



SEVERE HEREDITARY STOCHASTIC EFFECTS FROM IONIZING RADIATIONS

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Introduction: Hereditary health risk assessments in medical radiation workers must be accentuated as a precaution against genetic diseases.

We evaluated the lifetime risk of severe hereditary stochastic (SHS) effects in INMOL's medical radiation personnel. Low-level chronic exposure from ionizing radiation (IR) is considered potentially harmful as confirmed by epidemiological studies by the calculation of probabilities of causation and risk co-efficient for cancer or hereditary effects [1].

Ionizing radiations are known to induce hereditary radiation effects by impacting gonads. They can damage the genetic material by mutations and that can induce genetic diseases [2].

Materials and Methods:

The annual average effective doses (AAEDs) were assessed in from Nuclear Medicine (NM), Radiotherapy (RT) and Diagnostic Radiology (DR) departments were monitored through TLD dosimetry reader.

A software 'RadLab' was used to record the measured doses both in soft and hard copies. The determination of the 'whole-body' effective doses was performed by 'dose assessment algorithm'.

We adopted the procedure described by ICRP (Publication 60) and complied by UNSCEAR for the assessment of lifetime severe hereditary annual risks from radiation exposed dose by using 'nominal probability coefficient' for stochastic effects. [4].

Results:

These exposures are well below the annual dose limit. The risks of severe hereditary effects were also decreased from 2014-2018. The SHS risk was decreased from 5.012×10^{-4} to 3.948×10^{-4} in NM, 4.004×10^{-4} to 2.996×10^{-4} in RT and 4.76×10^{-4} to 3.388×10^{-4} in DR department.

The risk of SHS was higher (5.012×10^{-4}) in NM workers in 2014, however, which has been minimized (4.032×10^{-4}) in 2018. The risk was minimum in RT workers in 2018 (2.996×10^{-4}).

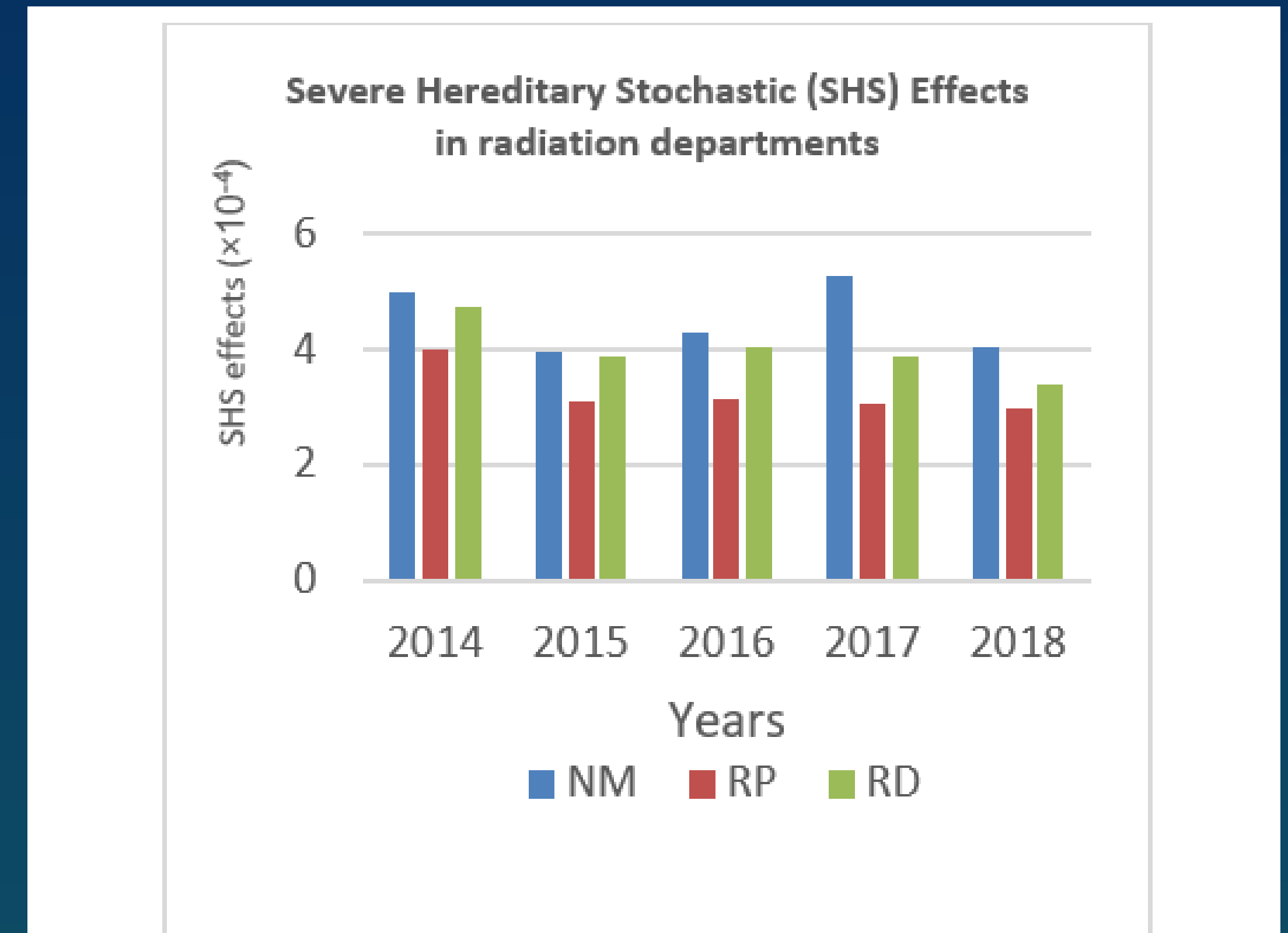


Fig. 1. Comparison of SHS in all departments (NM, RT, DR) from 2014 to 2018

Conclusions: There is still no potential stochastic study available to affirm the hereditary health risks from the long term exposure in existing radiation workers.

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These estimated SHS risks were quite low as compared to risk of deaths from other different causes e.g., 9×10^{-3} (in France), 9×10^{-3} (in USA) and 8×10^{-3} (in Japan) [4].

This study emphasizes to evaluate the risks of hereditary effects from chronic exposure of radiations in occupational workers to avoid further late genetic complications.

There is a need to devise a robust technique of an early diagnosis of any developmental hereditary genetic disease in occupational radiation personnel.

References

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