

1.Introduction

Following the news of Russia's invasion of Ukraine, tensions are rising that nuclear weapons will actually be used. From my great-grandfather's experience of the atomic bomb attack,I refuse using a nuclear weapon because the radiation of nuclear weapons triggers person not only short term but also, long term damages. Also, it is demonstrated that radiation has a worse influence on future generations. So, it is a very dangerous weapon for us humans. However, when I was working as a high school student peace messenger, I realized that there is an apparent lack of a scientific perspective in the discussion of nuclear abolition. Then, as a peace messenger in Hiroshima, I wanted to carry out peace activities which might bring persuasiveness for the abolition of nuclear weapons by exploring the effect of radiation on the human body from a scientific point of view.

2.Purposes

- (I)To abolish of nuclear weapons,I,as a high school student peace messenger in Hiroshima ,will tell many people about the importance of abolishing of nuclear weapons.
- (II)Investigating the effects of radiation on the human body from the scientific point of view.

3.Projects

(I) My efforts as a high school student peace messenger to abolish nuclear weapons

① Who is a high school student peace messenger?

In the late 1990s, citizens who had concerns about carrying out nuclear tests all over the world sent two high school students to the United Nations Headquarters in New York to appeal to nuclear weapons abolition. This was the beginning of the high school student peace messenger and ,twenty-five years have passed. From the third generation, change the destination to the United Nations European Headquarters (Switzerland:Geneve) where the disarmament conference has been held and the high school student peace messenger visit there every year. Now, there are thirty-one high school active members in the whole country are activating.

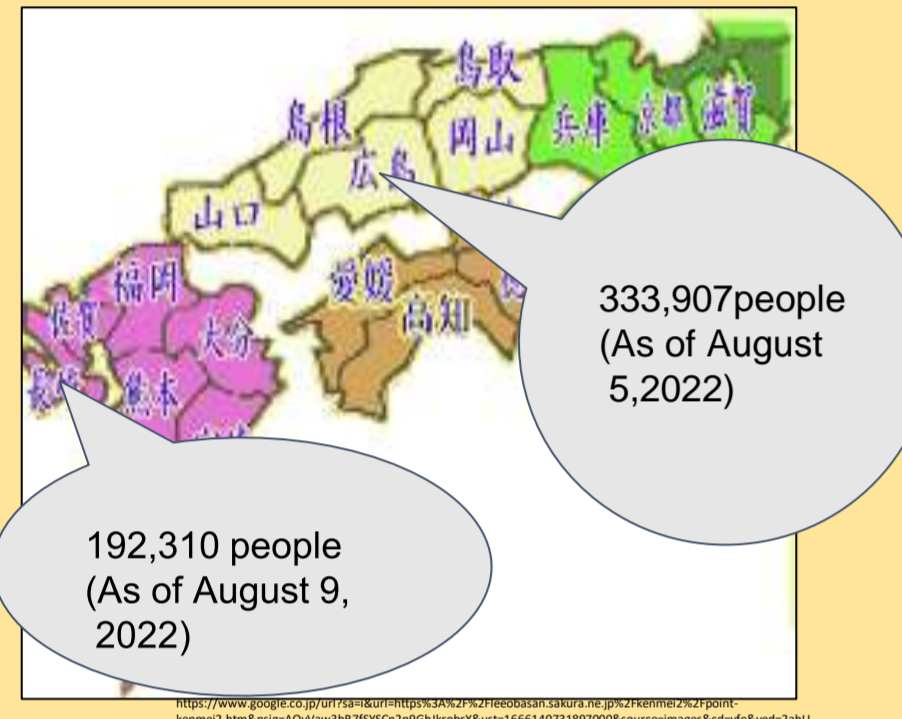


Fig. 1 Deaths number by atomic bombs in Hiroshima and Nagasaki

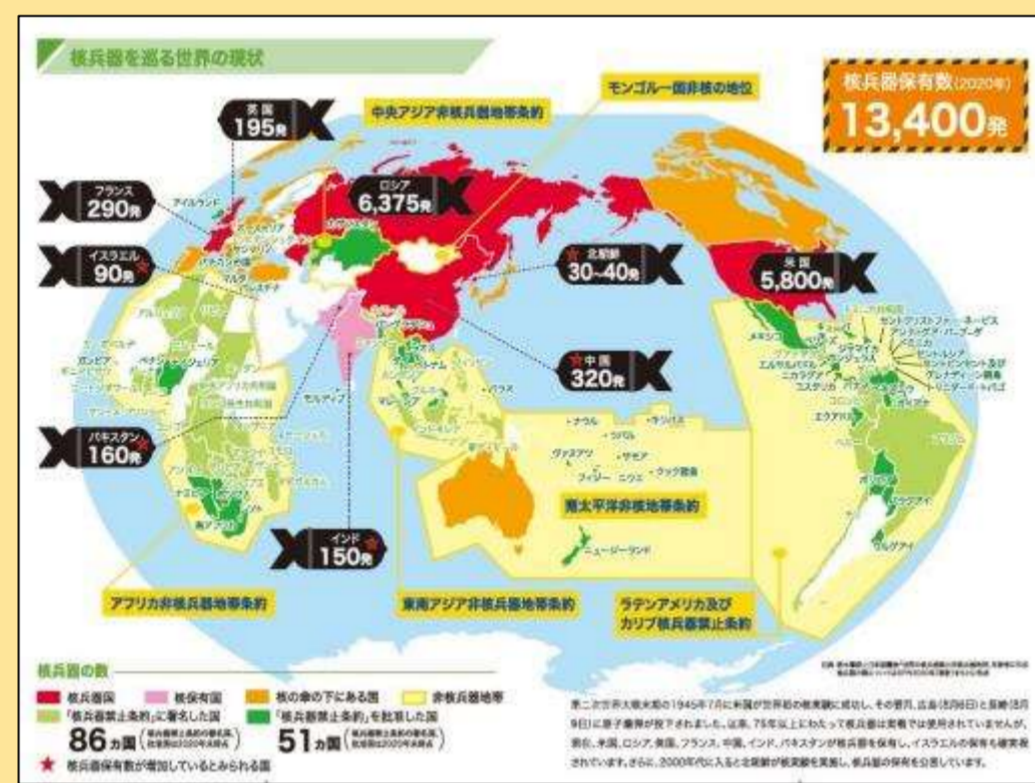


Fig.2 World map showing the number of nuclear weapons in possession(2022)

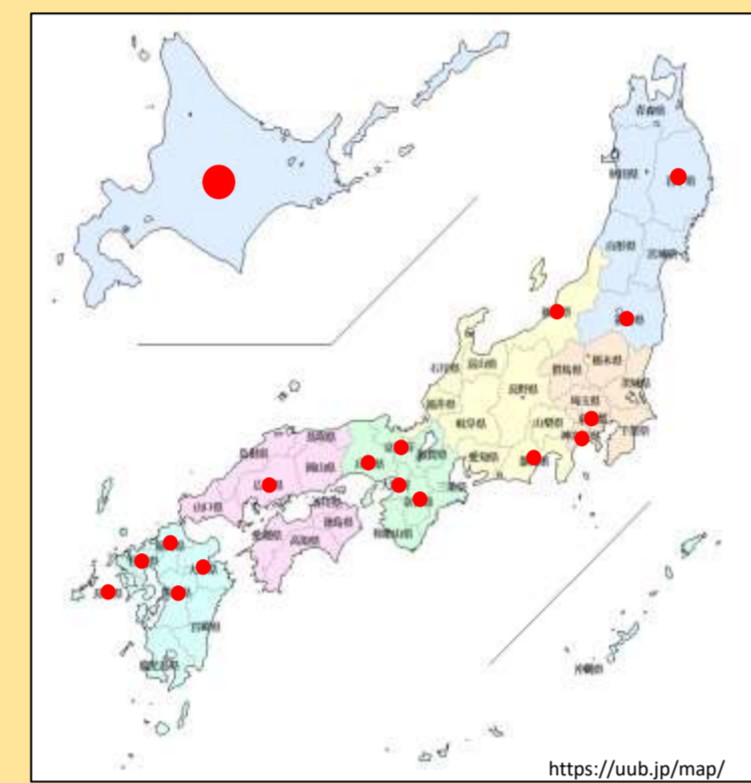


Fig.3 High school students peace messenger (25th)

Table.1 Major peace activities in 2022

Contents	Signature activity	Memorial monument tour guide	Torch of peace	Study in Hiroshima and Nagasaki	tell a my activity
Day	Sunday on a month	Visitore day	7/31	8/4~8/11	10/11·12
Place	Hiroshima Peace memorial Park	Hiroshima Peace memorial Park	Hiroshima Peace memorial Park	In Hiroshima and Nagasaki	institution and schools
Fig	4	5	6	7	8

② Activity content

Signature-collecting campaign

In Hiroshima peace memorial park, we collect signatures for the abolitions of nuclear weapons and realization of a peaceful world. We take collected signatures to the United Nations Headquarter.



Fig.4 Signature activity

Memorial monument tour guide

I made tours at the memorial monument with visitors who came to the Hiroshima peace memorial park. Then, I introduced about monument's background.



Fig.5 Memorial monument tour guide

Torch of peace

First, we heard about the experience of the atomic bomb attack. Second, we walked with torch of peace in Hiroshima peace memorial park. We listened to the word from an atomic bomb victim who said "I want you to do your best without giving up by the day no nuclear weapons in the world and the fire in the peace park vanished".



Fig.6 Torch of peace

Study in Hiroshima and Nagasaki

We joined peace ceremony in Hiroshima and Nagasaki. We also offered flowers and did declaration of our determination as a high school student peace messenger and representatives in Hiroshima. Later, we took a field trip to the remains that conserved at that time's condition, and we learned the damage.



Fig.7 Study in Hiroshima and Nagasaki

Tell my activity

For school trip students who visit Hiroshima and my school students, I told my activity of peace messenger. I could share my thoughts on activities and peace to young people of the same generation inside and outside the prefectures.



Fig.8 Tell my activity

③ Outcomes and future tasks

Through my activities, I was able to render services to increase the number of people who perceive importance of abolishing nuclear weapons for theirself.

However, high school students peace messenger's activities have been acting for 25 years, in the world is, not moving toward the abolition of nuclear weapons. So, I think we have to continue our activities including signature activities. Also, I felt that there was not enough discussions of nuclear abolition from a scientific point of view when we discuss and call for the abolition of nuclear weapons. Therefore, I must learn and inform people about radiation's damages. Then, I think that we must actively learn about world affairs.

4.Research

(II)The influence of radiation on the human body

① What is radiation?

Unsettled atom such as Uranium(U) Radium(Ra) and so on will spontaneously change into stable atom, taking out radiation.

There are some sorts of radiation such as α rays, β rays, γ rays, neutron rays, X rays (Table.2).

Table.2 Kind of radiation[1]

sort	materials	ionization	transmitting power
α rays	atomic uncles of Helium	strong	strong
β rays	electron	medium	medium
γ rays	short electromagnetic of wavelength	weak	strong
neutron rays	a neutron	weak	strong

② Influence which radiation gives cells and DNA

When the human body is exposed to radiation generated outside the body, it is called external exposure, and when it is exposed to radiation generated inside the body, it is called internal exposure. Because the γ rays contained in nuclear weapons have high transmission power, organs in the body suffer radiation hazards even in the case of external exposure [1][2].

The ionization of radiation damages DNA in cells, but cells have the ability to repair DNA. When a certain amount of cells that fail to repair DNA die in a short period of time, tissues with active cell division, such as the skin, are damaged (Fig. 9). When cells repair DNA, incorrect repair can occur (Fig. 10), resulting in mutations in the genetic code of the DNA. Mutations can cause cancer or leukemia years to decades later. Actually, the increase of the probability of cancer and leukemia has actually been reported (Fig.11. 12). This type of effect is called stochastic effect. Studies of A-bomb survivors have shown that the increase in radiation dose and cancer risk is roughly proportional at doses higher than 100 mGy, and that the cancer risk increases at a rate of about 0.47 per Gy, assuming that the probability of the cancer without exposure to radiation to be 1 [3].

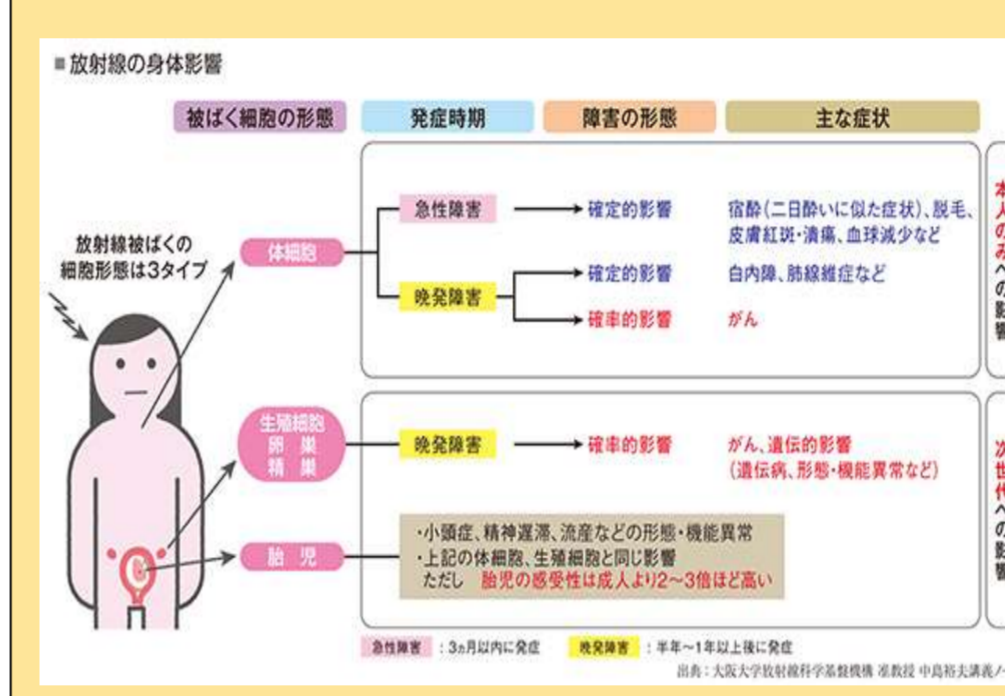


Fig.9 Body effect of radiation

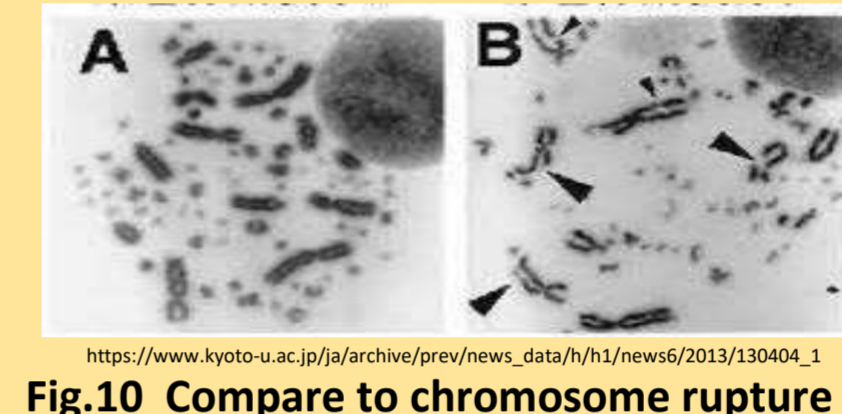


Fig.10 Compare to chromosome rupture

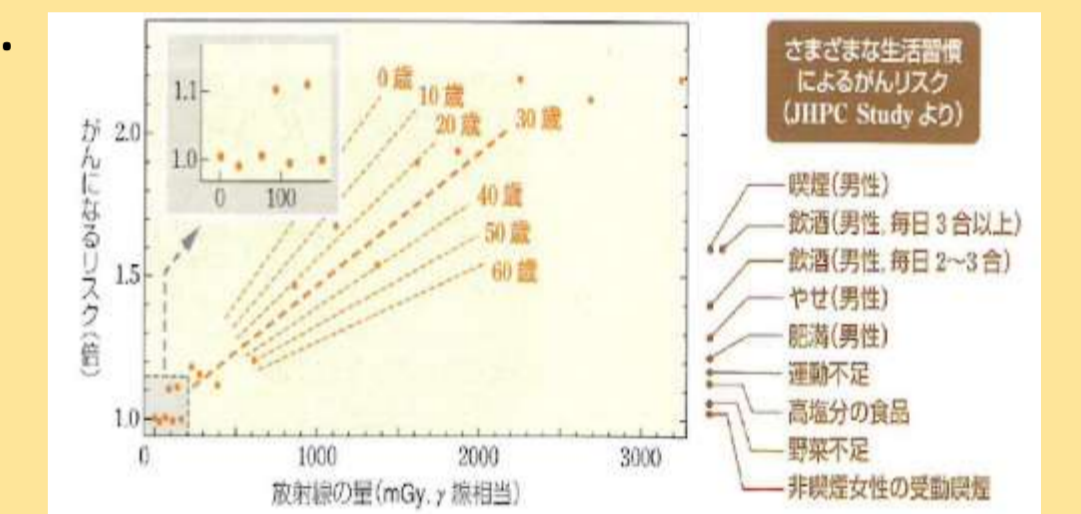


Fig.11 Amount of radiation and ration of probability



Fig.12 Final effect and probability effect



Fig.13 Epidemic by radiation

③ Epidemic caused by radiation

The number of people suffering from breast cancer, stomach cancer, colon cancer, lung cancer, and other cancers begins to increase around 10 years after exposure to radiation. Statistics show that the number of cases of cancer is higher than that of people who are not exposed to radiation, and this is only true for those exposed to 200 millisieverts or more. Normally, 30% of people between the ages of 30 and 70 develop cancer. If one is exposed to 200 millisieverts at the age of 30, the percentage rises to 33%. In the case of 100 millisieverts, the calculated risk is 31.5%. The risk increases with decreasing age of exposure, and the risk is slightly greater for women than for men [4]. Please, review Fig. 13.

Leukemia

The incidence of leukemia began to increase within two years of exposure, with children having several times the incidence for the same age group. The increase in incidence is significant [4].

Atomic bomb microcephaly

This is caused by exposure of the fetus to a large dose of radiation in the early stages of pregnancy. The degree of the disorder varies from person to person [5].

④ Application of radiation to medicine

X ray pphotography

Making use of ability of radiation to transmit through materials, we can see inside of the body, which we can't usually be seen with ordinary light.

Radiation therapy

It is a medical treatment in which radiation is focused on cancer cells to kill malignant cells. Radiotherapy has the positive aspect of being less pain to the patient compared to surgery or chemotherapy, since it can be used regionally without damaging the body [6].

Nuclear medicine studies

After a radioactive isotope is injected or administered internally, the amount of radiation emitted outside the body is measured to determine the distribution of the isotope in which organs and how the isotope is distributed, which will clarify in the diagnosis of diseases [7].

5.Discusion

From my research on the effects of radiation on the human body, I learned once again about the short- and long-term damage caused by radiation from nuclear weapons and the inhumanity of nuclear weapons. Therefore, I realize the importance of continuing to appeal for the abolition of nuclear weapons by spreading the implementation of radiation damage from Hiroshima, where the atomic bomb was dropped for the first time in the world, based on scientific data on the damage caused by radiation. Also, through my activities of peace messenger, I felt that the history of Hiroshima back 77 years ago is fading away due to the aging of Hibakusya. Now, we must reconsider the tragedies of Hiroshima and Nagasaki, and not to repeat them and for no more Hibakusya.

The G7 summit is scheduled to be held in Hiroshima in 2023. I would like to appeal actively for peace and the abolition of nuclear weapons.

On the other hand, radiation has not only bad effects but also good effects in terms of medicine. I will continue to conduct experiments and research to gain correct knowledge of radiation and advocate for the abolition of nuclear weapons. I would also like to utilize the knowledge to save the lives of people suffering from illnesses and help them maintain their health.

6. Future research

Using simulations and other methods, I will clarify the damage caused by the use of nuclear weapons in today's world. I will also clarify the genetic consequences of radiation from nuclear weapons through experiments. I will also promote the abolition of nuclear weapons from a scientific point of view by sharing opinions with people around the world.

7. References

- [1] 國友正明ほか10名(令和4年1月31日発行)『改訂版 物理基礎』数研出版
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