

# Medical Exposure Increase versus General Health Care Improvement Contribution to the Discussion

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## Introduction/Objectives

The poster is a contribution to the ongoing discussion on the increase in radiation exposure in medicine due to the increasing amount of ionizing radiation sources and procedures using ionizing radiation. The aim is to confirm whether this increase is a fact also in the Czech Republic and in addition, to take into account other information (such as the number of radiation workers and their doses or quality of medical care) relevant to considerations whether this should be seen as a negative phenomenon.

## Methods

All presented data were obtained from the registers kept by the State Office for Nuclear Safety of the Czech Republic (Register of ionizing radiation sources and Central register of professional exposures), from databases of health insurance companies and from information provided by Institute of Health Information and Statistics of the Czech Republic.

## Results, Discussion, Conclusions

Presented data clearly indicates that the radiation sources used in health care are continuously renewed and their total number increases (Figure 1). Obviously there is an increasing trend in the number of examinations and treatments associated with higher patients' doses and in their share on total number of examinations. For interventional procedures there is a slight increase (Figure 2) but for CT examinations it is very distinct (Figure 3).

CT procedures create in Czech Republic about 10% of total radiodiagnostics procedures. We have no evidence how many are unnecessary procedures. In European countries CT examinations creates in many cases more than 10% of total examinations and worldwide for countries in health care level I (UNSCEAR 2008) 7%.

To evaluate the justification of growth of CT procedures require more detailed analysis focused to the diagnostic effectiveness of each procedures and direct impact to the health improvement of certain patient.

Fig. 1: Number of sources in medicine in years 2000 - 2010

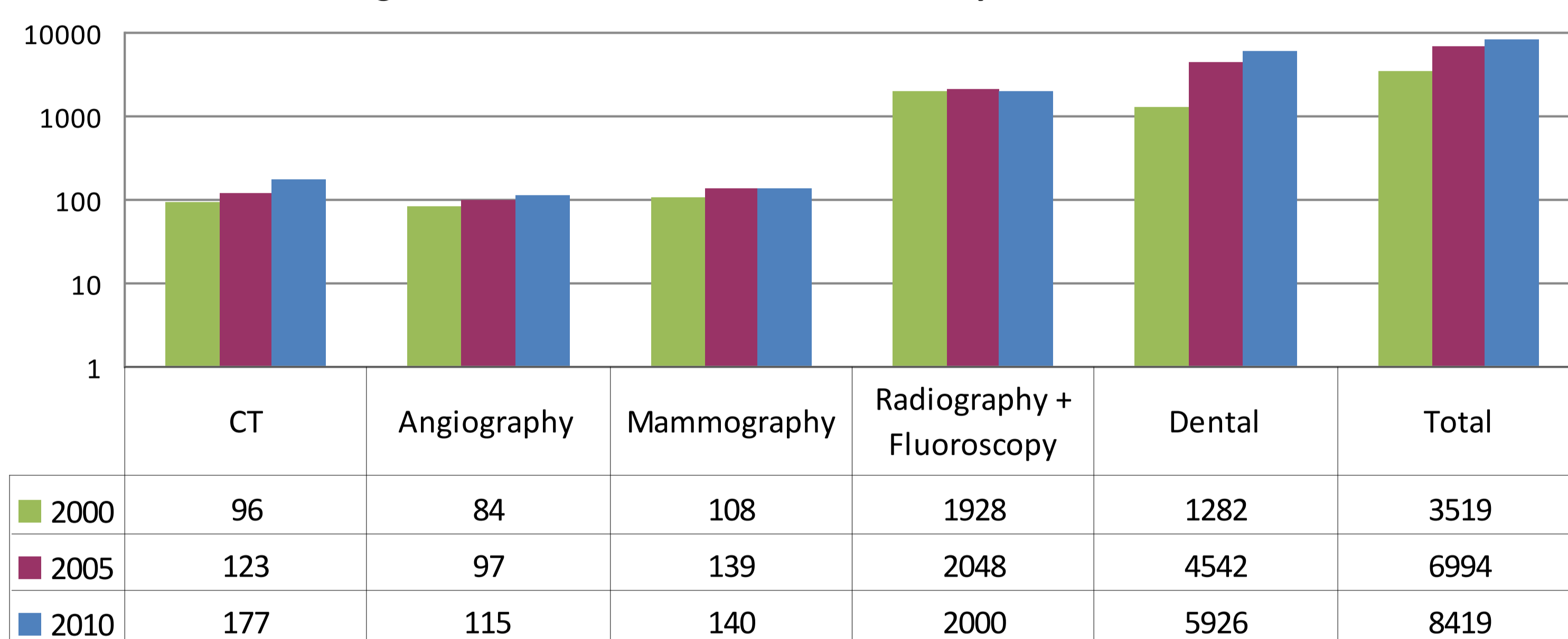


Fig. 2: Intervention exams relative to all

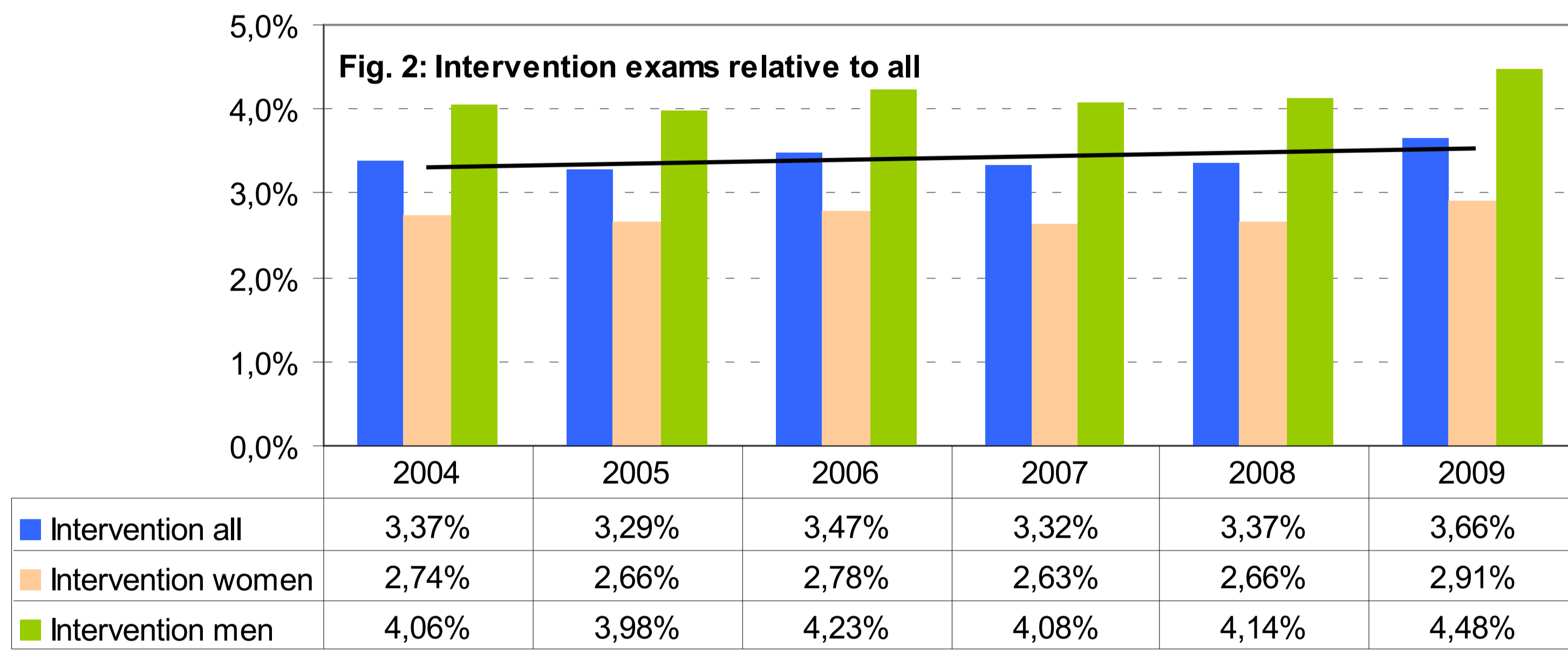
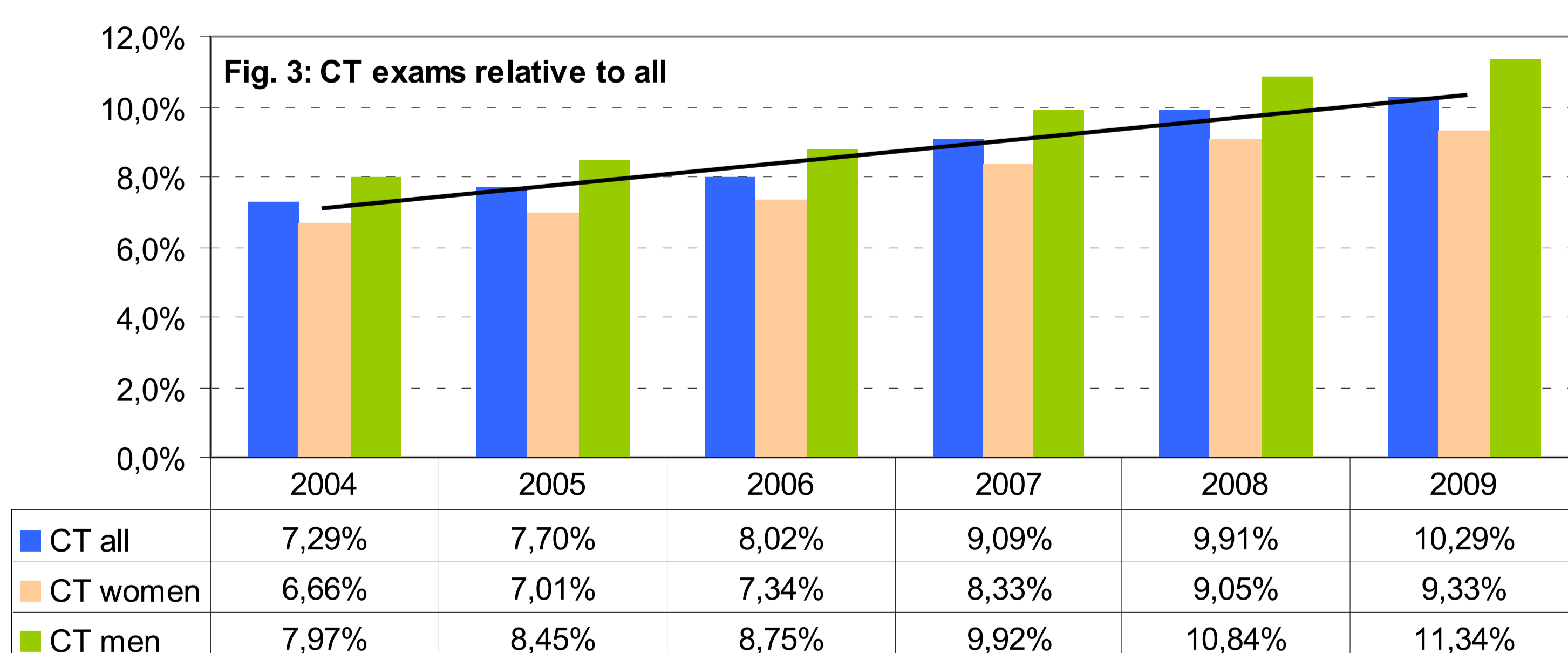


Fig. 3: CT exams relative to all



This trend described above cannot be however considered only as a definitely negative phenomenon. Increasing number of sources and procedures is undoubtedly associated also with increasing quality of medical health care where obtaining of better diagnostic information or possibility of performing in time a specific therapy has positive benefits for the patient.

It is of course not easy to find a specific parameter demonstrating a direct correlation between growth of number of CT or interventional procedures and improvement of health care and in fact a quality of life but we can use as a first step a general parameters like life expectancy and mortality rate as it is shown in Tab.1. As we can see all parameters improved significantly during last decade. For example total mortality rate decreased by 18% in last 5 years.

	2000	2005	2009
Age structure > 65	13,8	14,1	15,0
<b>Life expectancy</b>			
Men	71,5	73,0	74,3
Women	78,3	79,3	80,6
Deaths till 1 year per 1000 live births	4,6	3,4	2,9
<b>Standardised mortality rate by total causes of death</b>			
Men	1179	1076	962
Women	711	657	576
<b>By malignant neoplasm</b>			
Men	320	295	265
Women	179	165	148
<b>By circulatory system</b>			
Men	603	508	435
Women	402	351	256

Tab.1: selected parameters demonstrating improvement of health care in CZ

Logically it would be interesting to follow parallelly with patient doses and numbers of procedures performed the number of workers involved in these procedures and their personal doses. Based on the data registered in the Central Register of Occupational Exposures we can observe that the number of radiation workers in medicine (Figure 5) and their average effective dose remains in last 10 years generally the same (Figure 6).

It could indicate an improvement of technical quality of devices and their safety features and ideally also an improvement of culture of work with ionizing radiation. Nevertheless the average individual effective dose of cardiologists has still potential for reduction and mainly the equivalent doses to their hands are still in some cases exceeding the annual limit. Currently identified way for improvement is development of standardized procedures for specified examinations or interventions.

As the base of a standardized procedure serves in this case an identified good practice with the best parameters of selected procedure. Another workplaces are then motivated by the example and demonstration of such good practice to the improvement. This approach was already tested in selected hospitals as a pilot study and a decrease of individual doses of patients as well as physicians has been observed when implemented. This effort will continue in next months with the support of professional bodies and radiological physicians working on related facilities.

Fig. 5: Number of radiation workers in medicine in years 2000 - 2010

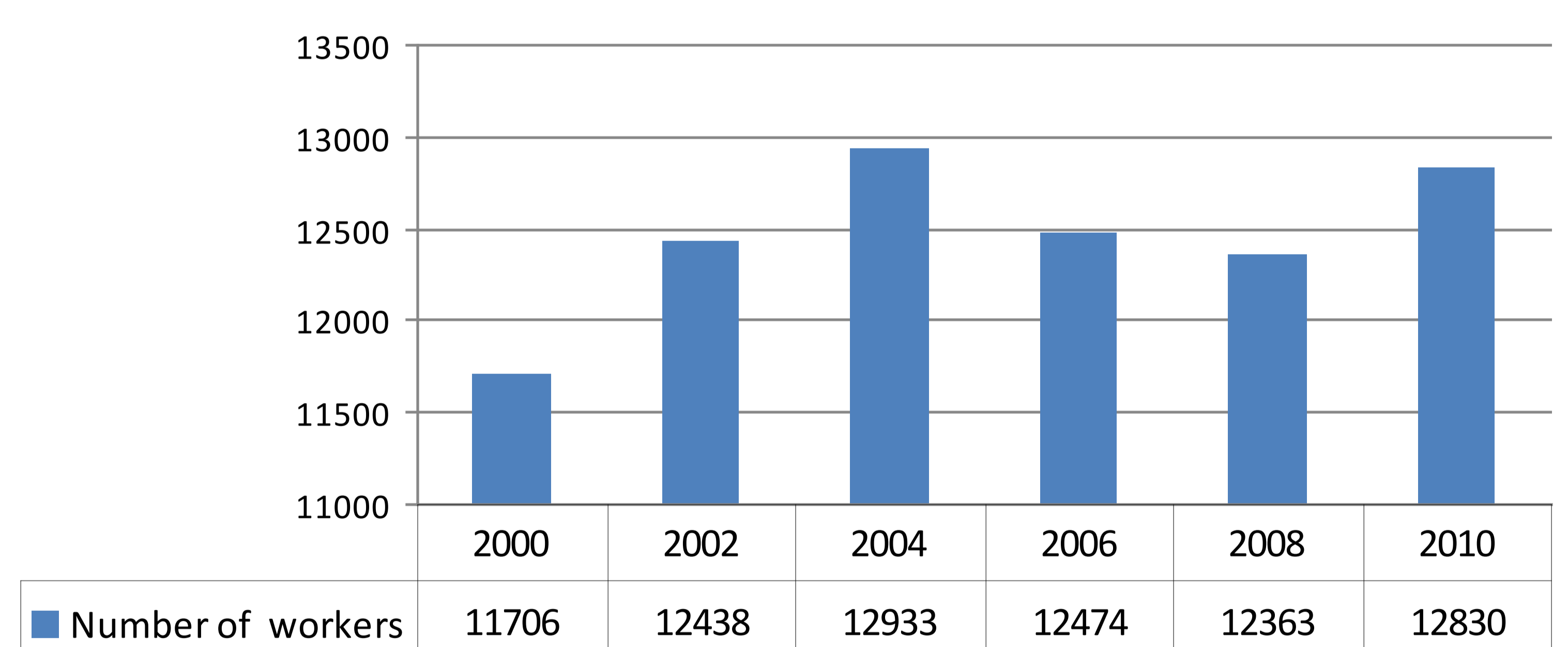


Fig. 6: Average effective dose of radiation workers in various professional groups in years 2001 - 2010



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