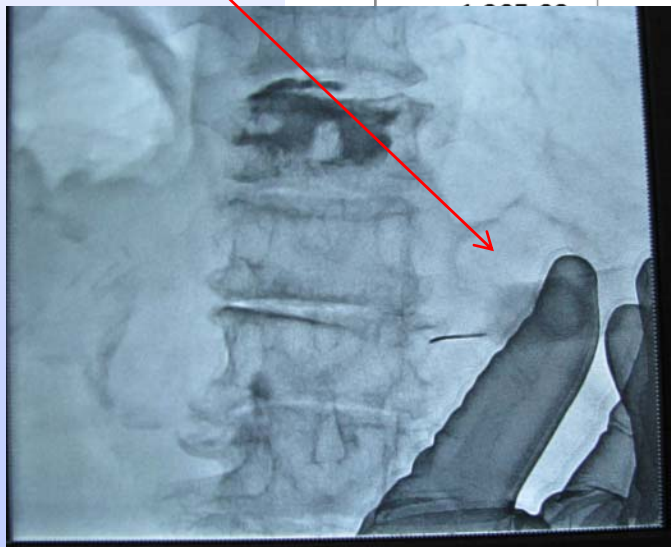
- Comparison of types of systems →  $KAP(0,07)/KAP$



## Extremity and eye lens doses

- Radiation protection means to reduce doses to the hands
  - Hospital N: uses tweezers to hold the needles during irradiation

Needle held with hand during positioning



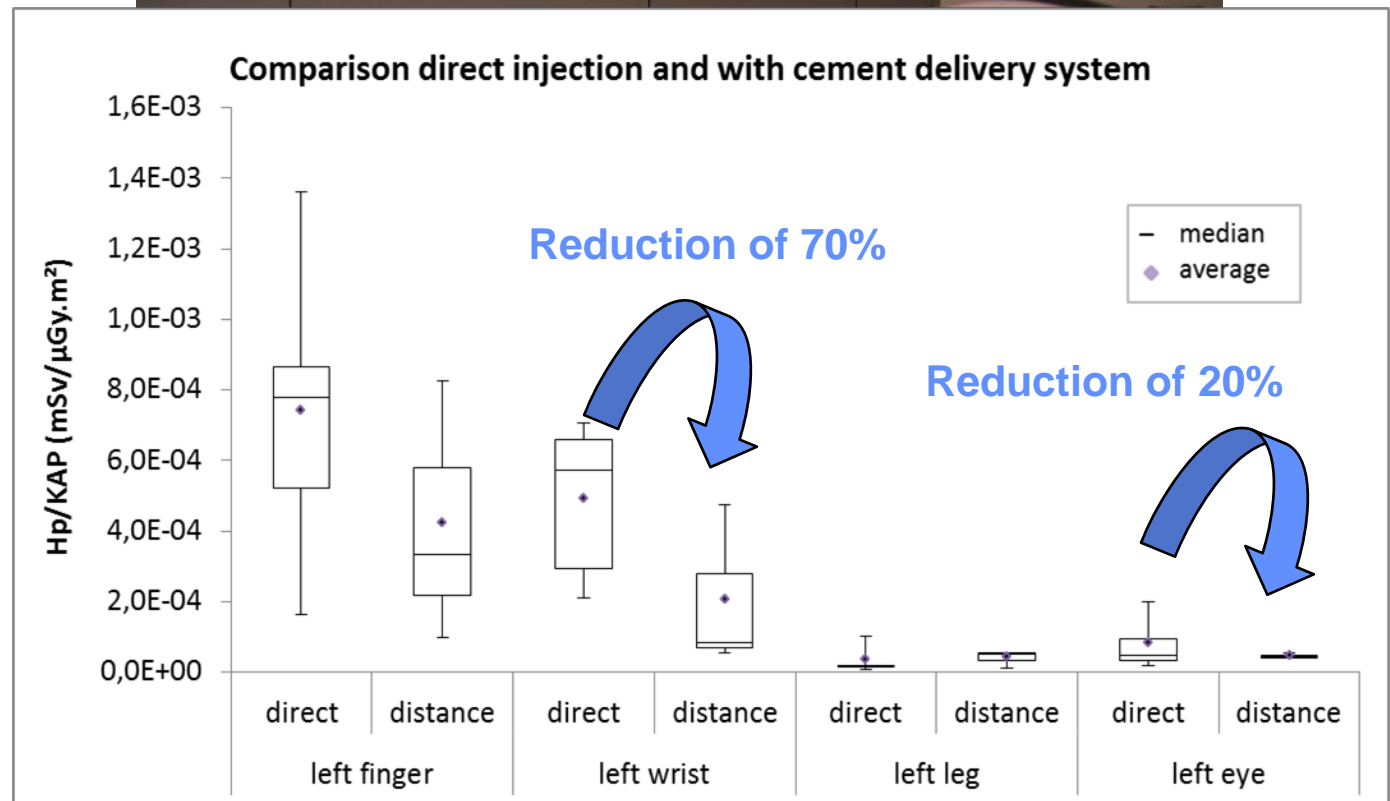
## Extremity and eye lens doses

- Radiation protection means to reduce doses to the hands
  - Hospital K: tests the use of lead gloves



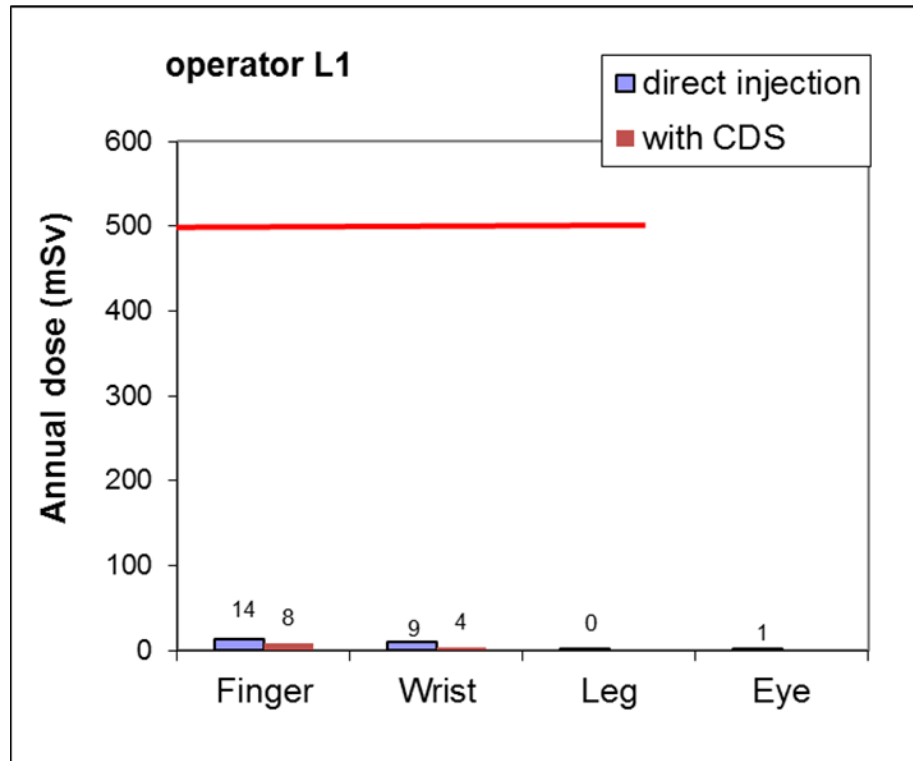
## Extremity and eye lens doses

- Radiation protection means to reduce doses to the hands
- Hospital L: Uses the Cement Delivery System (CDS)



## Extrapolation to annual doses

- Annual dose calculated as product of
  - Average  $H_p(0,07)$  values from ExDos project
  - Estimation of number of procedures per year



Hospital K  
Hospital E  
Q-arm system  
C-arm system

285 procedures per year  
95 procedures per year

More types of  
Performs also 50  
procedures are  
discographies  
performed by operator



- For vertebroplasty and kyphoplasty procedures
  - high doses are obtained for fingers and wrists
  - Non negligible doses are obtained for eyes
- Annual doses can reach the dose limit, especially for the hands
- C-arm systems give higher absolute  $H_p(0,07)$  values than O-arm systems
  - More radiation is used, higher KAP values are observed
- There exist effective radiation protection means
  - Working from a distance
    - Tweezers for positioning needles
    - kyphon@CDS for cement delivery
  - The use of lead gloves





**THANK YOU  
FOR  
YOUR ATTENTION**



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