



United Nations Scientific Committee
on the Effects of Atomic Radiation

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Medical Radiation Exposures UNSCEAR 2008 Report Keith Faulkner

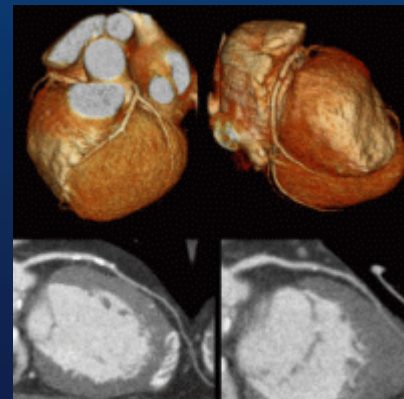
Assessment of the global population dose from medical
exposures in the period 1997-2007





What Are Medical Exposures

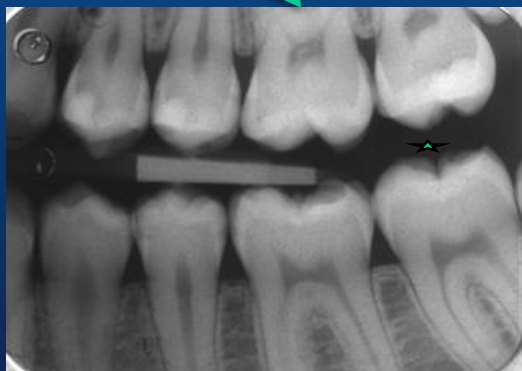
- Exposure of patients as part of their medical diagnosis or treatment;
- Exposure of individuals as part of health screening programmes;
- Exposure of healthy individuals or patients voluntarily participating in medical, biomedical, diagnostic or therapeutic research programmes



Types Of Medical Exposure

Diagnostic Medical

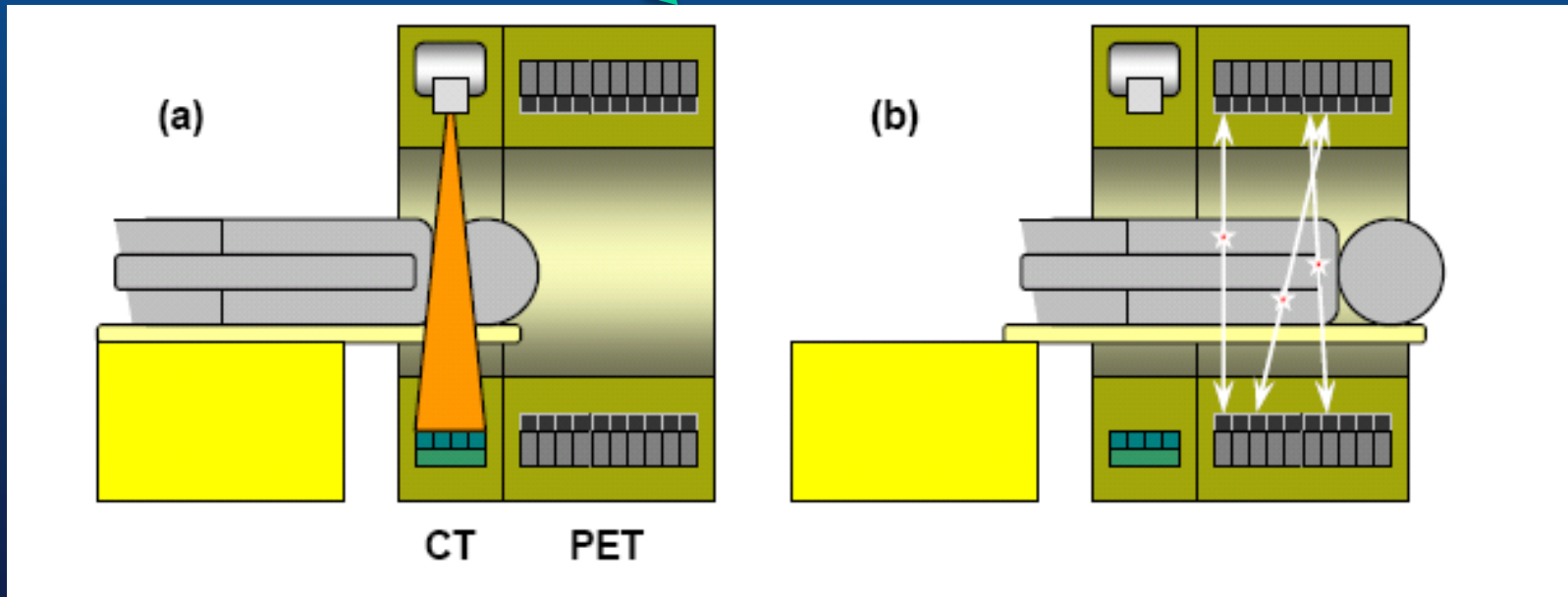
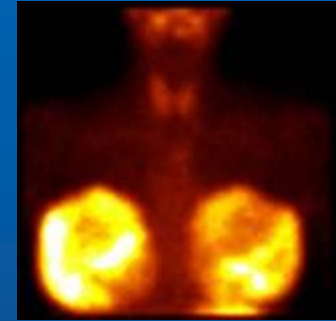
- Computed Tomography
- Dual Energy X-ray Absorptiometry
- Dental



Types Of Medical Exposure

Nuclear Medicine

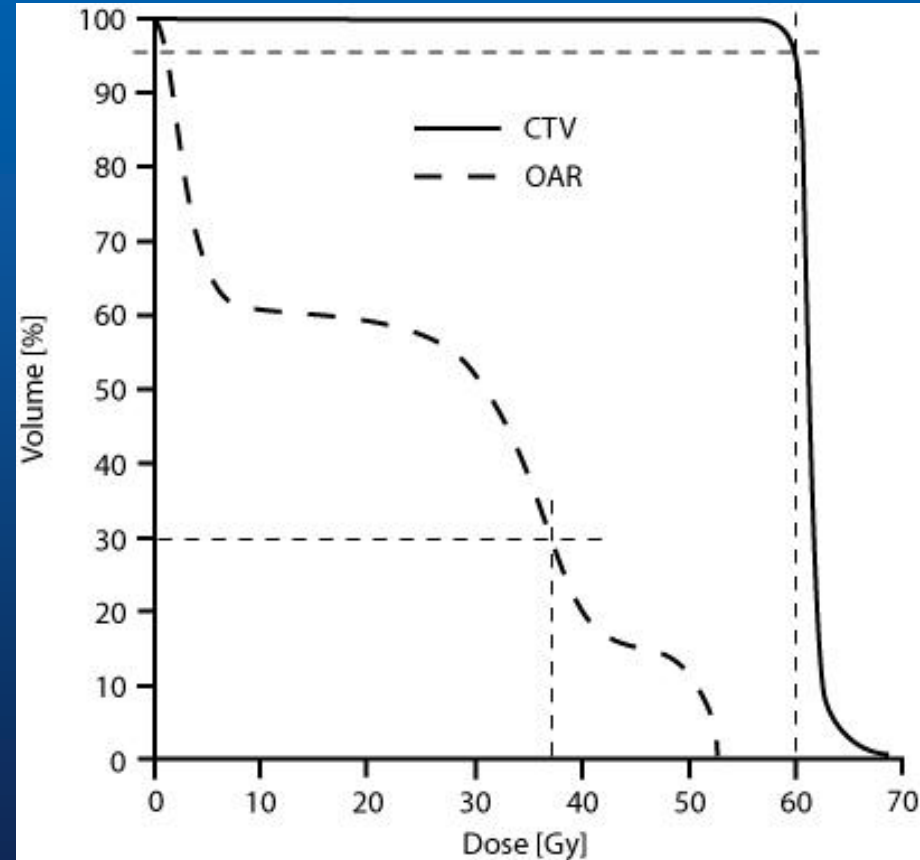
- Gamma Camera
- PET/CT
- Treatments



Types Of Medical Exposure

Radiation Therapy

- External beam therapy
- Brachytherapy
- Treatment planning





Assessment Of Collective Effective Dose

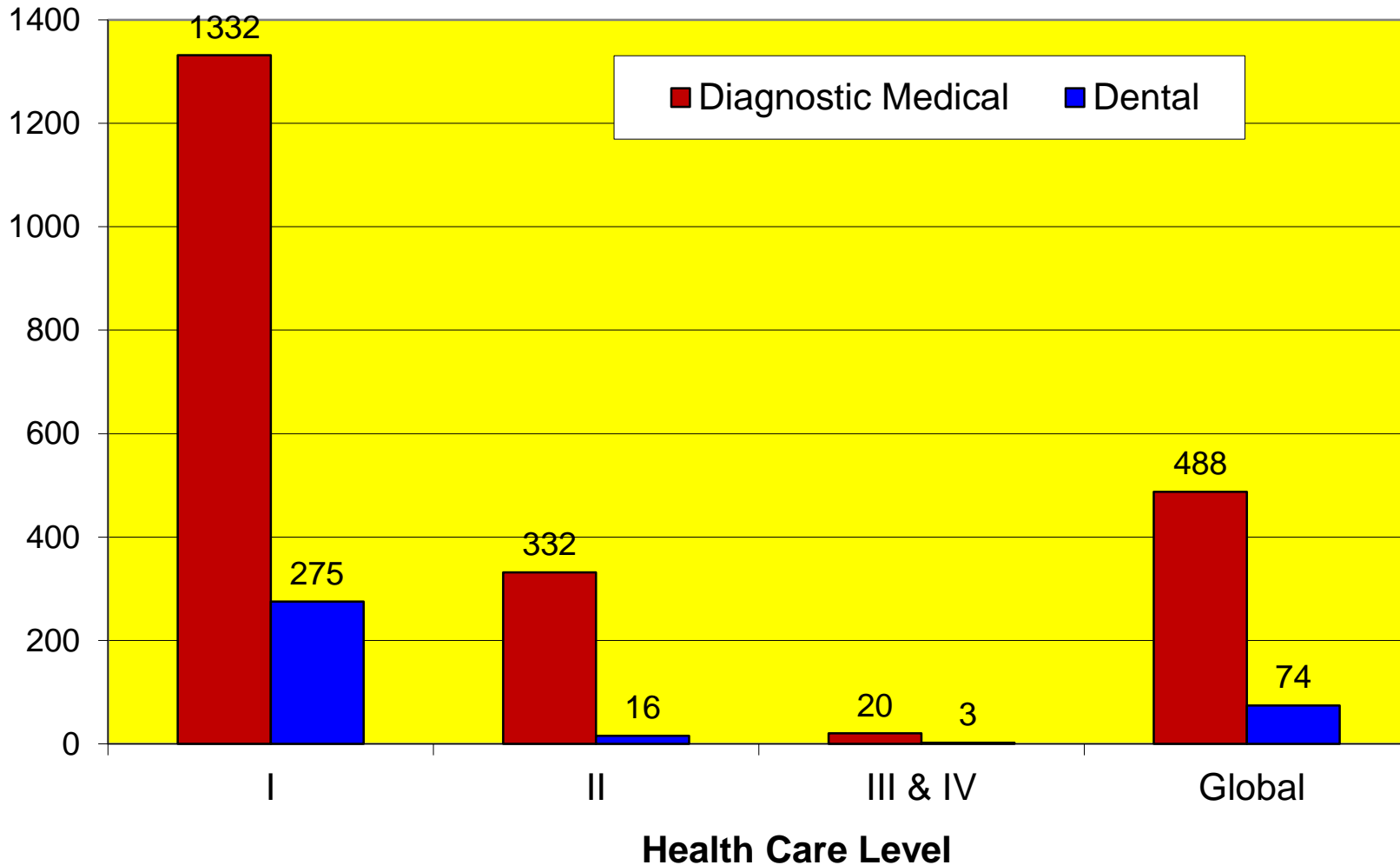
- Collective effective dose to the population is the sum, over all types of examinations, of the mean effective dose, E_e , for a specific examination type multiplied by the number of these examinations, n_e .
- The number of examinations may be deduced from the annual frequency (expressed as number of examinations per 1,000 population) and the estimated population for that country or health care level.



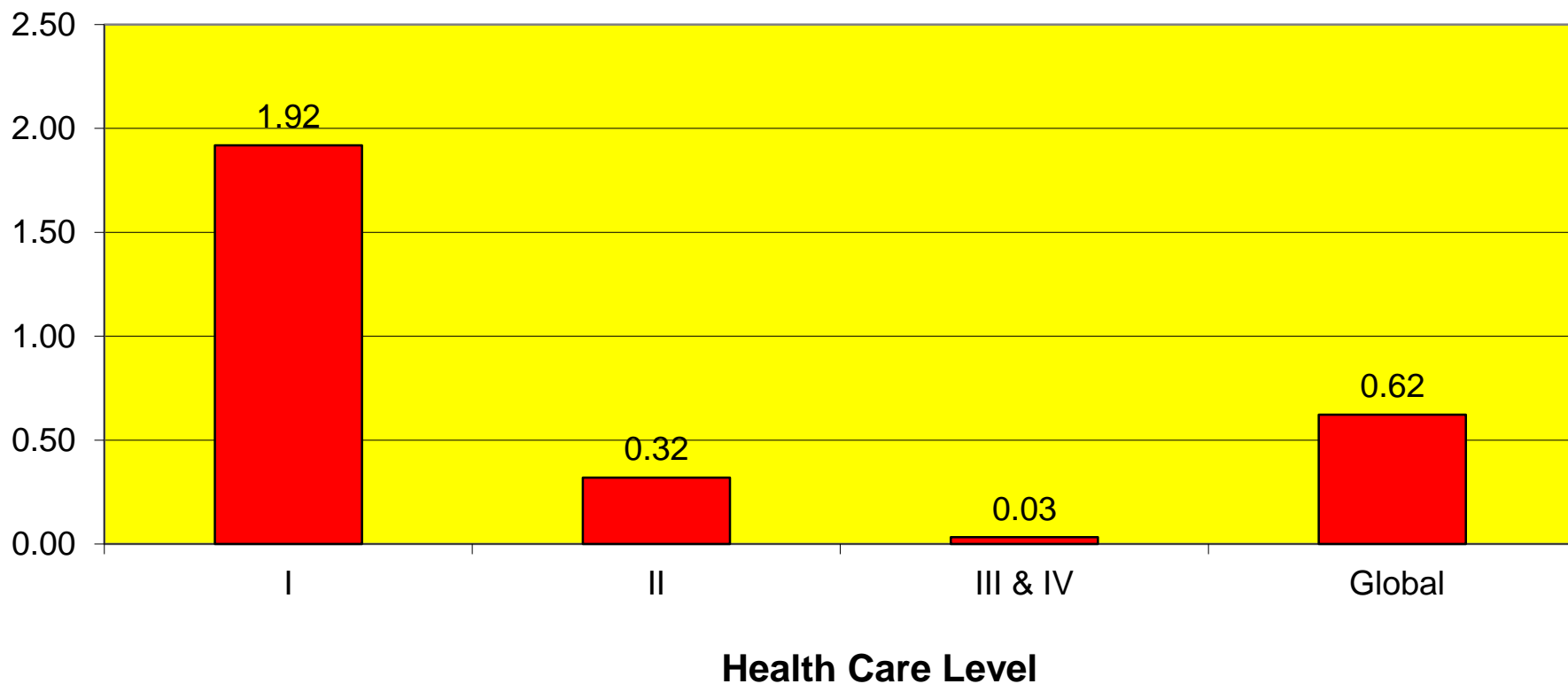
- The per caput effective dose is also used to quantify exposures.
- It is the collective effective dose averaged over all the population (both exposed and non-exposed individuals).
- The weakness of this approach is that medical exposures tend to be performed on a subset of the population whose members are ill.

Frequency Of Diagnostic Medical and Dental Examinations 1997-2007

Frequency per 1000 population

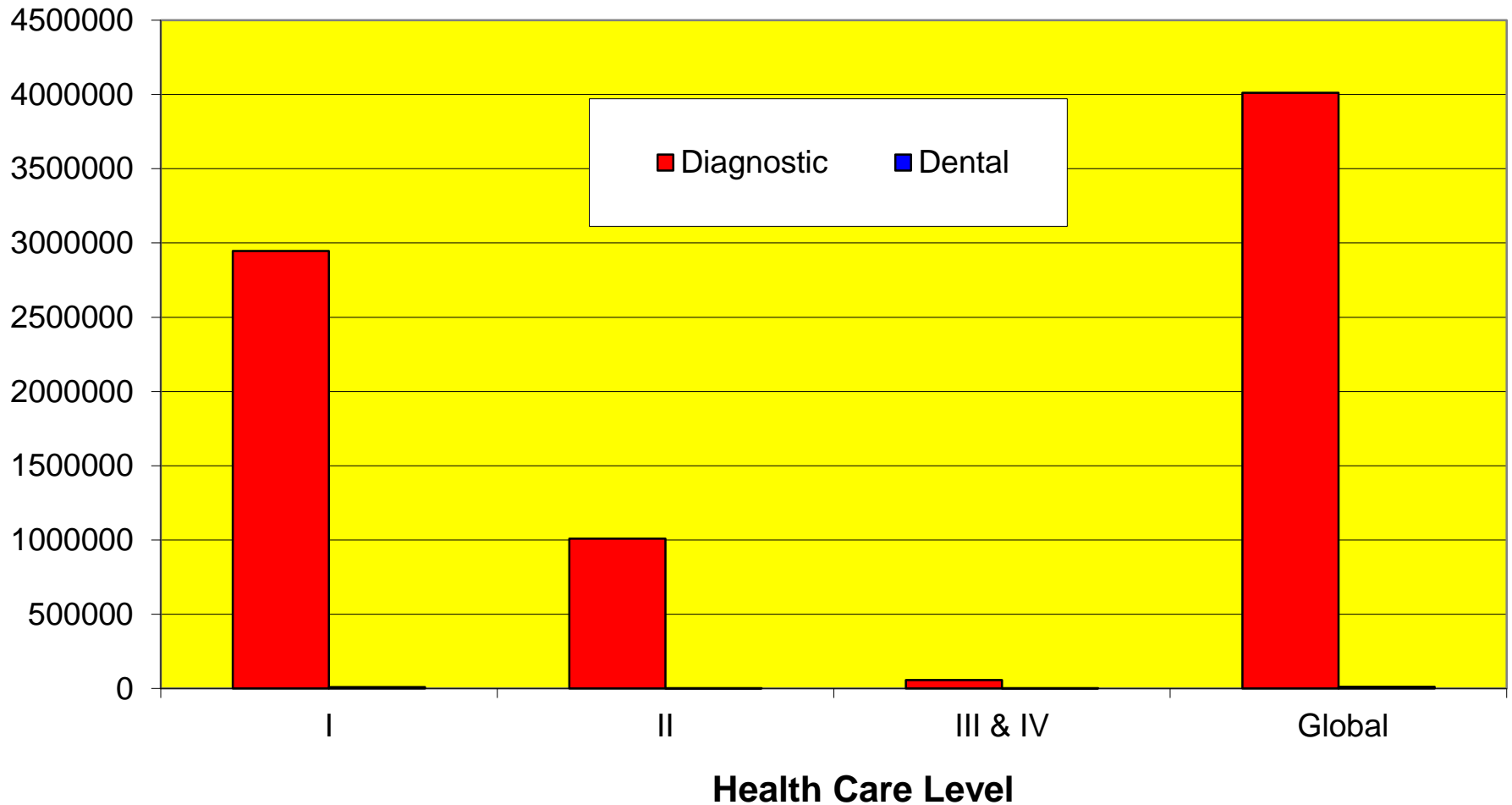


Per caput effective dose (mSv)



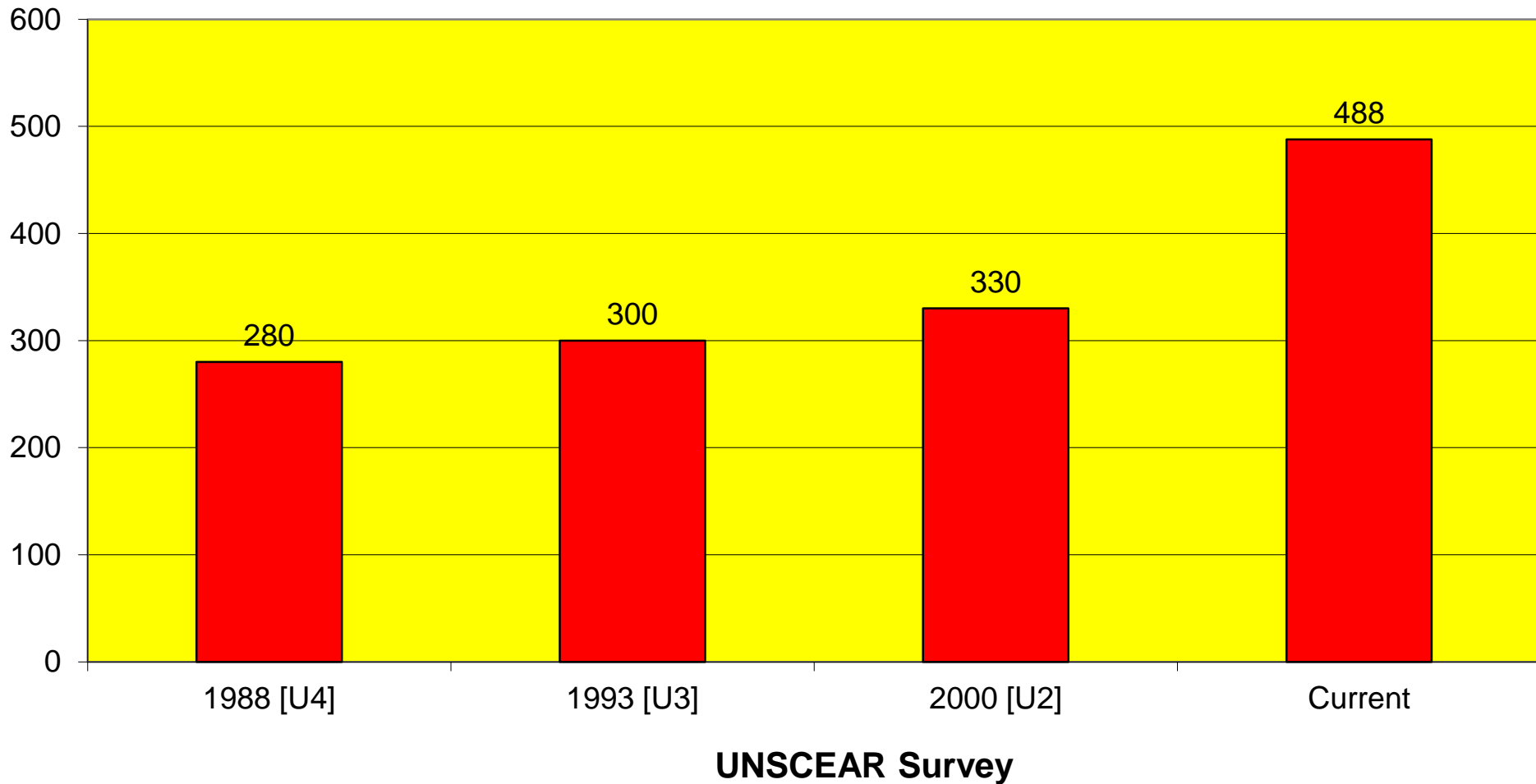
Collective Effective Dose From Diagnostic Medical and Dental Examinations 1997-2007

Collective effective dose (manSv)



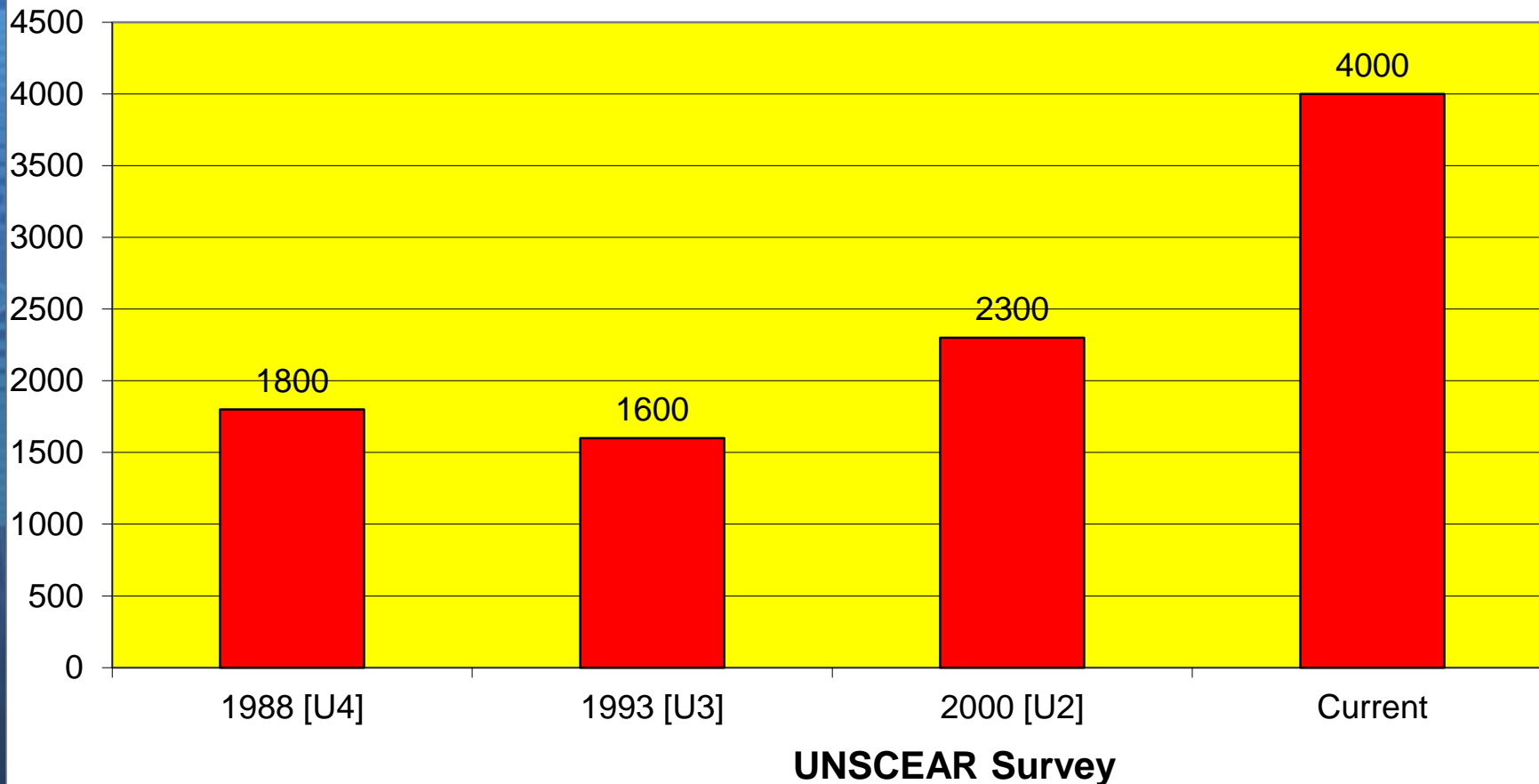
Temporal Trends In The Frequency Of Diagnostic Medical Examinations

Frequency of examinations (/1000)



Temporal Trends In The Collective Effective Dose From Diagnostic Medical Examinations

Collective Effective Dose (1000man Sv)



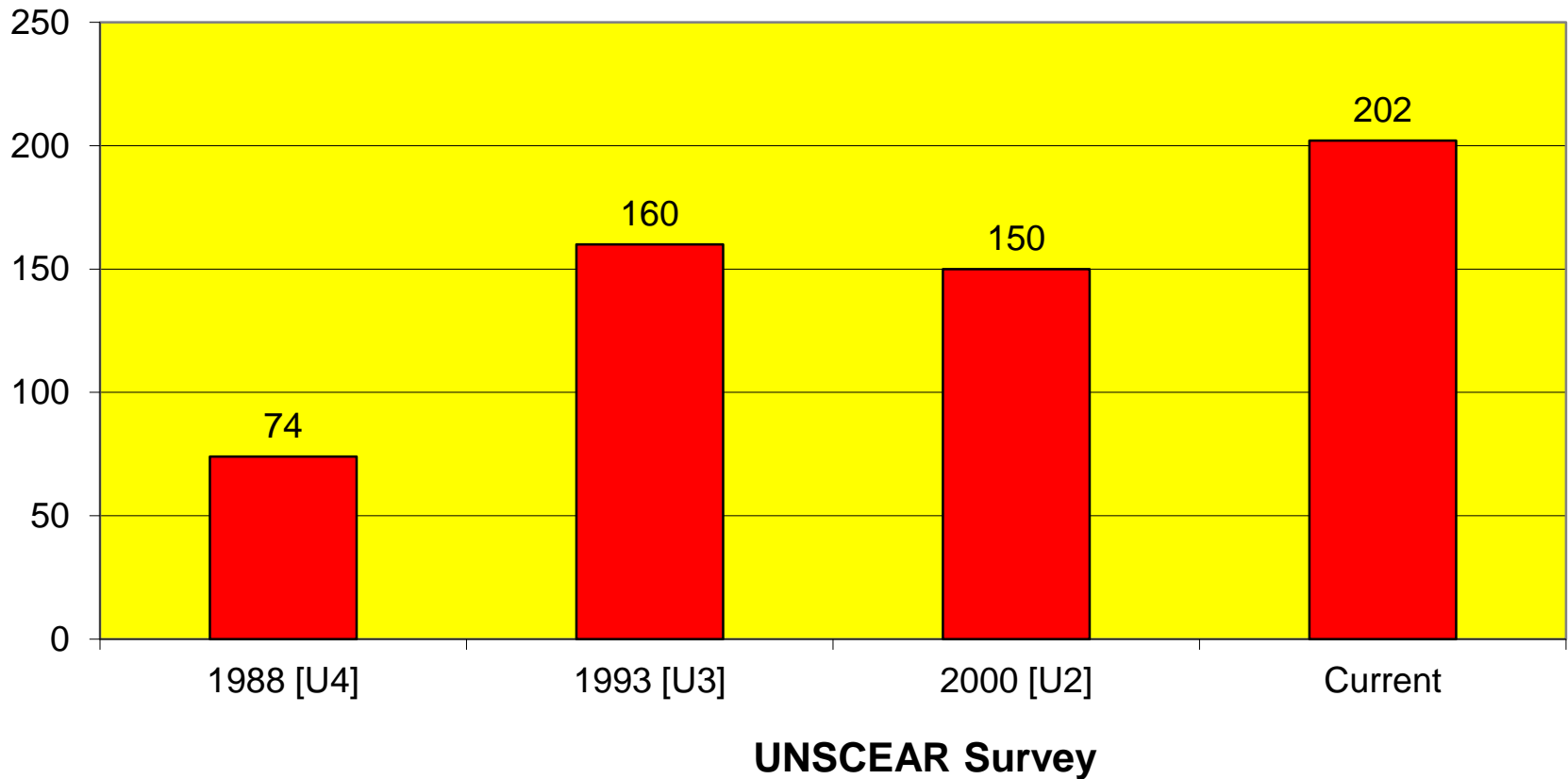
Estimated dose to the world population from diagnostic nuclear medicine procedures (1997–2007)

<i>Health care level</i>	<i>Population (millions)</i>	<i>Annual per caput effective dose (mSv)</i>	<i>Annual collective effective dose (man Sv)</i>
I	1 540	0.12	186 000
II	3 153	0.005 1	16 000
III-IV	1 752	0.000 047	82
World	6 446	0.031	202 000

Estimated annual number of therapeutic treatments with radiopharmaceuticals in the world

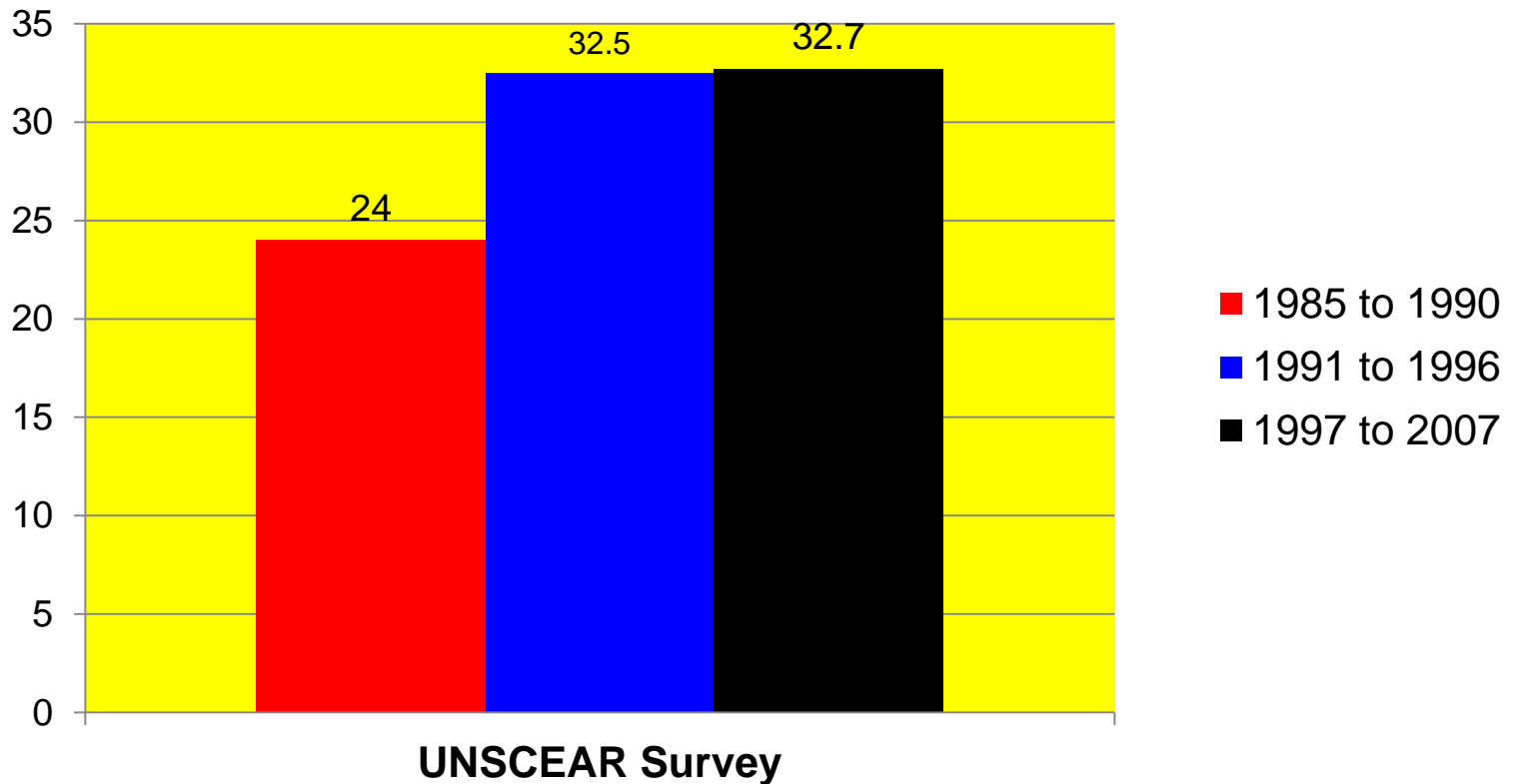
<i>Health care level</i>	<i>Population (millions)</i>	<i>Annual number of treatments</i>	
		<i>Millions</i>	<i>Per 1 000 population</i>
I	1 540	0.73	0.47
II	3 153	0.14	0.043
III–IV	1 752	0.007 5	0.004 3
World	6 446	0.87	0.14

Collective effective dose (1000man Sv)



Temporal Trends In The Number Of Nuclear Medicine Examinations

Millions



<i>Health care level</i>	<i>Population (millions)</i>	<i>Annual collective effective dose (man Sv)</i>			
		<i>Medical</i>	<i>Dental</i>	<i>Nuclear medicine</i>	<i>Total</i>
I	1 540	2 900 000	9 900	186 000	3 100 000
II	3 153	1 000 000	1 300	16 000	1 000 000
III	1 009	33 000	51	82	33 000
IV	744	24 000	38		24 000
World	6 446	4 000 000	11 000	202 000	4 200 000

<i>Source</i>	<i>Annual collective effective dose (man Sv)</i>	<i>Contribution (%)</i>
Natural background	16 000 000	79
Diagnostic medical radiology	4 000 000	20
Diagnostic dental radiology	11 000	<0.1
Nuclear medicine	202 000	1.0
Fallout	32 000	<0.1
Total	20 200 000	100