

# EURALOC educational tools for radiation protection of interventional cardiologists

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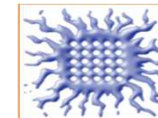
Radboud University



TÉCNICO LISBOA



Statens strålevern  
Norwegian Radiation Protection Authority



ISTITUTO DI FISIOLOGIA CLINICA



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# European epidemiological study on radiation induced lens opacities among interventional cardiologists

The work leading to the development of these tools has received funding from the European Atomic Energy Community's Seventh Framework Programme (FP7-Fission-2013) under grant agreement no 604984

Approved at the first OPERRA research call

Project duration: Dec 2014 – May 2017

[www.euraloc.eu](http://www.euraloc.eu)

# EURALOC Eye Lens Dosimetry Methodology

- Major factors in procedure specific eye lens dose
  - Procedure type
  - X-ray equipment



Old system!

- Common radiation protection devices

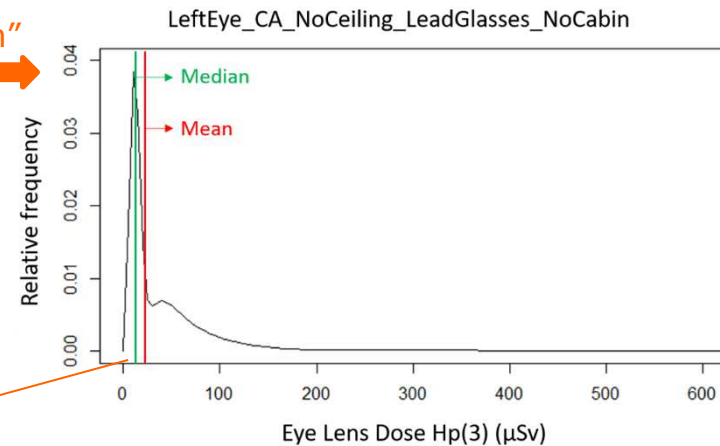


# EURALOC eye lens dosimetry methodology

## ➤ Cumulated eye lens dose calculation

$$D_{eye,cum} = \sum_{i,j,x,y,z} D_{j,x,y,z} \times N_{i,j,x,y,z}$$

"Exposure Configuration" →



## ➤ Median value

- Good approximation for single dose estimate
- Can be used for training & education purposes

# Development of an educational App

- Target population: interventional cardiologists
- Dedicated to be used on mobile devices
- Ready-accessible, user-friendly
- Track and learn to optimise individual eye lens doses
- Uses underlying median values of the exposure configurations



mEyeDose

[www.meyedose.eu](http://www.meyedose.eu)

Track individual cumulated eye lens doses  
Calculate the effect of RP device  
Calculate the effect of an alternate X-ray system

Not a replacement of  
an eye lens  
dosemeter!



# mEyeDose: [www.mEyeDose.eu](http://www.mEyeDose.eu)

- "Online App"
- ~~➤ Ransomware~~
- Stores data on your device (very limited) so he will remember you
- Suitable for:
  - Iphones: Safari, Firefox, Google Chrome
  - Android phones: Firefox, Chrome
  - PC/Mac: Safari, Firefox, Chrome, ~~Internet Explorer~~
  - ~~Windows phones~~

# mEyeDose: entering procedures

Enter  
Procedure



- Choose Procedure type
- Choose equipment
- Choose protection
- Choose start/end date
- Add
- Save Changes

Add Procedures x

Procedure  
CA + PCI (PTCA)

Equipment  
Carm

Protection  
glasses  
Cabin  
Shield

Start / End Date  
12/06/2017  
16/06/2017

Number  
5

Add!

| #  | Proc. | Equip. | Time                 | Prot.  |   |
|----|-------|--------|----------------------|--------|---|
| 10 | CA    | Carm   | 05-06-17<br>09-06-17 | Shield | x |
| 5  | PTCA  | Carm   | 12-06-17<br>16-06-17 | Shield | x |

Save changes

# mEyeDose: results

The screenshot shows the mEyeDose application interface with several annotated features:

- Switch for eye:** A red circle highlights the "Eye" section with radio buttons for "Left Eye" (selected) and "Right Eye".
- Show results per period or cumulated:** A red circle highlights the "Display" section with radio buttons for "Period" (selected) and "Total Cumulated".
- Call the help screen:** An arrow points to the question mark icon in the top right corner.
- Time slider to adjust results period:** An arrow points to a horizontal slider bar below the display options.
- Cumulated Dose value:** An arrow points to the text "Eye lens doses: 0.34 (mSv), 1.68% of yearly dose limit" and a row of four colored boxes (red, orange, yellow, green) with values 0.20, 0.15, 0.10, and 0.05.
- Adjust Protection:** A red circle highlights three control buttons labeled "shield", "glasses", and "cabin", each with a minus sign, a circle, and a plus sign.
- Dose level:** An arrow points to a vertical bar chart showing dose levels for "Oct week 43", "Nov week 44", and "Nov week 45". The bars are colored with a gradient from red to blue.
- Protection level, full width= 100% protection:** An arrow points to the blue bars in the chart, indicating the protection level.

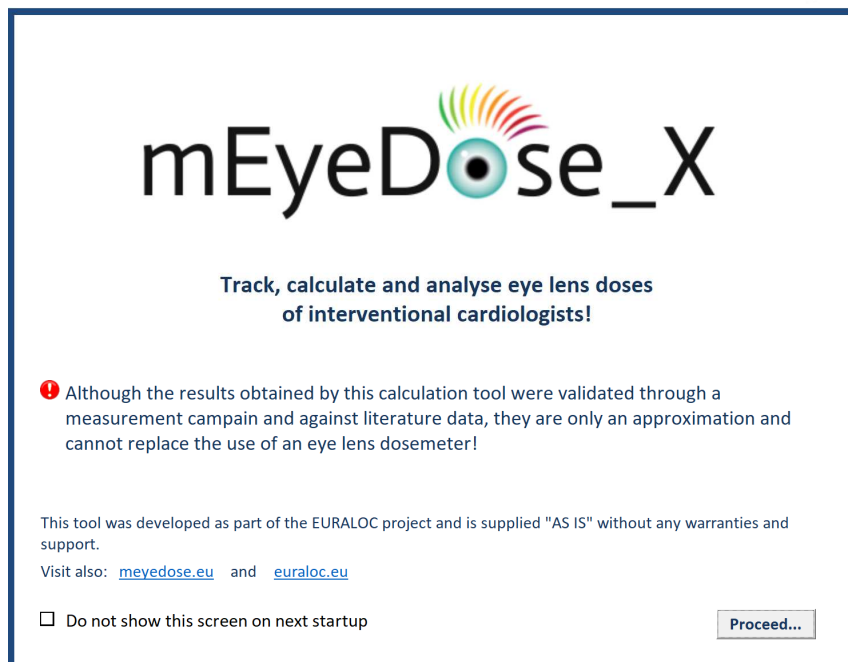


## To conclude...mEyeDose:

- Uses the EURALOC Dosimetry Methodology
- Didactic interface
- Tracks and visualises eye lens doses
- Visualises the effect of a radiation protection devices

# Individual use → Multiple use

- mEyeDose : individual use
- Multiple cardiologists: mEyeDose\_X



mEyeDose\_X

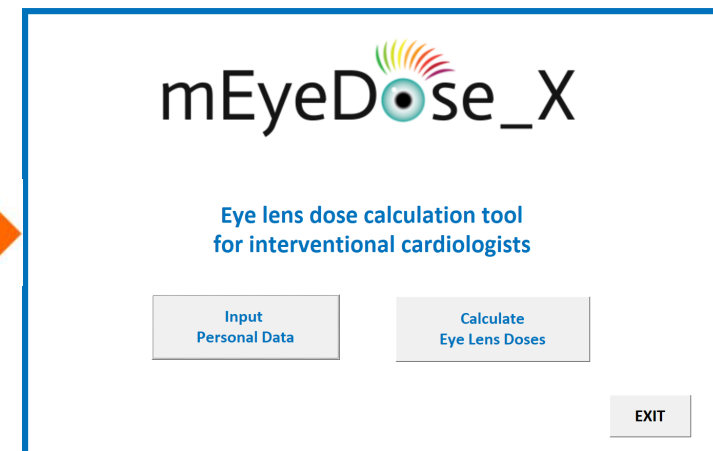
Track, calculate and analyse eye lens doses of interventional cardiologists!

⚠ Although the results obtained by this calculation tool were validated through a measurement campaign and against literature data, they are only an approximation and cannot replace the use of an eye lens dosimeter!

This tool was developed as part of the EURALOC project and is supplied "AS IS" without any warranties and support.  
Visit also: [meyedose.eu](http://meyedose.eu) and [euraloc.eu](http://euraloc.eu)

Do not show this screen on next startup

Proceed...



mEyeDose\_X

Eye lens dose calculation tool for interventional cardiologists

Input Personal Data

Calculate Eye Lens Doses

EXIT

# mEyeDose\_X

- Target population: epidemiologists, radiation protection professionals, occupational physicians,...
- Desktop application (Microsoft Access)
- User-friendly
- Track, optimise and calculate eye lens doses of (a population of) cardiologist (s)
- Uses the full EURALOC dosimetry methodology
- Possibility to export statistics



2 approaches:

- Using procedure workload
- Using over-apron dose data

2 methods:

- Single value using median or mean of PDFs
- Complete dose distribution using Monte Carlo sampling of PDFs

## Tools are freely available!

➤ mEyeDose: go to [www.meyedose.eu](http://www.meyedose.eu)

➤ mEyeDose\_X : go to [www.euraloc.eu](http://www.euraloc.eu)

→ Go to “project partners”

→ Request your copy through email from one of the project partners



# Thanks for the attention!