Nuclear weapons: catastrophic impacts on health

Conference on Humanitarian Impact of Nuclear Weapons

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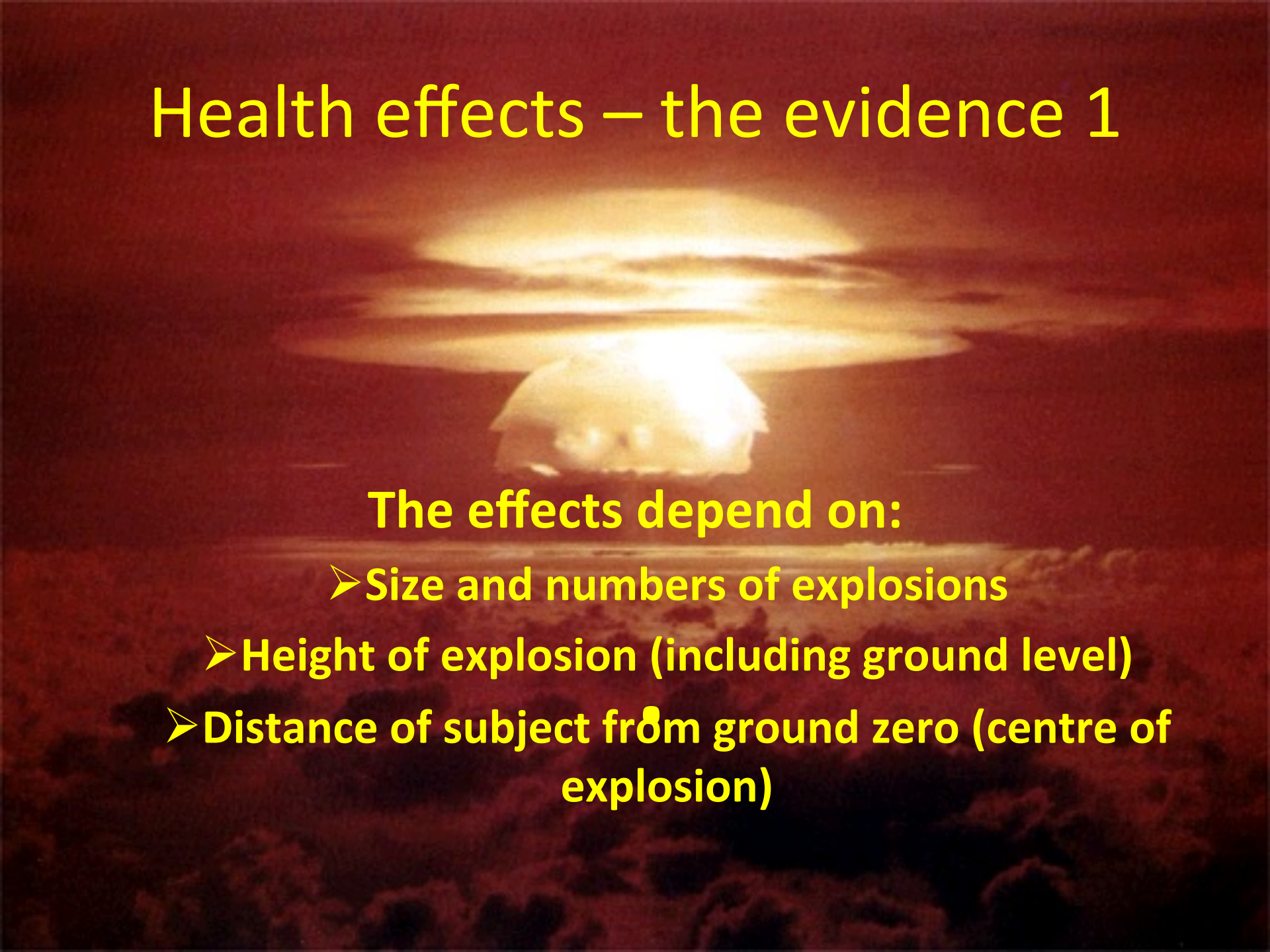
With thanks to

Liz Waterston, Joseph Mutti, Frank Boulton, Marion Birch , the late Douglas Holdstock MEDACT Richard Moyes Article 36 , Phil Webber SGR,John Loretz , Ira Helfand IPPNW

Health effects – the evidence 1

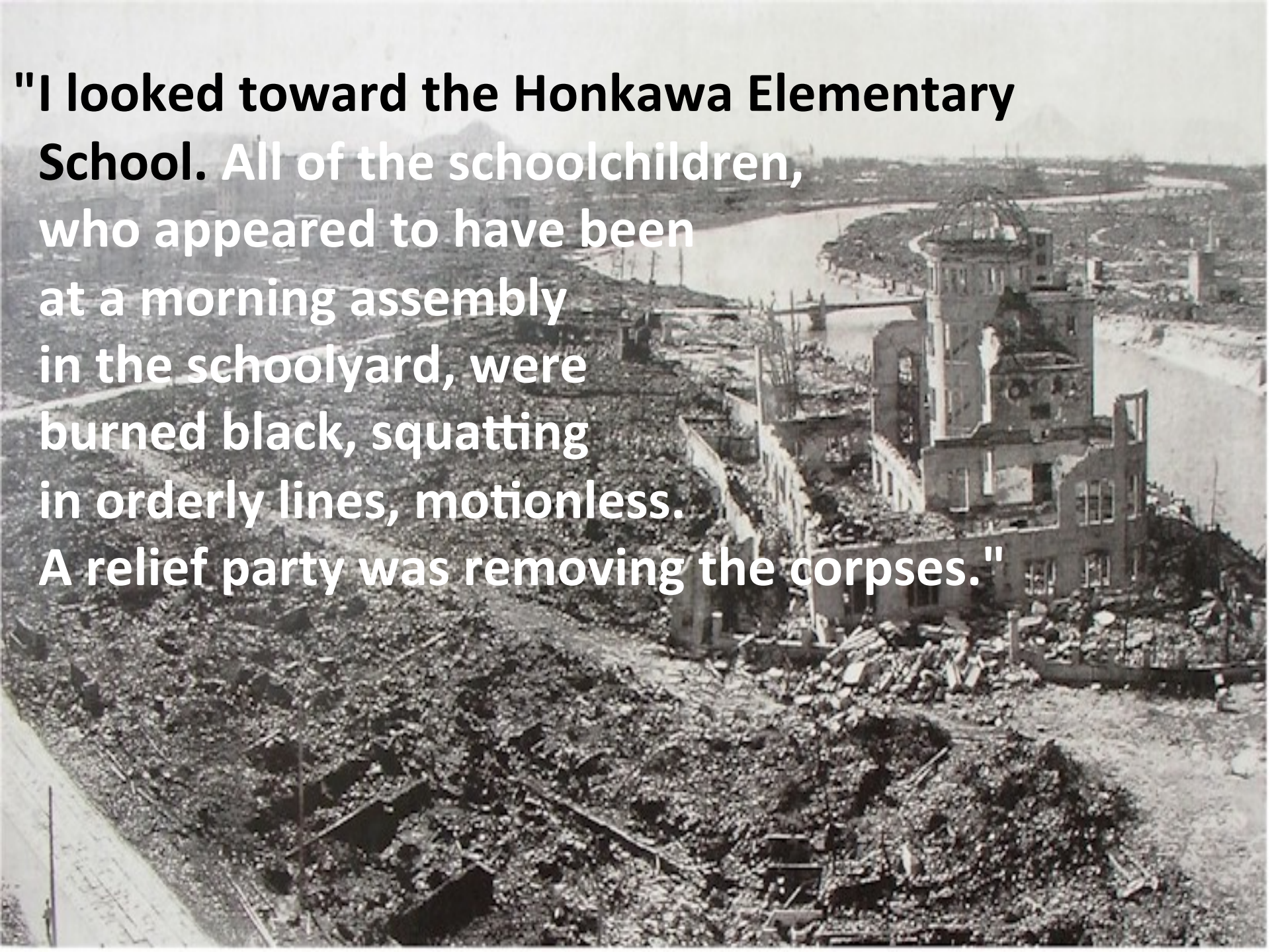


The effects depend on:

- **Size and numbers of explosions**
- **Height of explosion (including ground level)**
- **Distance of subject from ground zero (centre of explosion)**

Hiroshima, 6 August 1945

90,000- 160,000 dead by 2-4 months after the bombing from immediate effects and later effects of burns, radiation and related disease.


"I looked toward the Honkawa Elementary School. All of the schoolchildren, who appeared to have been at a morning assembly in the schoolyard, were burned black, squatting in orderly lines, motionless. A relief party was removing the corpses."

Nagasaki, 9 August 1945

- 60,000 – 80,000 Dead by 2-4 months after the bombing from immediate effects and later effects of burns, radiation and related disease.

Health effects –2

- Immediate deaths from the fire ball – the centre of which is several million degrees C
- An intense flash of heat radiation causes lethal burns and flash blindness over a wide area
- Immediate deaths from the shock wave which travels at supersonic speed and results in falling buildings and lethal flying objects

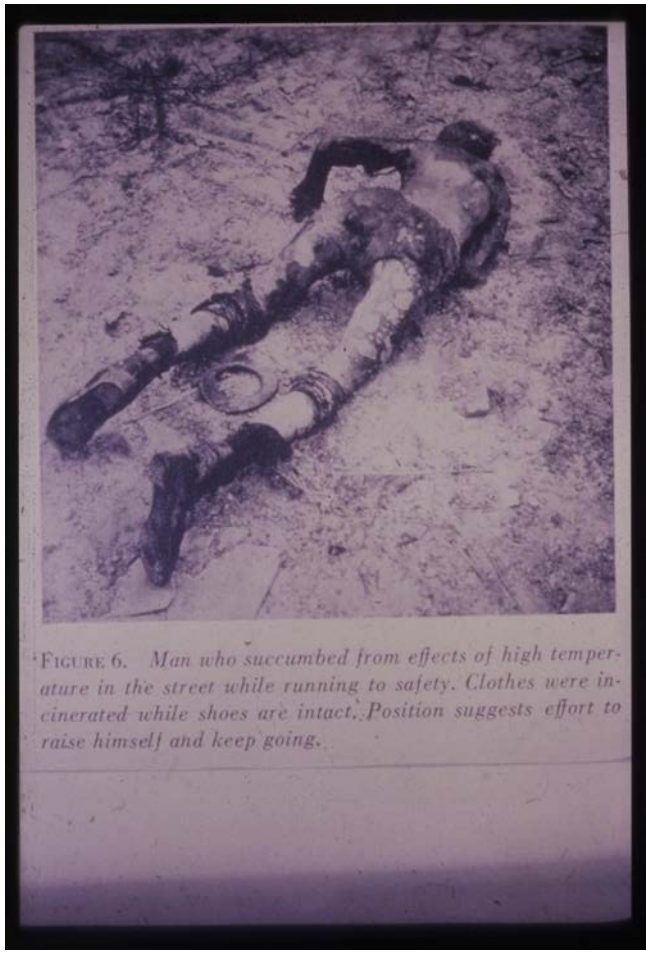
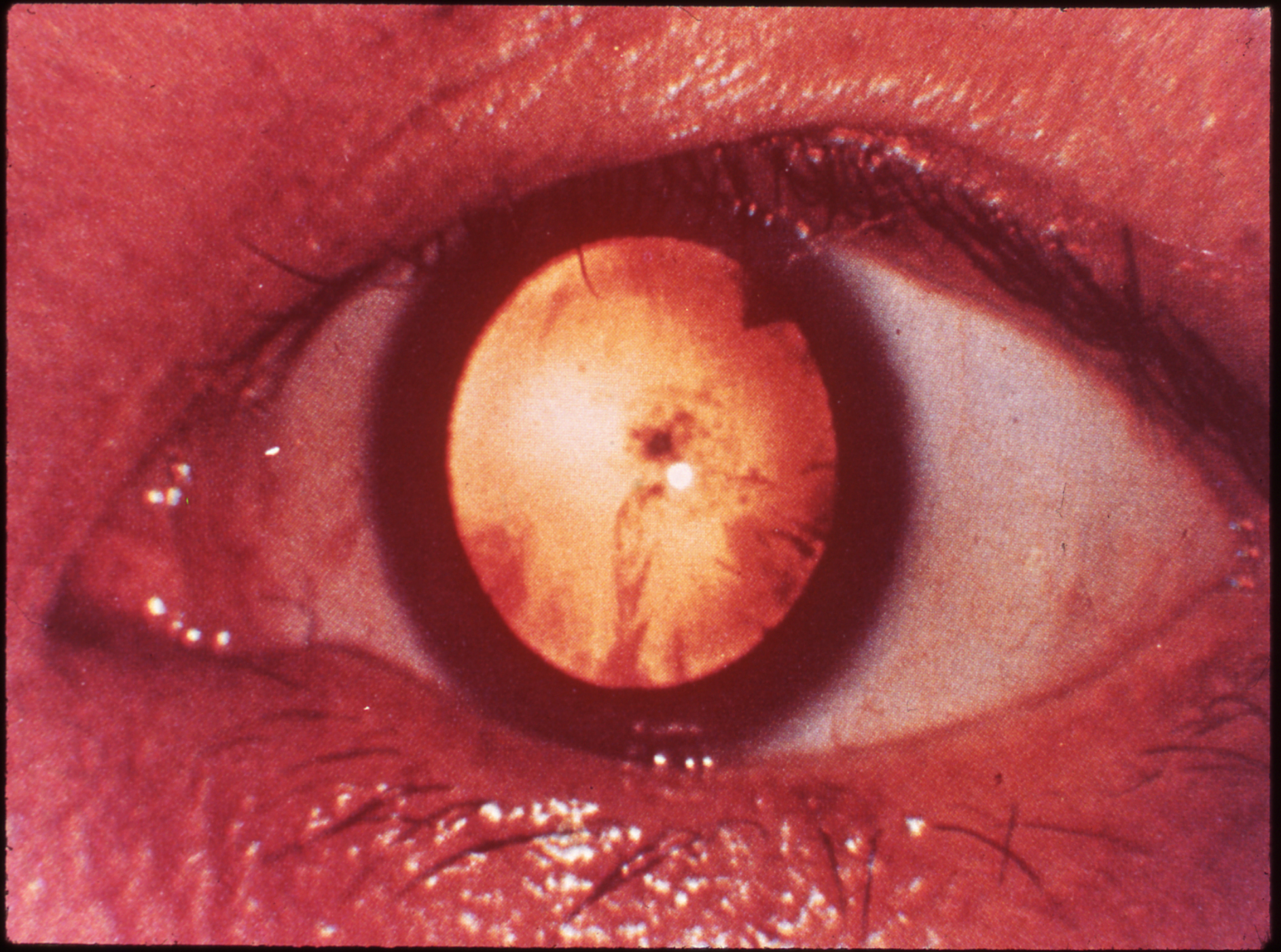


FIGURE 6. *Man who succumbed from effects of high temperature in the street while running to safety. Clothes were incinerated while shoes are intact. Position suggests effort to raise himself and keep going.*

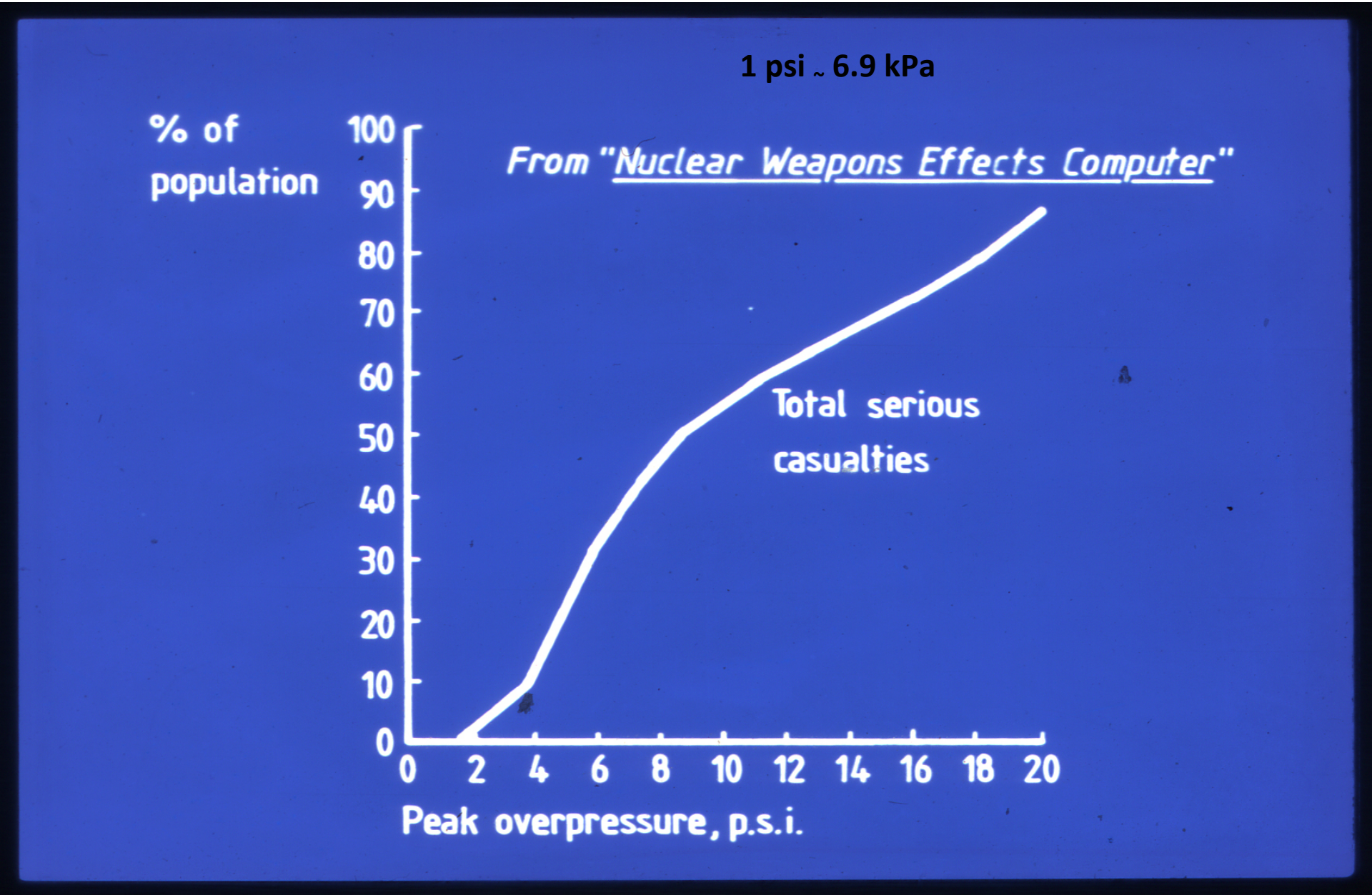


Ranges from ground-zero at which burns would be inflicted by explosions of various magnitudes in the atmosphere*

Degree of burn	Distance in km from effective explosion				
	1 kt	10 kt	100 kt	1 mt	10 mt
First-degree burn (reddening of skin)	1.12	3.0	8.5	22.4	48.0
Second-degree burn (blistering of skin)	0.8	2.4	6.4	18.0	38.4

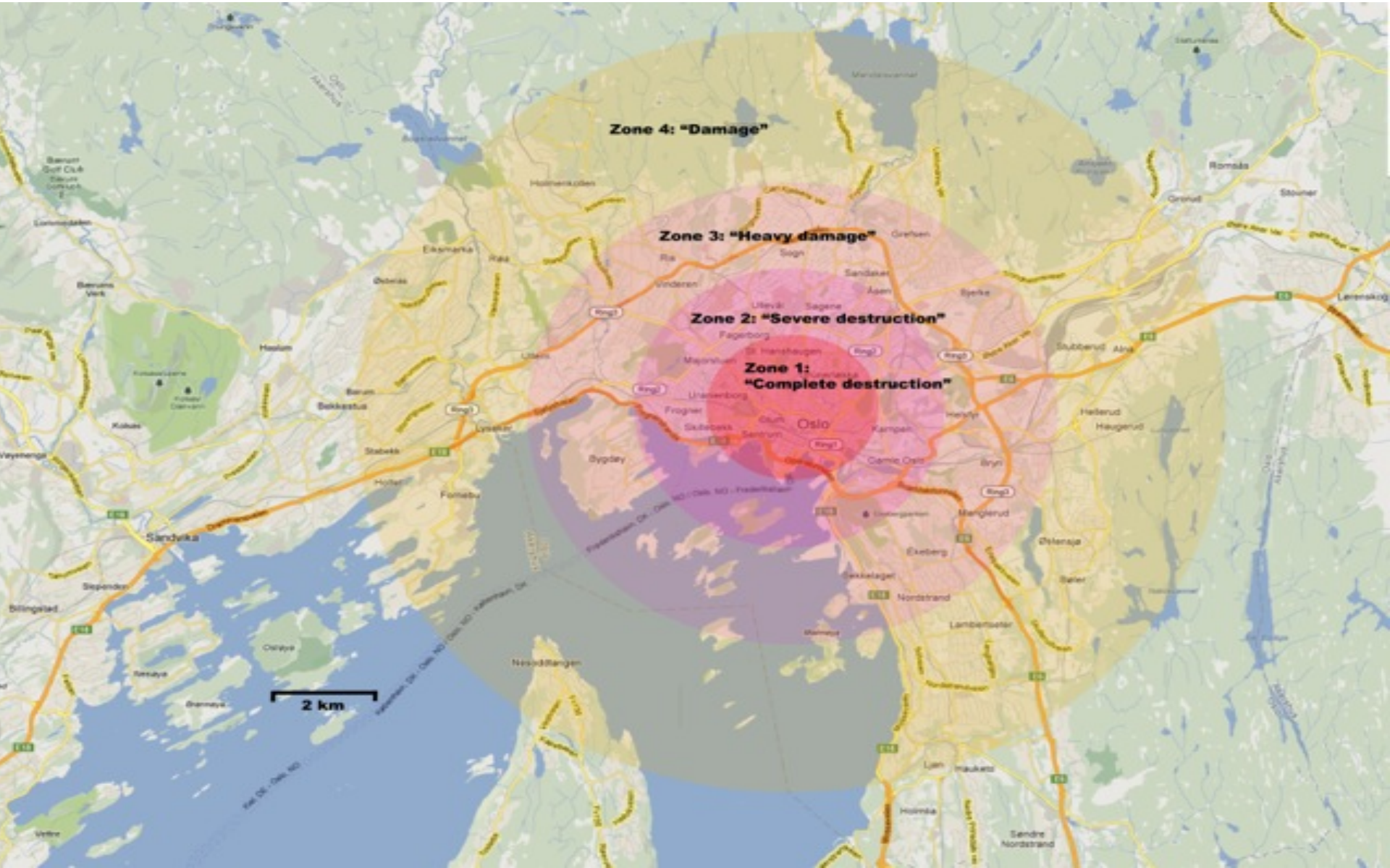
* In the case of surface explosions, the corresponding distances would be approximately 4/5 those for an aerial explosion of the same effectiveness.

Serious casualties and blast pressure



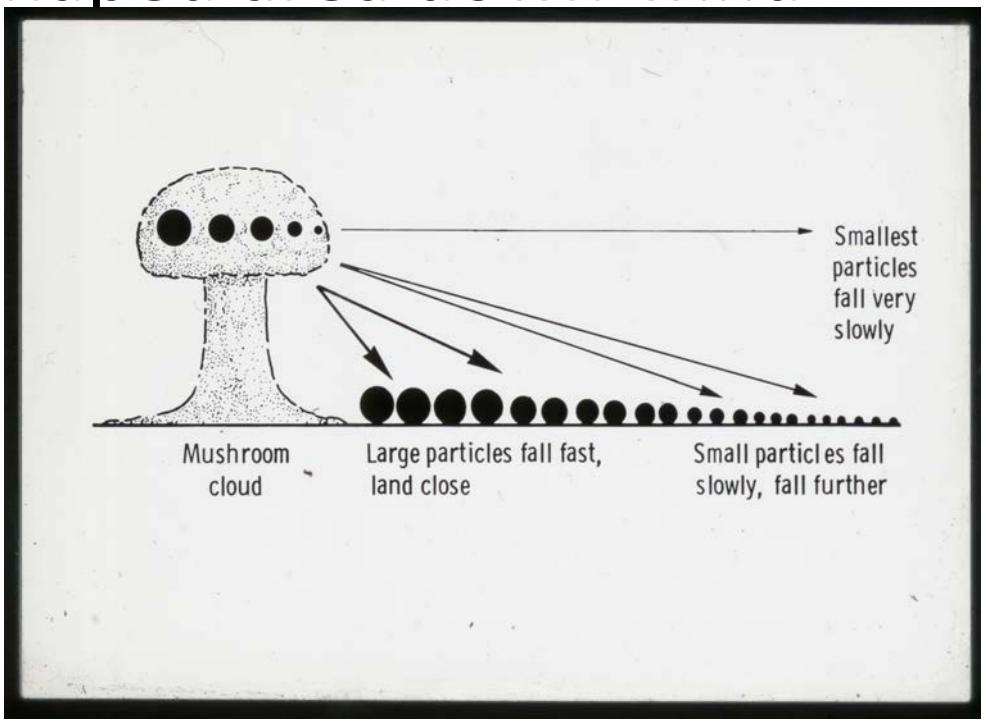
Damage from 100 kt nuclear weapon exploded over Oslo

Richard Moyes Article 36



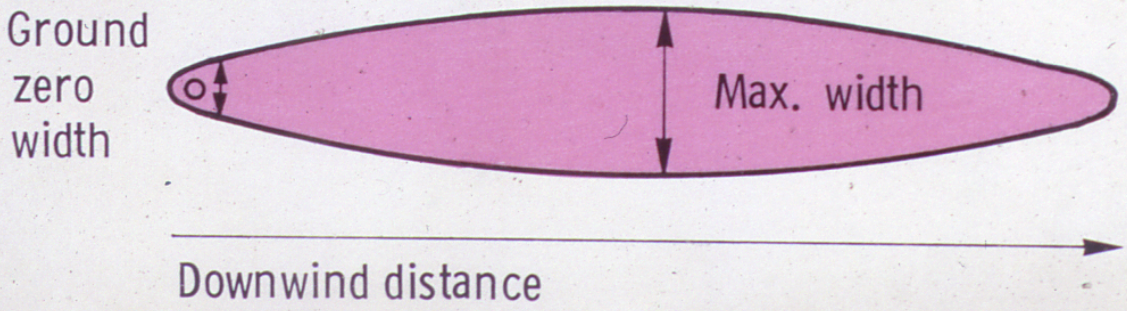
Health effects - 3

- Initial radiation (one third)
- Radioactive fallout is caused especially by a groundburst explosion which draws debris into the fireball, irradiating it and spreading it in a cigar-shaped area down-wind



Fallout 1Mt surface burst, assuming 50% fission

Accumulated dose at 2 weeks rads.	Downwind distance km	Max. width km	Ground zero width km
6000	34	4.7	2.3
1500	65	11.0	5.0
300	162	20.0	8.9
75	321	38.6	11.4



(100 rad equivalent to 1 Gray) exposure to 500 rads usually causes death within 14 days

Exposure to ionizing radiation: Acute radiation syndrome

Large external doses of X-rays, gamma rays, and neutrons

Destruction of bone marrow; gastrointestinal, cardiovascular, and central nervous system damage

Death can occur in days or weeks

In the medium term radiation exposure would cause immunosuppression, decreasing resistance to infection

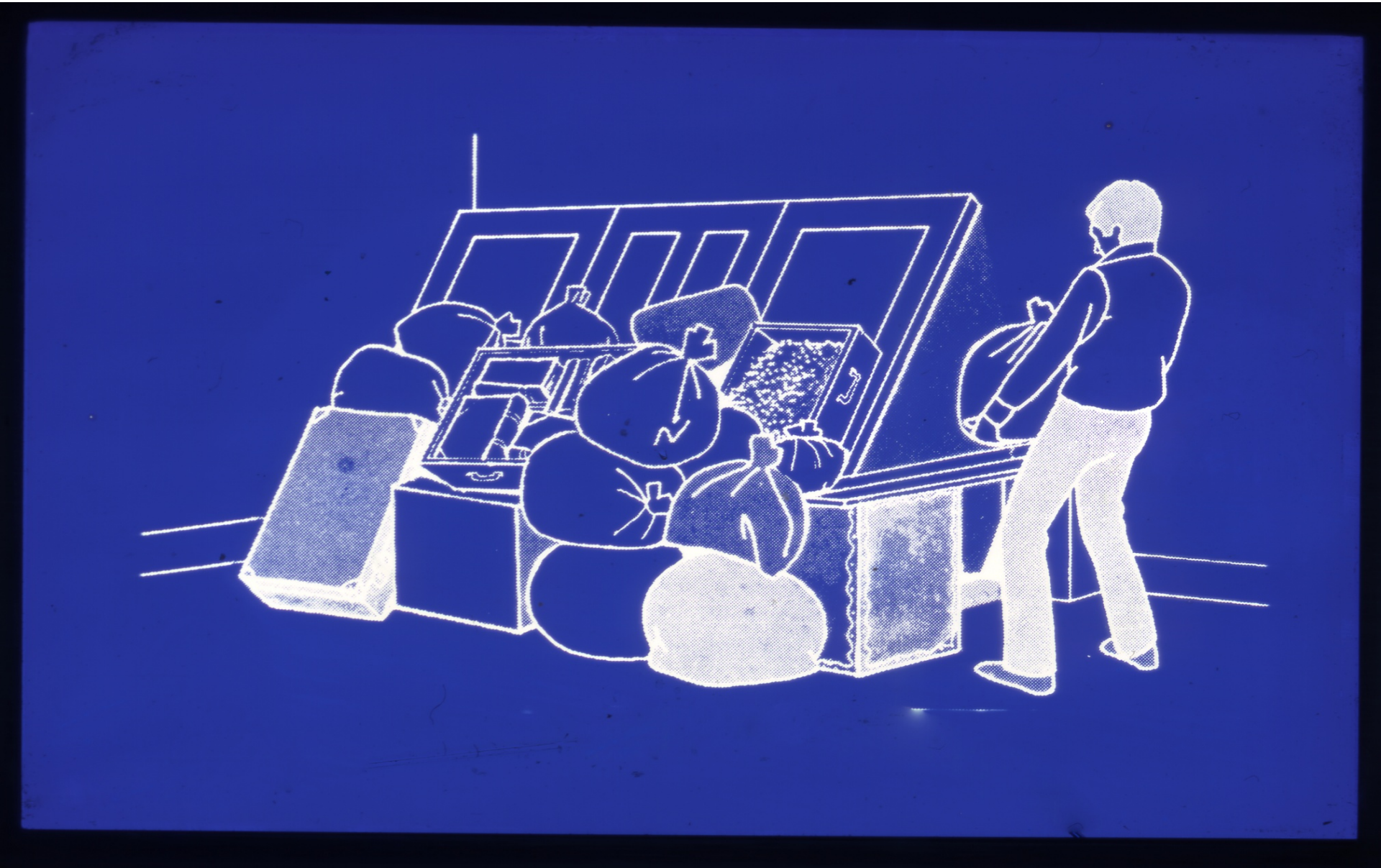
Number of Medical Personnel Killed or Injured in Hiroshima

Profession	Number of Casualties	Percentage of Total Profession
Physicians	270	90
Dentists	132	86
Pharmacists	112	80
Nurses	1,650	93

Health effects - 4

- Health services (burns , blood transfusion etc) would be overwhelmed
- Economic and social infrastructure would be wrecked and supply chains broken
- In Hiroshima and Nagasaki 15–20% died from radiation sickness, 20–30% from burns, and 50–60% from other injuries, compounded by illness.
- A nuclear war would have disproportionately greater effects

Can civil defence preparations protect populations?



The most important function of the physician, however, relates to prevention. So very little can be done in the area in which a bomb or a series of bombs has been exploded that the employment of every reasonable means to prevent such a catastrophe becomes the concern of everyone, and not least the physician.

Joseph Garland, NEJM editorial 1962