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Effect of High Dose Natural Ionizing Radiation on the Immune System of the Exposed Residents of Ramsar Town, Iran

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Abstract:

Iran is one of several countries that has regions of high dose natural ionizing radiation. Two wellknown villages in the suburb of Ramsar Town in the Caspian Sea strip, Taleshmahaleh and Chaparsar, have background radiation that is 13 times higher than normal. This radiation is the result of Radium 226 and Radon gas both of which are highly water soluble.

While people living in these regions do not suffer from any major health problems, we decided to study the their immune responses to infection and inflammation in order to determine if their habitat affects their immune defense mechanisms as a way of compensating for their exposure to high dose environmental ionizing radiation. Our results showed that the total serum antioxidant level in the exposed people was significantly lower than the individuals not exposed to high dose natural ionizing radiation. The exposed individuals also had higher lymphocyte-induced IL-4 and IL-10 production, and lower IL-2 and IFN- γ production. In addition, neutrophil NBT, phagocytosis, and locomotion were higher in the exposed group. In contrast, lymphocyte proliferation in response to PHA was unaffected.

We conclude that the immune system of individuals exposed to high dose ionizing radiation has adapted to its environment by shifting from a Type 1 to a Type 2 response to promote antiinflammation.

This may be because inflammatory Type 1 responses generate more free radicals than

Type 2 responses, in addition to the free radicals generated as a result of high environmental radiation.

Thus, the serum total antioxidant level in the exposed residents was lower than the unexposed group.

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[Ionizing radiation](#)

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