



The Real Effects of Low-dose Radiation

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Controversy about Low-dose Radiation Effects after Fukushima Accident



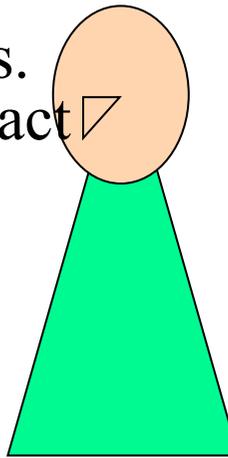
Physicist

Physicists strongly associate radiation with atomic weapons. Therefore they tend to over-react to the existence of minute amounts of radiation.

"Comparing of the risk of low-dose radiation and smoking is unreasonable!"

Knowledge of radiation is poor because lack of initiatives in last 40 years to educate citizens.

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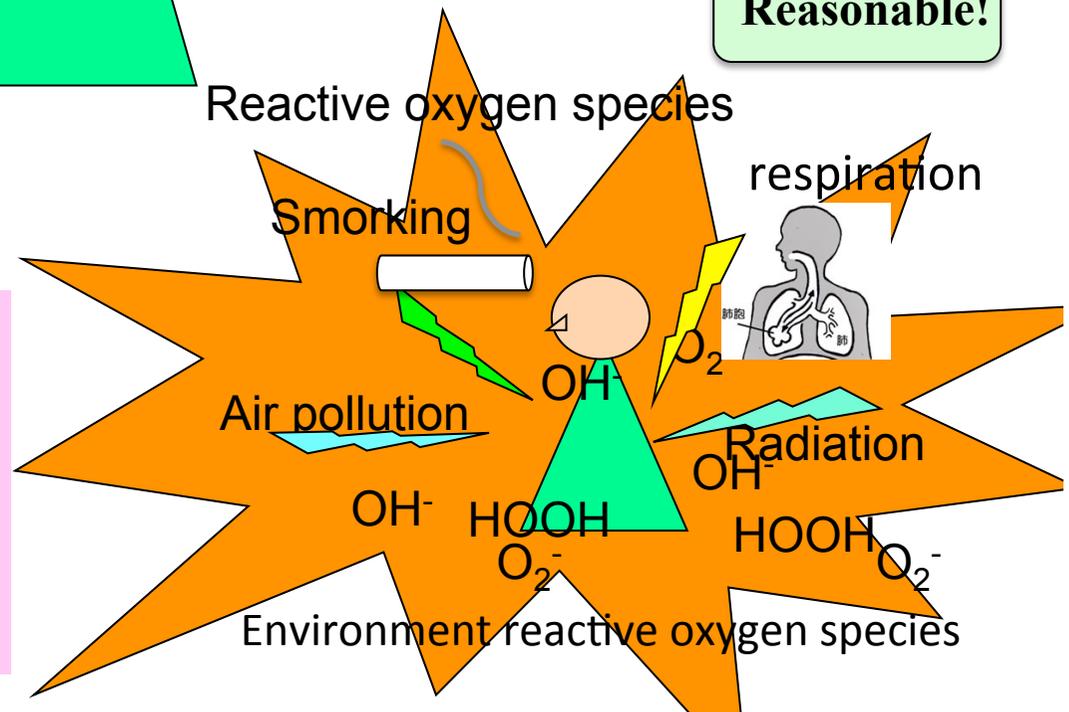


Medical Doctor, Biologist



Medical doctors often use radiation in doses exceeding 50 Sv to treat and cure patients. Healthy cells repair themselves on a daily basis. This repair occurs for damages inflicted from all sources including those from radiation exposure.

Reasonable!



Anxiety Among Fukushima Residents

Primary concern : increasing risk of various cancers

Secondary concern: increasing risk of adult diseases

My Response

1. Understanding the difference between the effects of high and **low dose radiation(<100mSv)** is important.
2. By making lifestyle changes now, can decrease the effects of any radiation exposure, and lead to significant health benefits up to 20 to 30 years in the future.
3. Worrying and giving into despair is more likely to lead to accelerated ageing than any radiation in the environment.
4. Food and water supply have been tested to ensure that any radiation is below acceptable levels and is safe to consume.



Multistep cancer development. Each has its own inhibition/repair system.

Damaged cells don't necessarily turn to cancer, and when they do it takes 20-30 years

Radiation, Smoking, Mutagen,--

Radical scavenger
SOD, GSH

DNA damage

DNA repair

Multi step cancer gene mutation

apoptosis

Activate tumor gene

inflammation

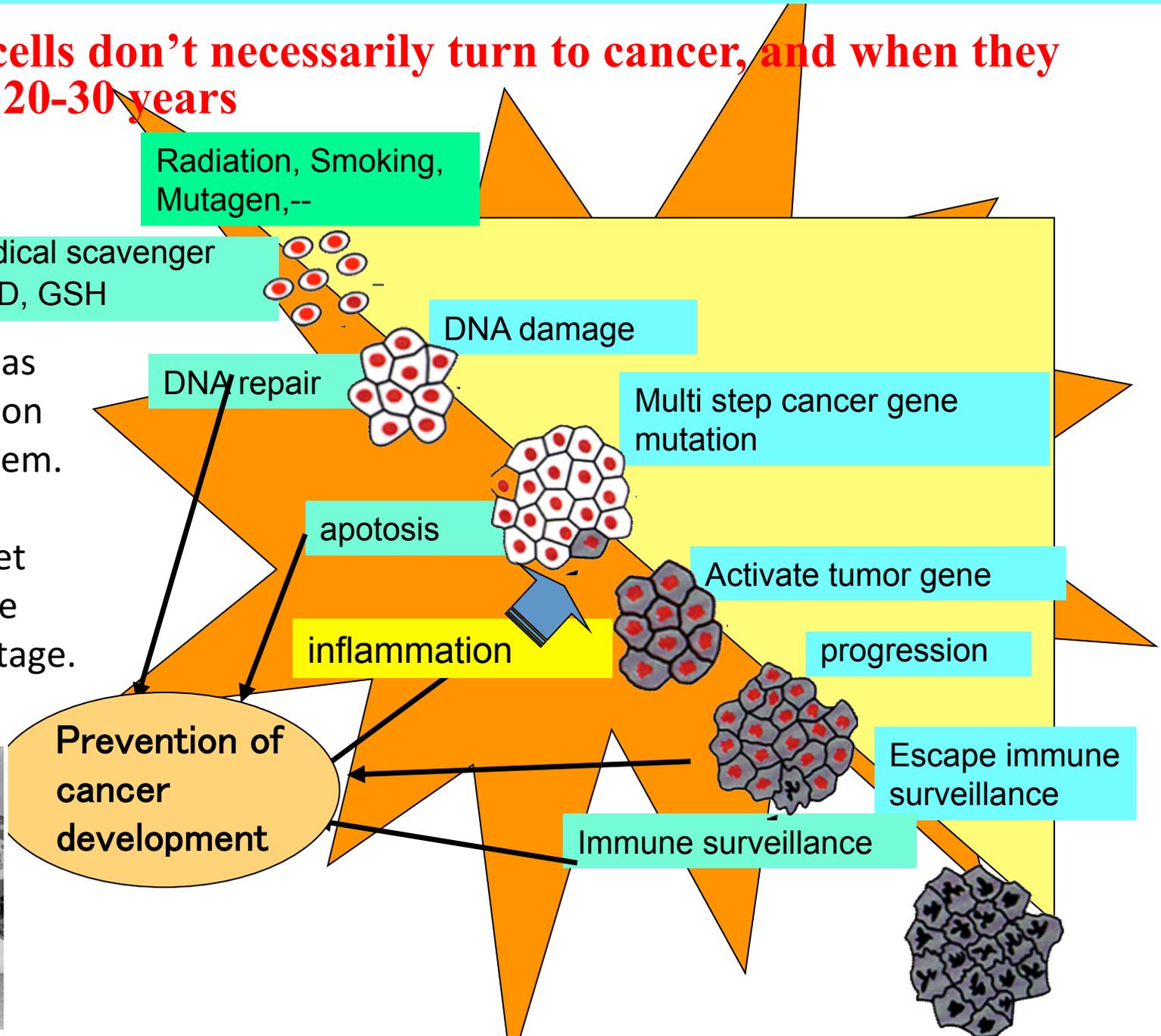
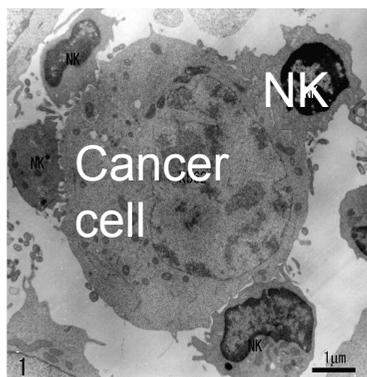
progression

Prevention of cancer development

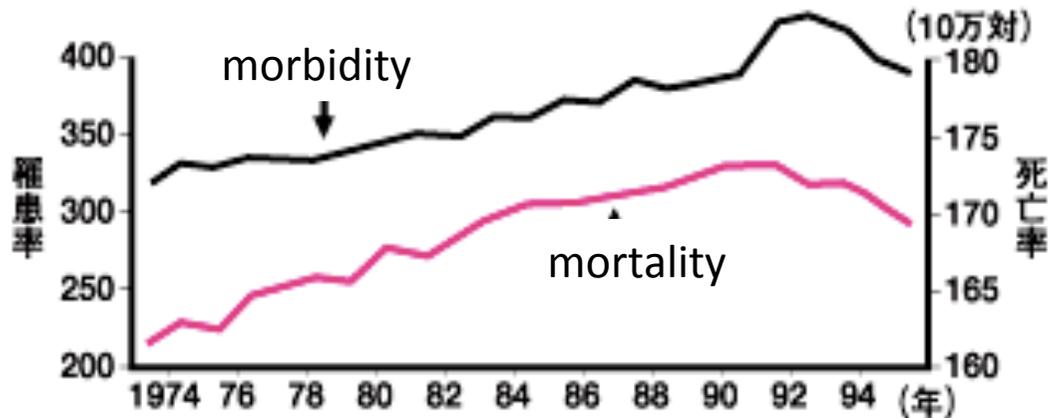
Escape immune surveillance

Immune surveillance

Each process has its own inhibition and repair system. A healthy anti-oxidant rich diet can support the body at each stage.



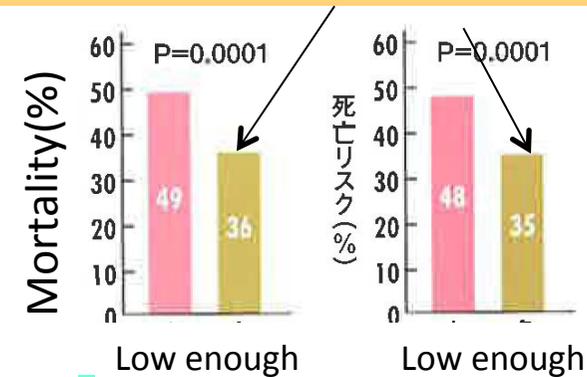
Initiatives in America to increase the consumption anti-cancer foods



(財) 予防医学協会HP (辻一郎東北大学大学院教授) より

Foods & Cancer risk

A-bomb survivors with higher intake of raw vegetables and fresh fruits had lower mortality rates due to cancer.



228人
 広島 色野
 菜の摂取頻度 (多: 毎日摂取、少: 1週間に1回以下) を調査し、1980年以降の20年間の、がんによる死亡者

In the 1990's a dietary reform started in the U.S. The focus of which is to encourage Americans to dramatically improve the way they eat by:

- reducing the intake of foods high in saturated fats, cholesterol, salt and sugar
- eating more fresh fruits and vegetables high in anti-oxidants



A similar dietary regimen for Fukushima residents will do more to improve their ability to stay cancer-free and adult diseases-free life than most other methods.



+low salt food and no smoking

Difference between

Fukushima

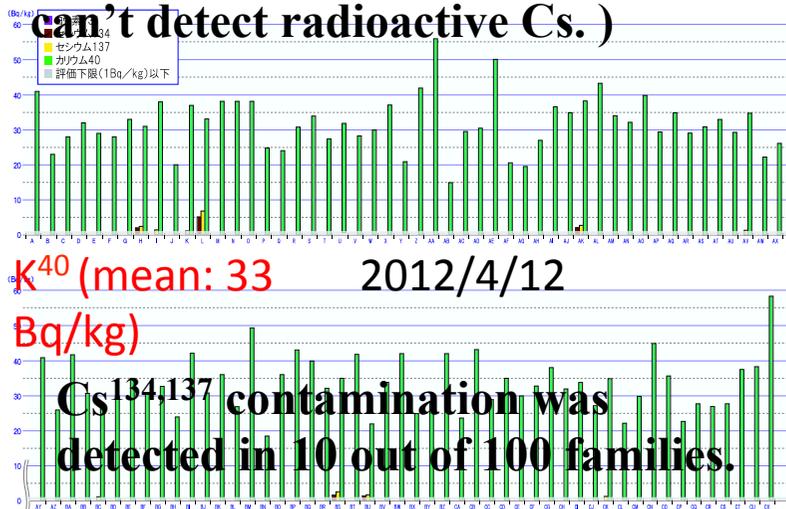
Maximum thyroid dose in Fukushima evacuees (<33 mSv)

Fukushima milk production was stopped.

The Japanese diet is high in seaweed, so iodine deficiency is not common

Transfer of radioactive Cs to food was lower than expected. (Fukushima soil is mostly clay)

Internal radioactive contamination in adults and children are not serious whole body counter tests. (In 2013, almost of subjects can't detect radioactive Cs.)



Chernobyl

The mean thyroid dose for residents in Chernobyl(50-2000mSv)

Chernobyl residents consumed cow's milk contaminated with radioactive substance

Many children in Chernobyl were iodine-deficient

Even now, foods contaminated with Cs are still being detected. (Chernobyl is mostly sandy)

Most of food in Fukushima passed strict test standard.

10^7 of rice testing positive was 70 in 2012 and 0 in 2014



Fukushima will not become a catastrophe like Chernobyl.

A comprehensive risk evaluation

Cause	Cancer risk
2000mSv	1.6
Smoking	
Excessive Alcohol	
1000–2000mSv	1.4
Under weight	
Alcohol(360ml/d)	1.29
Obesity	1.22
Lack of exercise	1.15–1.19
200–500mSv	1.16
High salt diet	1.11–1.15
100–200mSv	1.08
Deficiency of vegetable	1.06
Secpnd haand smoke	1.02–1.03

Obesity, lack of exercise, bad diet and stress are more likely to increase the risks of cancer than the amount of radiation that is currently present in the evacuated zones in Fukushima

Changing the focus from radiation exposure to critical lifestyle and other factors that may increase the risk of cancer is a more effective way of reducing or managing any relative risks.

A comprehensive risk evaluation that looks beyond radiation effects is required!

Failure of Safety Dogma in Japan

To learn from living things about multifaceted protective mechanisms

Failure of crisis communication

Education program about radiation are required

Accidents will happen in the best regulated families

Failure of consideration to vulnerable people

High mortality, due to initial evacuation, suggests that evacuating the elderly was not the best life-saving.

Careful consideration of the relative risks of radiation exposure and the risks and benefits of evacuation is essential

Areas with atomic power plants should always be prepared for a crisis.

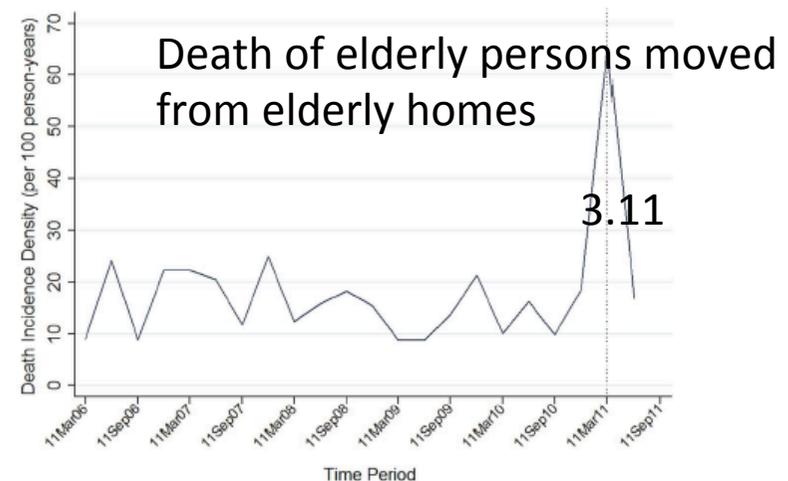


Figure 1. Time series trend of death in elderly homes. Dotted line indicates the time of the earthquake (11/3/11). doi:10.1371/journal.pone.0060192.g001