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Mini Review

The Impact of Radioactive Contamination on Infectious Disease Dynamics in Animals, Marine Life, and Humans

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ABSTRACT

Infectious disease-chemical pollution interactions are well-known and recognised as key variables in controlling how wild animals react to pollutant exposure. However, although commonly occurring in conjunction with chemical pollution, the influence of ionising radiation and radio nuclides on host-pathogen interactions in contaminated environments has been ignored. Nonetheless, there is a large body of literature on host-pathogen interactions under radiation exposure from laboratory and field investigations, and with a renewed interest in radioecology growing, an assessment of infectious disease dynamics under these settings would be appropriate. In laboratory studies, the impact of external ionising radiation and radio nuclides on animal hosts and pathogens (viruses, bacteria, protozoa's, helmets, and arthropods) is assessed, and data from field studies, including the large number of investigations conducted after the Chernobyl disaster, is compiled. It is clear that radiation has a significant impact on the host-pathogen interaction. Although damage to the host immune system is a key component, other factors such as damage to host tissue barriers and pathogen viability inhibition also play a role in parasite illness frequency and intensity. The development of host-pathogen relationships in radioactively polluted areas is complicated, according to field research, with a range of biotic and abiotic variables impacting both pathogen and host, resulting in alterations in infectious disease dynamics.

INTRODUCTION

Human activities produce a rise in natural radiation levels, which is referred to as radioactive pollution. Human activities are thought to be responsible for around 20% of the radiation we are exposed to this activities involve radioactive materials, such as mining, handling and processing radioactive materials, and handling and storage of radioactive waste, are examples of human activities that can release radiation as well as the use of radiation in medical (e.g. X-rays) and research, as well as the use of radioactive reactions to generate electricity (nuclear power plants). But what about microwave ovens, cell phones, radio transmitters, wireless gadgets, computers, and other everyday items?

The term "radioactivity" refers to the breakdown of atoms. The number of protons in the nucleus can be used to describe an atom. Some natural elements are prone to deterioration. As a result, their nuclei decay or dissolve, releasing energy in the form of radiation. Radioactivity is a physical phenomena, and radioactive atoms are known as nuclei.

Natural radiation, both from within and beyond the planet, has always been a part of man's life. Cosmic radiation, often known as cosmic rays, is the radiation we get from space. Man-made radiation, such as X-rays and radiation used to detect ailments and treat cancer, also exposes humans. Man is also exposed to radiation through fallout from nuclear explosives testing and small quantities of radioactive elements released into the environment by coal and nuclear power plants. Nuclear Radiation: Causes, Effects, and Solutions Radioactive pollution occurs when radioactive elements are present in the atmosphere or environment, especially when their presence is unintentional and poses a risk to the ecosystem owing to radioactive decay.

Radioecology is a specialised discipline of environmental research that is unique. Radio ecologists, on the other hand, could be far more aware of the parallels and distinctions between their discipline and other fields of pollution science. Exposure and risk assessment, as well as the problem of bioavailability of potentially harmful chemicals in environmental media, are discussed here. Radiometric and radio ecological modelling tools, it is argued, can much aid in understanding and quantifying both of these concerns. The presence of various pollutants in many areas around the world necessitates an integrated approach to evaluation and remediation, involving a collaboration of scientific disciplines. Molluscs are

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essential commercially and ecologically in aquatic habitats.

Disease can have significant consequences on marine molluscs, their ecological connections, and ecosystem services at spatial dimensions ranging from centimetres to thousands of kilometres and durations spanning from hours to years, according to an increasing number of case studies. The cascading indirect consequences of parasite infection of molluscs can often reach considerably beyond the temporal and spatial scales at which the sickness affects the molluscs. Because: [1] expanding aquaculture; [2] current and future climate change; [3] movement of non-native species; and [4] coastal development are modifying molluscan disease dynamics, resulting in complex relationships between diseases and cultivated and natural molluscan populations, understanding molluscan host-parasite dynamics is becoming increasingly important.

Invertebrate model systems for environmental monitoring and toxicity are aquatic molluscs. They are, however, susceptible to a wide range of viral illnesses that can have major consequences on host ecology and physiology, making them a natural source of stress for populations. Anthropogenic activities, particularly those involving chemical contaminants that damage the environment, can have an impact on the ecological and physiological aspects of molluscs. Pollution and viruses, when combined, pose a major threat to the health of aquatic populations, which is becoming more widely recognised. The current study looks at how hazardous contaminants interact with viral, bacterial, protozoan, and trematode diseases in aquatic molluscs.

The current study looks at how hazardous contaminants interact with viral, bacterial, protozoan, and trematode diseases in aquatic molluscs. The effects of pollution on other, less well-studied infectious illnesses, as well as the differences in pathogen and pollution responses across wild and farmed molluscan populations, are also taken into account. The thymus showed the most signs of cellular damage in the lymphoid organs. Trout sensitivity to infections was reduced (viral haemorrhagic septicaemia or elevated when lymphoid cells were removed from immunocompetent organs. Radiation has an age-dependent suppressive impact. The use of irradiation to detect asymptomatic carrier fish seems to be a reliable method.

The Chernobyl Effect

On April 25 and 26, 1986, the greatest nuclear disaster in history occurred when a reactor at a nuclear power station exploded and burned in what is now northern Ukraine. The episode, which was shrouded in secrecy, was a watershed moment in both the Cold War and nuclear power history. Scientists believe that the zone around the defunct factory would be uninhabitable for up to 20,000 years after more than 30 years. The accident occurred in Chernobyl, in the former Soviet Union, which invested substantially in nuclear power after WWII. Soviet scientists began installing four RBMK nuclear reactors at the power station, which is now located just south of Ukraine's border with Belarus, in 1977. The fourth reactor of the V.I. Lenin Nuclear Power Station was scheduled for routine maintenance on April 25, 1986, and workers planned to use the downtime to see if the reactor could still be cooled if the station lost power. During the test, however, personnel disobeyed safety regulations, and the plant's electricity surged.

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