Radiation countermeasures for acute radiation syndrome: an update

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Abstract: Exposures to ionizing radiation, whether they are intended or unintended, are currently an undeniable reality and carry potentially catastrophic health consequences. Therefore, medical preparedness and countermeasures are critical security issues, not only for the individual, but for the nation as a whole. Acute radiation exposure induces apoptosis of hematopoietic, digestive, cutaneous, cardiovascular, and nervous system tissues; extensive apoptosis ultimately leads to acute radiation syndrome (ARS). Significant scientific advances have been made over the last six decades toward the development of a safe, non-toxic and effective radiation/medical countermeasure (MCM) for ARS. However, to date, only one radiomitigator, granulocyte colony-stimulating factor, has received the United States Food and Drug Administration (US FDA) approval for countering hematopoietic-ARS.

A MCM capable of protecting the population at large from the effects of lethal radiation exposure remains a significant unmet need of the US citizenry, and has been recognized as a high priority by the government. A number of promising radiation countermeasures are currently under development, seven of which have received US FDA investigational new drug status for clinical investigation: CBLB502/Entolimod, HemaMax/NMIL12-1 (recombinant human interleukin-12: rHuIL-12), ON01210/Ex-RAD/Recilisib, BDP/OrbeShield, BIO 300 (Genistein), myeloid progenitors, and 5-Androstenediol (5-AED)/Neumune. Four of these agents, CBLB502, Ex-RAD, HemaMax, and OrbeShield, are progressing with large animal studies and clinical trials. Ongoing studies suggest that a few of these agents are progressing well along the US FDA approval pathway.