Current status of Misasa Radon Study

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Misasa hot springs

Misasa hot springs have been known well in Japan for more than 800 years. The water of hot springs contains much radon, usually about 500 Bq/L. Misasa hot springs are believed to stimulate the body's healing mechanism and to enhance immunity.

Examples of water analysis

Hot springs	Water Temperature ◦C	Rn-222 Bq/L	Ra-226 mBq/L	U-238 mBq/L
Misasa Medical Center (for sauna)	57	770±30	6.1±0.4	10.0±1.8
Misasa Medical Center (for drinking)	49	500±20	8.5±1.3	0.5±0.6
No.5 (municipally owned)	46	160±0.24	3.5±0.7	30.3±3.9
No.4 (municipally owned)	63	500±0.81	374.3±22.8	11.5±1.9
New No.1 (municipally owned)	70	310±0.56	627.4±38.0	2.4±0.7
Water Station	67	270±0.77	352.8±21.5	3.2±1.0
Kabu-yu (First spring in a legend)	38	190±0.51	47.0±3.2	2.4±0.7

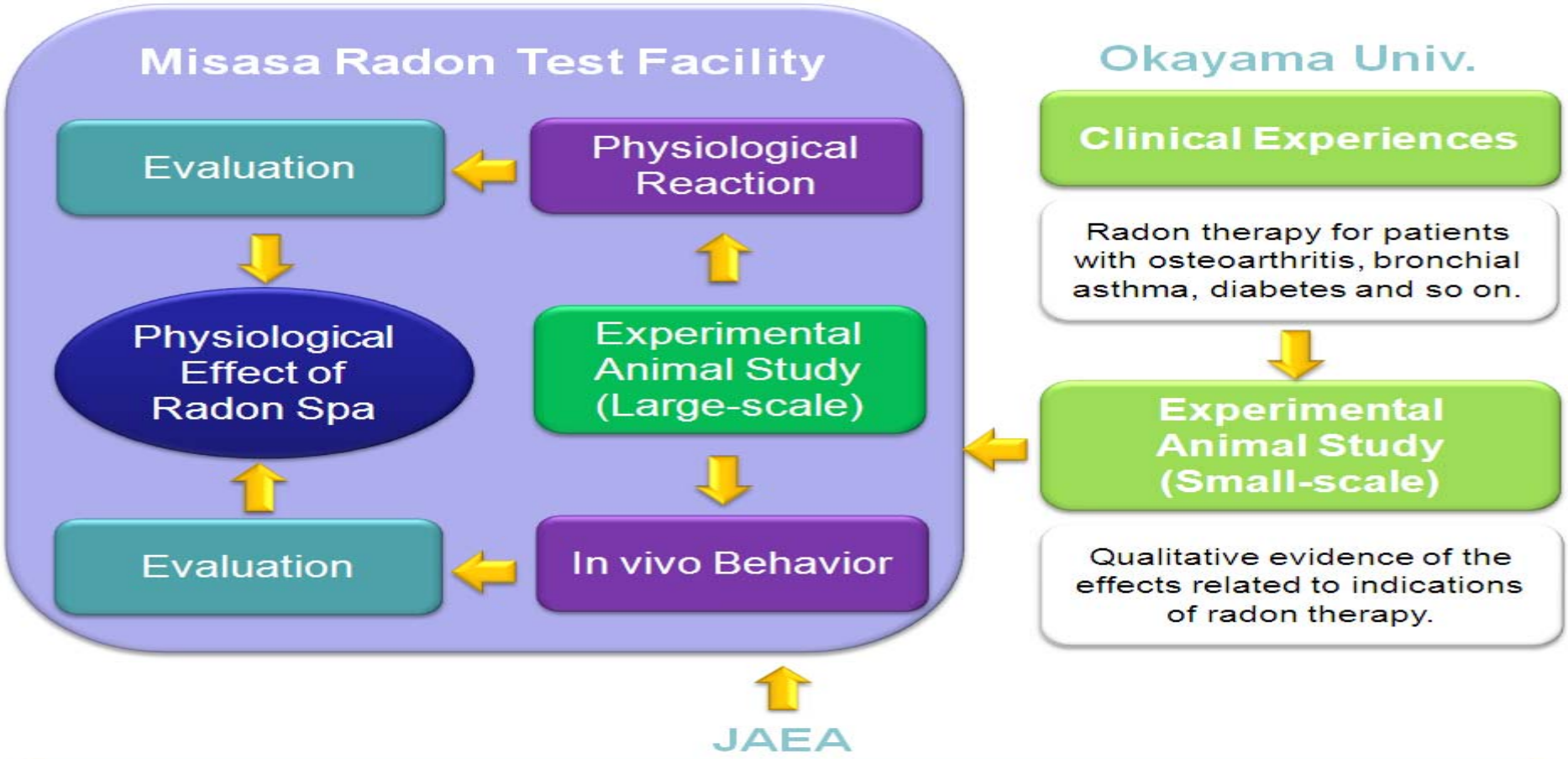
Introduction

So far, clinical experiences and some experimental animal studies provided qualitatively evidence of the effects related to indications of radon therapy employing cave or hot springs.

However, how much the physiological reaction affects personal health is not clear quantitatively yet.

Thus, the Japan Atomic Energy Agency and Okayama University started the experimental animal study and its related studies in 2007 in order to examine the physiological effects of radon (^{222}Rn) and its progeny in detail. The first target of this study is to examine the in vivo behavior of radon gas and its effects.

Study approach



Refs.(1)&(2)

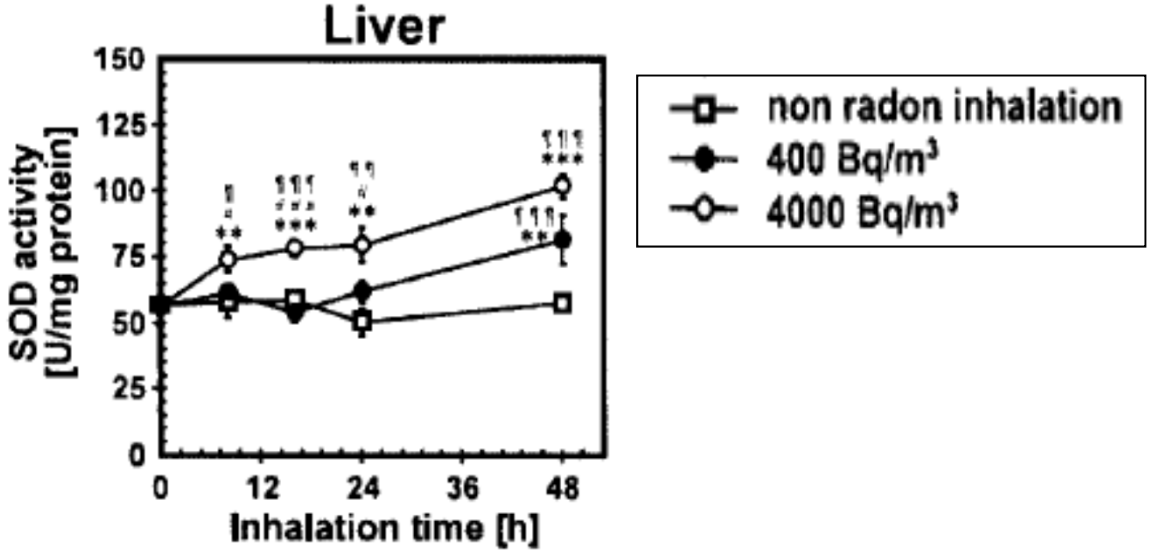
Radon test facility

This is a facility developed for radon inhalation experiments with small animals, and is the first large-scale facility of its kind in Japan.

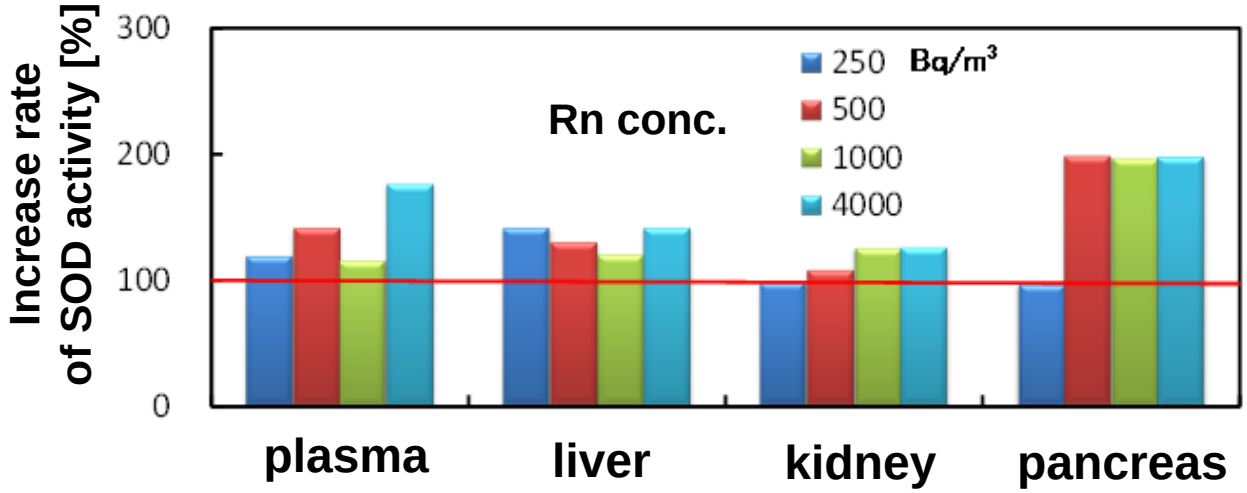
The facility has a capability to conduct approximately 150 mouse-scale tests at the same time. The apparatus for exposing small animals to radon has six animal chamber groups with five independent cages each. Different radon concentrations in each animal chamber group are available.

Refs.(3),(4)&(5)

Examples of study results



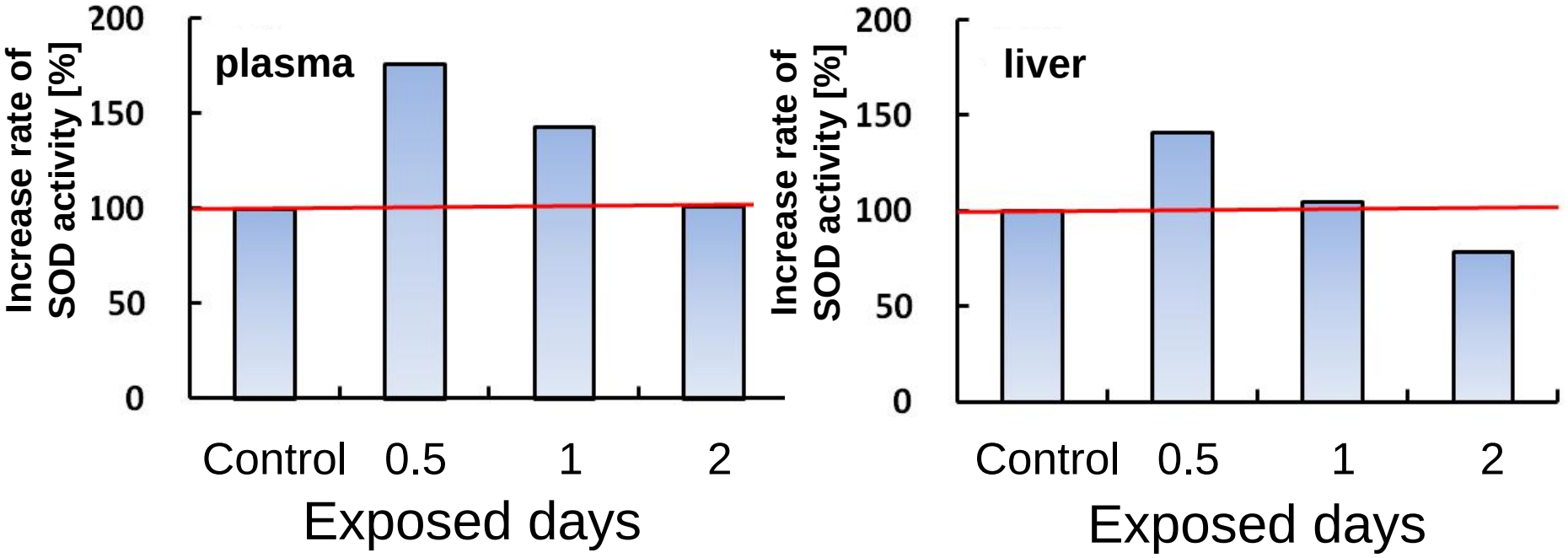
Radon inhalation activates anti-oxidation functions in some organs in mice.



The anti-oxidation functions activated by radon depend on organs.

Examples of study results

Higher activation of the anti-oxidation functions appears in higher radon concentration when the time-integrated radon concentrations are same levels.

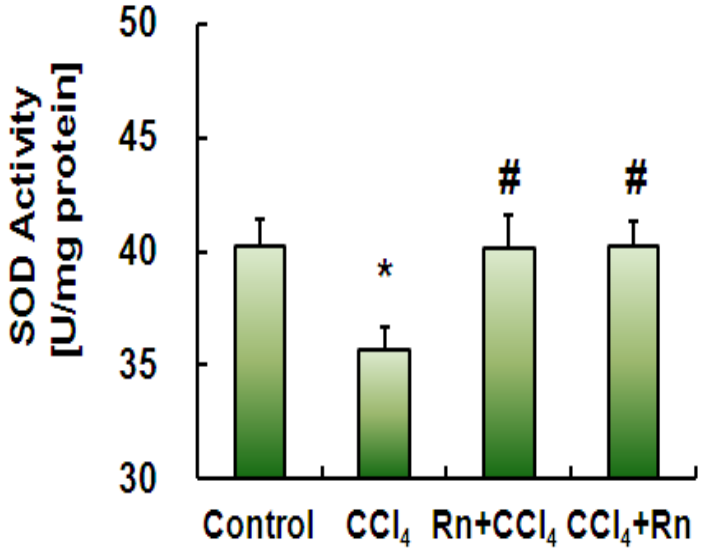


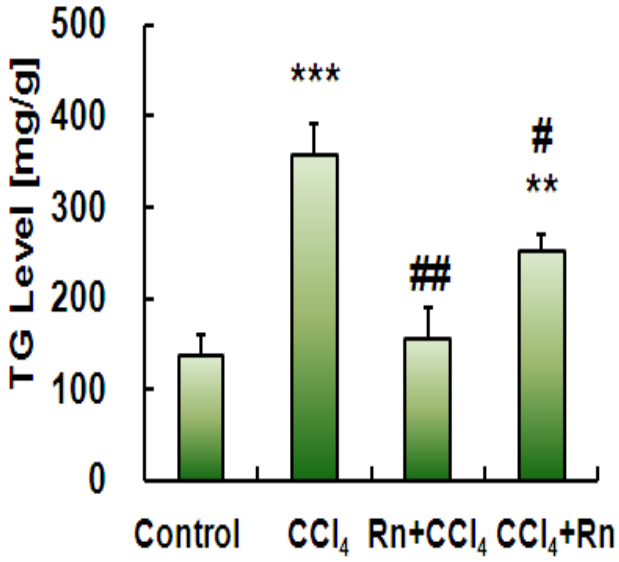
Examples of changes in increase rate of the SOD activity in mice tissues following exposure to 2000 Bq/m^3 day of integrated radon concentration.

Refs.(5)&(6)

Examples of study results

Radon inhalation inhibits alcohol-induced oxidative injury in mice liver.



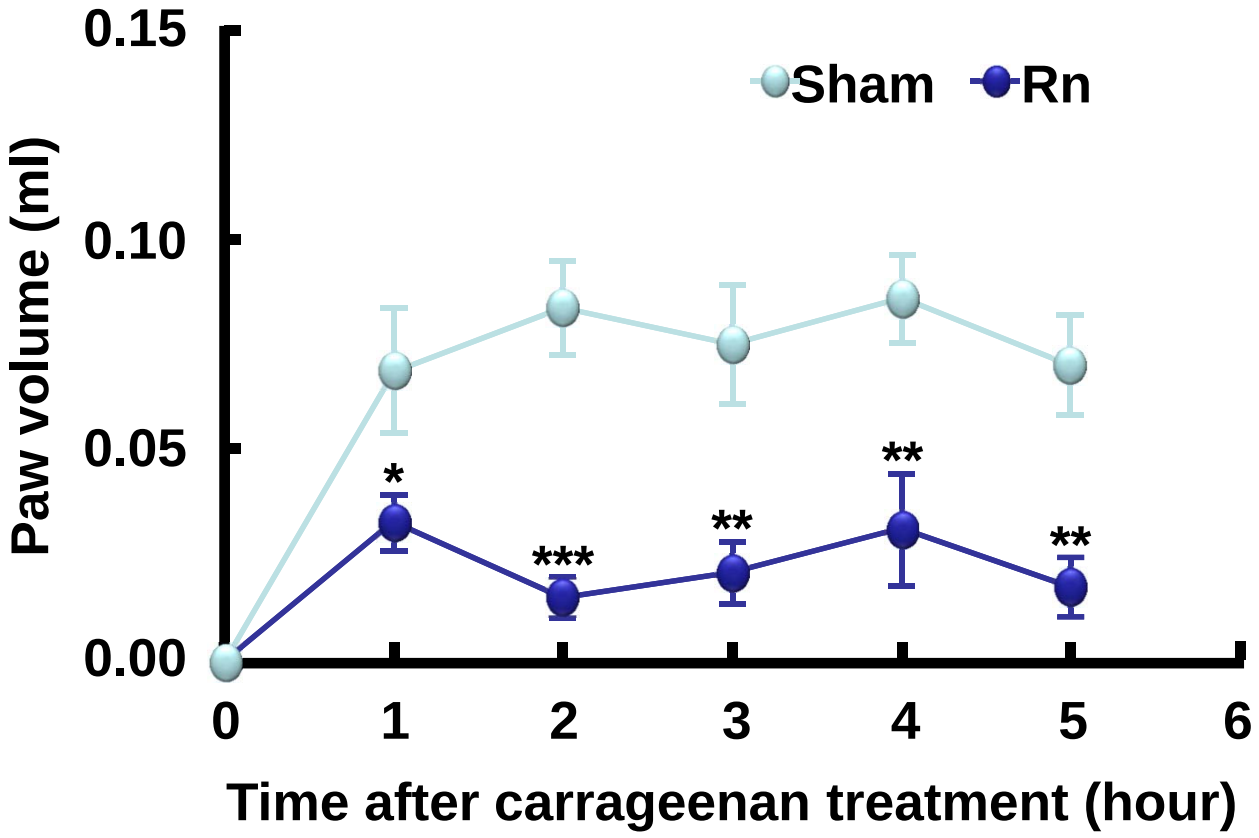


Radon inhalation also inhibits CCl_4-induced oxidative injury in mice liver. Preventive radon inhalation may be more effective.

Ref.(7)

Examples of study results

Radon inhalation inhibits carrageenan-induced paw edema



*p<0.05; **p<0.01; ***p<0.001 vs sham.

Conclusion

The adequate activation by radon inhalation expect to contribute to preventing or reducing ROS-related injuries and diseases, which are thought to involve peroxidation.

For high risk groups such as patients with such injuries or diseases, radon may lower their risk as a whole even if considering lung cancer risk.

References

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