

# Exposure of the Swiss population by X-ray diagnostic imaging: Results of the 2013 intermediate survey



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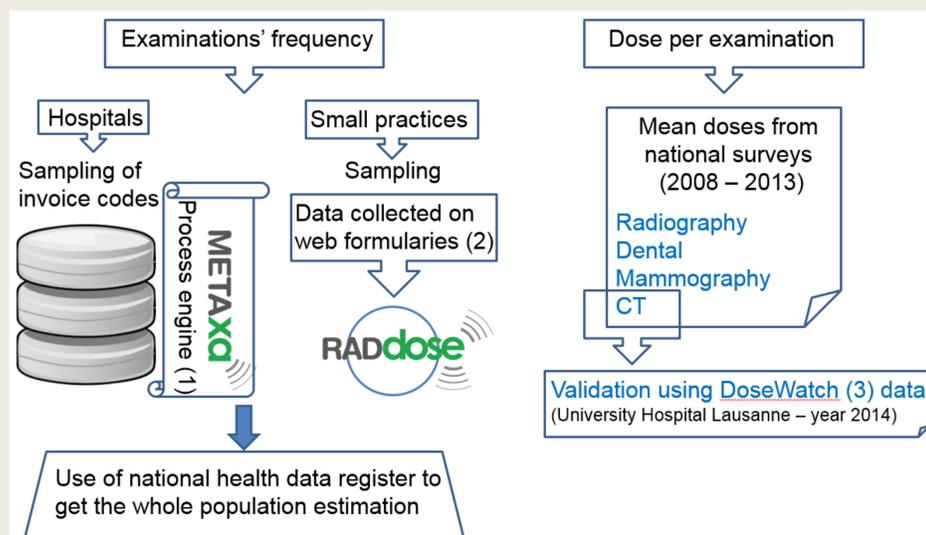
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## Background

Diagnostic x-rays contribute to about nearly 50 % of the total (man-made plus natural) annual effective dose of the general population in Western Countries. For radiation protection purposes, Art. 64 of the Council of EURATOM 2013/59 requires the set up of regular surveys enabling international comparisons. In addition, these surveys allow Public Health Authorities to define their priorities. This poster summarizes the outcome of the last survey assessing the practice in 2013.

## Methodology



## Results

The data concerning the sampling of the small practices is summarized in Table 1. The National sampling results were used to project the number of examinations at national level.

Table 1 – Sampling of small practices

Practices	Total	Contacted	Answered	Answer rate (%)	Natl sampling (%)
Chiropractitioners	116	110	31	28.2	26.7
General practionners	3715	200	56	28.0	1.5
Dentists w/out VCT	3129	100	26	26.0	0.8
Dentists with VCT	323	83	22	26.5	6.8
Radiology institutes	118	110	31	28.2	26.3

Concerning the larger structures (hospitals and clinics) the access to the invoicing information was often difficult. After several recalls we could only get 30% of the 2013's data. Nevertheless all data from the 5 University hospitals, 38 large hospitals and 7 private clinics were collected. Those data were used to estimate the age and sex distribution of the examination but not the frequencies of diagnostics examinations.

To get these number it was decided to use the data of one region ("Canton de Vaud") where almost 100% of the data could be obtained. These data are representative of the Swiss practice including large and small medical structures with including cities and more remote areas. This region counts 9.2% of the Swiss population. To take into account the fact that the radiological units might not be homogeneously distribution within Switzerland we preferred to use the number of medical consultation to project the data at level. This assumes the fact that the fraction of radiological examination among medical consultations is comparable. Using this methodology our sample collected 8.8 % instead of the population based 9.2%

The average dose per inhabitant due to X-ray imaging is estimated to be 1.4 mSv. The average number of examination per inhabitant being equal to 1.2. According to the data presented in Figure 1, CT for a frequency of 9.6% delivers 70.5% of the dose.

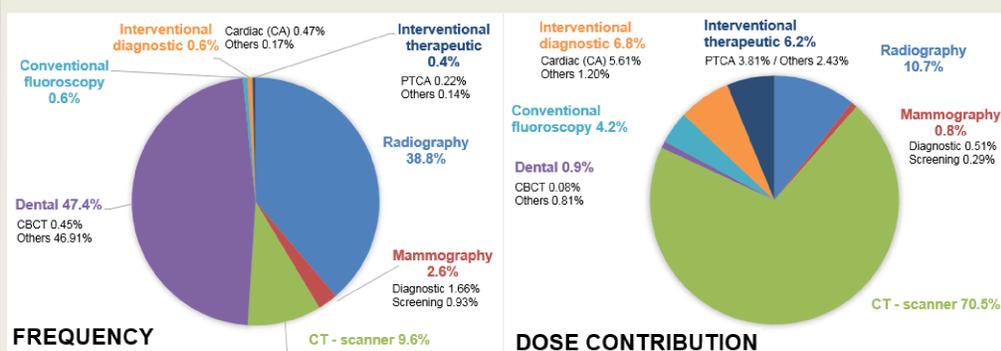


Fig. 1: Swiss survey 2013 – Frequency and dose distribution

Figure 2 presents the distribution of CT examinations among men and women with a general higher frequency about 21% for men is observed.

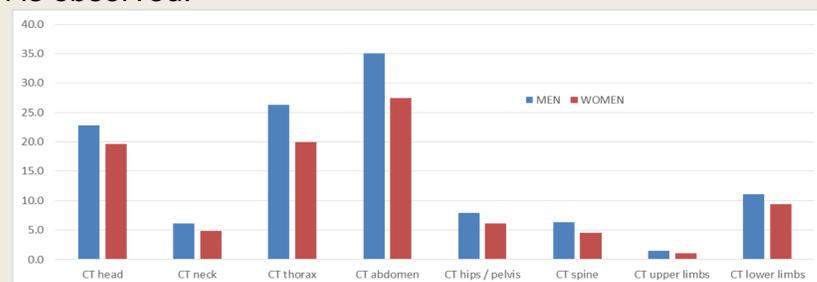


Fig. 2: CT distribution among men and women

As an example of age distribution figure 3 shows that the fraction of CT of the chest, for which a higher frequency for men than for women is observed, except between 20-40 years.

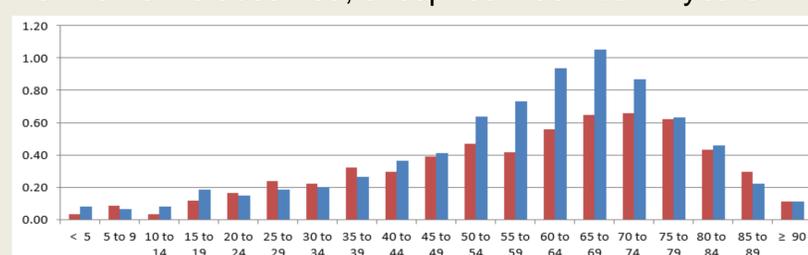


Fig. 3: Age distribution of chest CT examinations (women: red data – men: blue data)

Finally Tables 2 and 3 summarize the Swiss data (survey from 2008 and present data) with other available data.

Table 2 – Dose (mSv) per inhabitant (\* does not include nuclear medicine)

	CH 2008	CH 2013	F 2012 (4)	DE 2012 (5)
Graphy & Scopy	0.36	0.41	0.34	0.68
CT	0.80	1.00	1.14	1.13
Dental	0.01	0.01	0.003	0.054
Total*	1.20	1.42	1.47	1.80

Table 3 – Number of CT per 1000 inhabitants

	CH 2008	CH 2013	F 2012	DE 2012
CT	100	117	130	132

## Conclusion

As expected the frequency of CT examinations has increased from 2008 to 2013 leading to an increase of the population exposure. Clinical audits assessing the quality of the justification might help to avoid the present trend.

1: METAXa - *Metadata Extraction and Analysis* – Homemade data processing system developed in collaboration with engineers for complexe analysis and data mining. <http://www.ingenierie-sante.ch>  
 2: RADdose – *Radiation absorbed dose* – Dedicated website platform for data collection with formularies. <http://www.raddose.ch>  
 3: DoseWatch™ is a commercial product of GE Healthcare.  
 4: ISRN at [http://www.irsn.fr/FR/expertise/rapports\\_expertise/Documents/radioprotection/IRSN-PRP-HOM-2014-6\\_Exposition-France-rayonnements-diagnostic-medical-2012.pdf](http://www.irsn.fr/FR/expertise/rapports_expertise/Documents/radioprotection/IRSN-PRP-HOM-2014-6_Exposition-France-rayonnements-diagnostic-medical-2012.pdf)  
 5: BFS at [http://www.bfs.de/en/ion/medizin/diagnostik/roentgen/haefuefigkeit\\_strahlenexposition.html](http://www.bfs.de/en/ion/medizin/diagnostik/roentgen/haefuefigkeit_strahlenexposition.html)