

Deterministic Effects (Tissue Reactions) and Time Specificity



Period when important organs are formed
= Period requiring careful attention to the use of drugs
= Period when fetuses are vulnerable to radiation



Pre-implantation period
0 to 2 weeks after conception

- Miscarriage

Organogenesis period
2 to 8 weeks after conception

- Dysplasia (malformation)

Early fetal period
8 to 15 weeks after conception

- Mental retardation

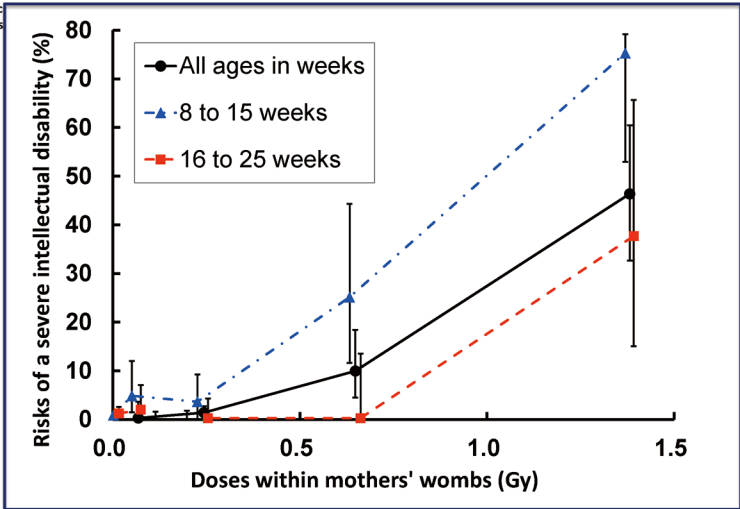
Late fetal period
15 weeks after conception to delivery

The threshold dose is 0.1 Gy or more.

* The time generally considered as two-week pregnancy is equivalent to zero weeks after conception.

Mental Retardation

Data on Atomic Bomb Survivors



Source: Prepared based on "Physical and Mental Development of Children Exposed to Radiation in Their Mothers' Wombs" on the website of the Radiation Effects Research Foundation (https://www.rerf.or.jp/programs/roadmap/health_effects/uteroexp/physment/)

Survey on children born from mothers who were pregnant at the time of the Chernobyl NPS Accident



Survey targets

- (i) **138 children who were exposed to radiation in the womb and their parents**(a group of children exposed to radiation in the womb: exposed group)
- (ii) **122 children in non-contaminated regions in Belarus and their parents**(control group: non-exposed group)

Children's mental development	When aged 6 to 7		When aged 10 to 11	
	(i) Exposed group	(ii) Control group	(i) Exposed group	(ii) Control group
Difficulty in speech	18.1%	8.2%	10.1%	3.3%
Disorder of emotion	20.3%	7.4%	18.1%	7.4%
IQ=70~79	15.9%	5.7%	10.1%	3.3%

- A significant difference in mental development was observed between the exposed group and the control group, but there was no correlation between exposed doses and intelligence quotients. Therefore, the difference was considered to be attributable to social factors associated with forced evacuation.
- There was correlation between parents' extreme anxiety and their children's emotional disorders.



It is considered that radiation exposure during pregnancy does not directly affect intelligence quotients of fetuses and children after growth.

Has the Chernobyl NPS Accident increased malformation?

Comparison of European congenital malformation/twin registry database between before and after the Chernobyl NPS Accident



European Surveillance of Congenital Anomalies (EUROCAT): 18 regions in 9 countries:

No change in incidence of malformations before and after the accident

Finland, Norway, Sweden:

No change in incidence of malformations before and after the accident

Belarus:

Increase in registration of malformations of aborted fetuses regardless of whether from the contaminated areas or not

Possibility of reporter bias* ¹

Ukraine: participated in EUROCAT in this century

Increase in neural tube defects in an isolated Polish community in the Rivne province

It is necessary to evaluate the influences of folate deprivation, alcoholism, consanguineous marriage, etc., in addition to radiation.* ²