Expression γ-H2AX in Medical Radiation Workers And Resident that Living in High Background Natural Radiation Area

Iin Kurnia
Center for Technology of Radiation Safety and Metrology, National Nuclear Energy Agency,
Jl. Lebak Bulus Raya No. 49, Jakarta Indonesia

Problem

Currently a huge number of professional and technical personnel in medicine, dentistry, and veterinary medicine are exposed to radiation while administering various radiologic procedures such as diagnostic, therapeutic, interventional, and nuclear medicine. Indonesia also has a region with high natural ionizing radiation. Mamuju, a village in the state of West Sulawesi in the Sulawesi Sea, has a background radiation around 13 times higher than normal.

Propose and Solution

An important effect of radiation exposure is the formation of DNA double-strand breaks (DSBs), considered to be one of the most damaging DNA lesions. DSBs can be identified and quantified in situ by detecting the γ-H2AX foci that formed around DNA break sites utilizing immunoflouresence staning techniques.
Proposed : these immersion to know how to detect and analysis γ -H2AX sites utilizing immunoflouresence staining techniques.

Picture

Fig 1. Immersion in England 2014 and Germany 2016

Background Research

DNA double-strand breaks (DSBs) are one of the most critical events affecting DNA when a cell or an organism is exposed to ionizing radiation, chemical or environmental stress. If not adequately repaired, DSBs can have severe consequences on, cellular senescence cells leading to cell death or the induction of genomic instability, genomic rearrangements which in turn may trigger carcinogenesis

Design

In medical workers sample , Cross Sectionally collecting the blood sample from workers that consist medical radiation workers and administrative workes (control) from several hospital in Indonesia, and resident that grouped exposed that living in high back ground area controls from the resident that living in low back ground area that boths in Mamuju.

Materials and Method

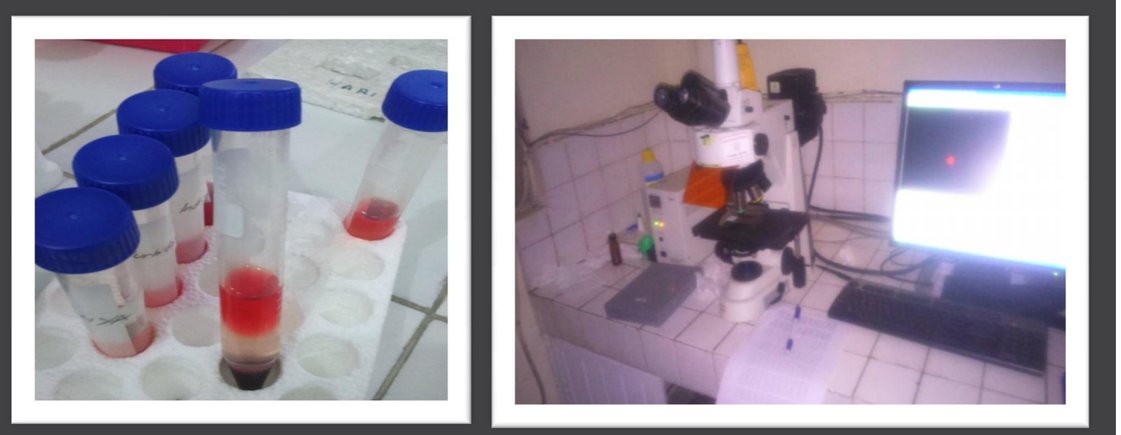

Fig 2.Immunoflouresense staining of γ-H2AX from medical worker and the resident that living in high back ground natural radiation area .

Data

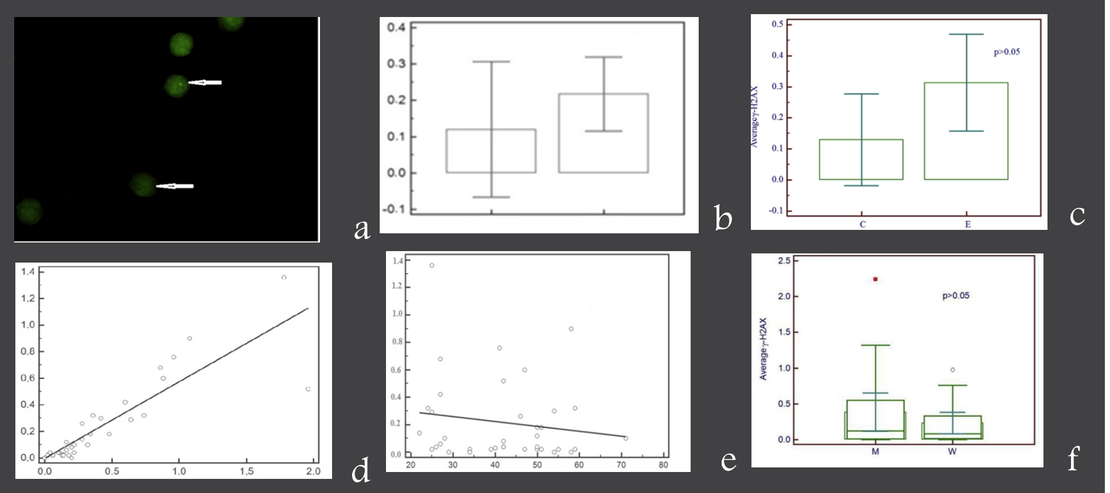

Fig 3.Expression of γ-H2AX (a), in control and worker (b), exposed and control (c), correllated to 53BP1(d), age in worker (e) and resident(e)

Result and Interpretation

Expression of γ-H2AX can be used as biomarker of DNA DSB damage both medical radiation workers and the resident that living in high background natural radiation area. This biomarer expression shows the presence and repair process of DNA DSB damage. In the resident that living in exposed area show any repair process of DNA DSB damage tend higher than control area., its phenomena was thought related to the adaptive response in the resident that living in exposed area. Potention of DNA DSB damage/repair from workers and control was not different. Both in the workers and ther resident that living in exposed area the potential of DNA DSB damage were not show releted to the age and gender of volunteers .

Conclusion

Different to workers, the resident show any potention of adaptive response to natural radiation exposure

References

1. Radiation Environment and Medicine 2019 Vol.8, No.2: 70–76.
2. Journal of Environmental Radioactivity 171 (2017) 212-216
3. Atom Indonesia. 2019; Vol 45 No 2:103-108.