

Exposure Modes and Effects

High-dose exposure

(Exposed to a large amount of radiation)

Low-dose exposure

(Exposed to a small amount of radiation)

Acute exposure

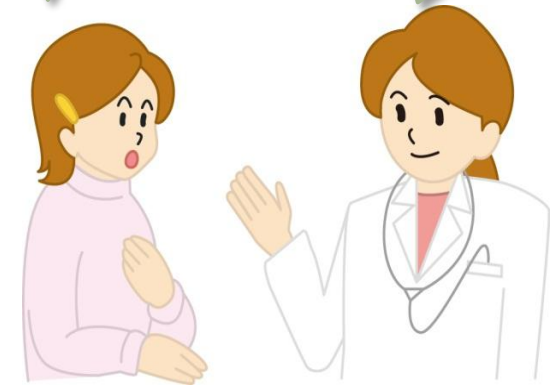
(Radiation exposure on one occasion or in a short time)

Chronic exposure

(Radiation exposure over a long period of time)

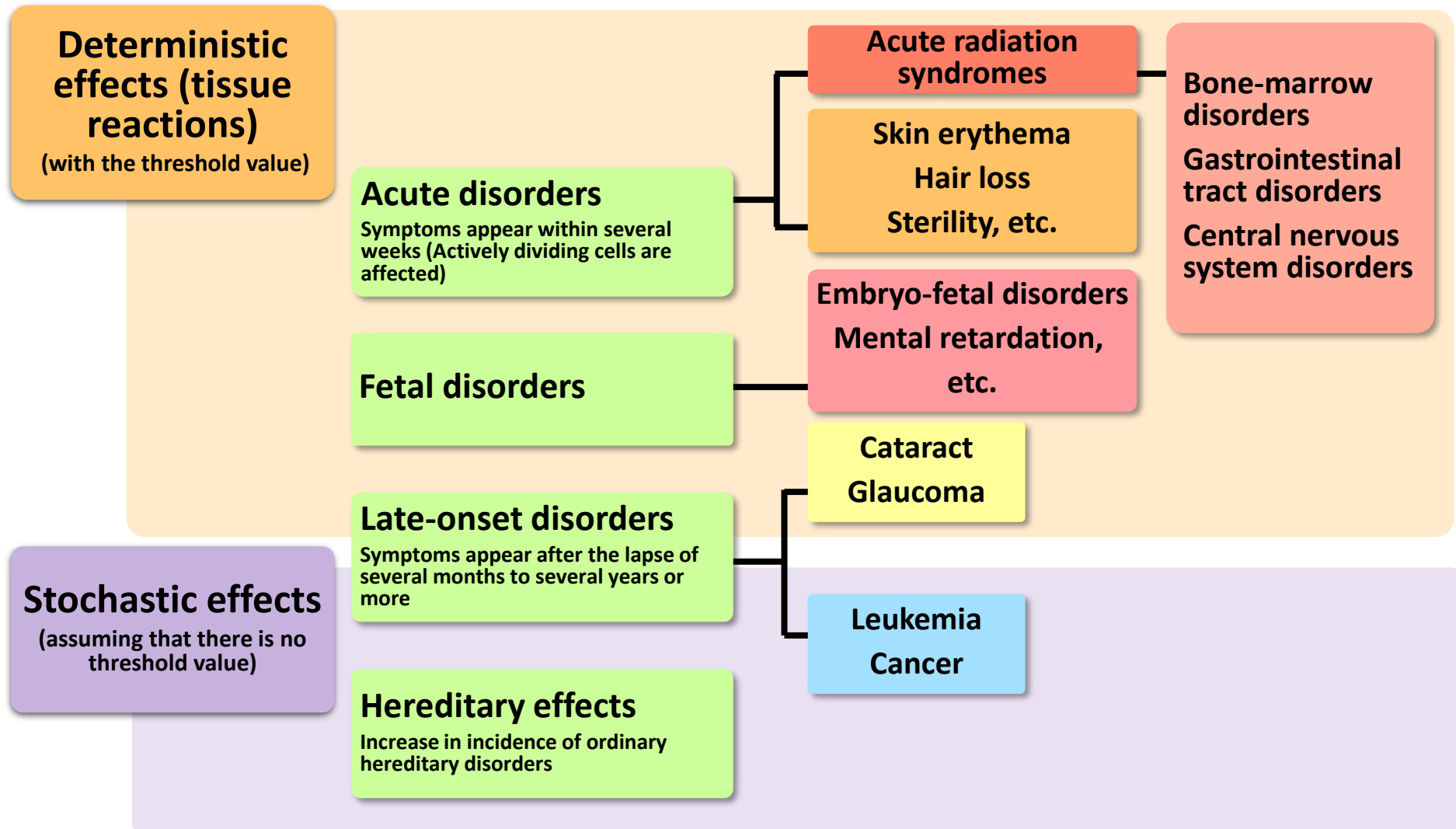
Skin injury,
nausea, hair
loss?

Acute disorders
appear when having
been exposed to a
large amount of
radiation in a short
time.





Types of Effects

► Consideration is to be given to what health effects arise after radiation exposure, the amount of exposure, parts exposed to radiation (whole-body exposure or local exposure), and the exposure situation over time (acute or chronic).



Classification of Radiation Effects

		Incubation period	e.g.	Mechanism of how radiation effects appear	
Categories of effects	Physical effects	Within several weeks = Acute effects (early effects)	Acute radiation syndromes ^{*1} Acute skin disease	Deterministic effects (tissue reactions) caused by cell deaths or cell degeneration ^{*2} 	
		After the lapse of several months = Late effects	Abnormal fetal development (malformation)		Opacity of the lens
			Cancer and leukemia		Stochastic effects due to mutation ^{*2} 
	Heritable effects	Hereditary disorders			

*1: Major symptoms are vomiting within several hours after exposure, diarrhea continuing for several days to several weeks, decrease of the number of blood cells, bleeding, hair loss, transient male sterility, etc.

*2: Deterministic effects do not appear unless having been exposed to radiation exceeding a certain dose level.

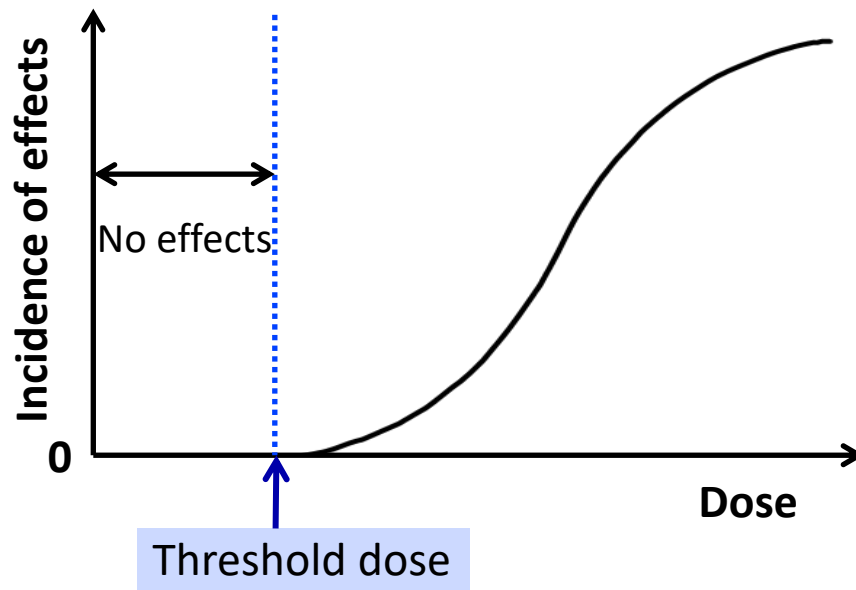
Deterministic Effects (Tissue Reactions) and Stochastic Effects

Deterministic effects (tissue reactions)

(Hair loss, cataract, skin injury, etc.)

A dose level, at which specific symptoms appear in 1 % of the population exposed to the same dose of radiation, is defined as the threshold dose.

(2007 Recommendations of the International Commission on Radiological Protection (ICRP))



Stochastic effects

(Cancer, leukemia, hereditary effects, etc.)

Effects of radiation exposure under certain doses are not clear because effects of other cancer-promoting factors such as smoking and drinking habits are too large. However, the ICRP specifies the standards for radiological protection for such low-dose exposures, assuming that they may have some effects as well.

