

Pediatric Neurological Disorder and Present Nuclear Detonation: A Hot Issue

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Abstract-

It is no doubt for the health effect of the radiation from the nuclear detonation from the destroyed nuclear power plant. Due to the present crisis in Japan, the public health concern on this issue should be raised. In pediatric neurology, there are some interesting reports on pediatric neurological disorder and its relationship to leaked radiation. In this specific brief article, the author hereby discusses on the nuclear detonation and pediatric neurological disorder. Although there are some reports on the increased incidence of some pediatric neurological malignancies and congenital neurological anomalies there is no confirmed evidence. Effect on cognitive function is still controversial. The induction of abnormal electroencephalography is also mentioned. The observation on the effect of present crisis in pediatric neurology can provide more information and help better understand this topic.

Key Words: nuclear, detonation, pediatric, neurology

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INTRODUCTION

A global concern on the unexpected nuclear crisis in Japan is the present interesting topic. The crisis is due to the destruction of the nuclear power plant after attacking by big earthquake and tsunami. It is no doubt for the health effect of the radiation from the nuclear detonation from the destroyed nuclear power plant. Due to the present crisis in Japan, the public health concern on this issue should be raised. The post crisis issue of the Japanese nuclear detonation is on the adverse effects to the exposed population⁽¹⁾.

Exposure at high dosage can result in several medical disorders. The good example is the induction of thy-

roid cancer. In pediatric neurology, there are some interesting reports on pediatric neurological disorder and its relationship to leaked radiation. However, there is no systematic review on this topic. In the present crisis, it is wise to summarize the knowledge on this topic. In this specific brief article, the author hereby discusses on the nuclear detonation and pediatric neurological disorder. The aim of this work is to summarize evidences on various aspects of pediatric neurological disorders relating to the nuclear detonation crisis.

Induction of pediatric neurological malignancy

In general, the incidence of cancer in the population exposed to radiation significantly increases⁽²⁾. Based on

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the data from the previous similar famous nuclear crisis, Chernobyl crisis, the increased incidence of cancer, especially for thyroid cancer is confirmed. There are some reports on the increased incidence of brain cancer⁽³⁻⁴⁾. However, there is no clear evidence on the contributing risk. A continuous increase of brain tumor incidence was detected⁽³⁾.

Considering the pediatric neurological malignancy, the focus is specifically on neuroblastoma⁽³⁾. After the Chernobyl crisis, the incidence of neuroblastoma increased⁽⁵⁾. However, according to a case-control study by Michaelis et al., it is concluded that the increased incidence might not be directly relating to radiation exposure⁽⁶⁾.

Congenital neurological malformation and impaired cognitive function

Exposure to radiation during fetal life is confirmed for the adverse effect on the neurological system of the newborn⁽⁷⁾. Nyaqu et al. reported on “a significant increase in mental retardation (IQ < 70) and of borderline and low range IQ, as well as emotional and behavioral disorders and a decrease in high IQ (IQ > 110) in children irradiated in utero as a result of the Chernobyl disaster⁽⁸⁾.” There are some reports on the congenital neurological malformation after Chernobyl crisis. Nevertheless, although there are some evidences of increased neural tube defect there is no confirmation on increased incidence of congenital malformation⁽⁹⁾.

Concerning impaired cognitive function, as noted, impaired cognitive function is an important outcome of exposure, either in fetal or infantile life⁽⁸⁾. The degenerative change of brain, especially for the degeneration of substantia medullaris astrocytes, is observed⁽¹⁰⁾. However, some new reports report on discordant findings. According to a recent publication by Taormina et al., it is reported that “Chernobyl did not influence the cognitive functioning of exposed infants although more evacuee mothers still believed that their offspring had memory problems⁽¹¹⁾.”

Neuroendocrinological disorder

Malfunction of function of the hypophyseal-thyroid

system in children exposed to the Chernobyl crisis is reported⁽¹²⁻¹³⁾. A functional activation of the thyroid system is the important disorder⁽¹²⁻¹³⁾. Subclinical hypothyroidism in children due to the disturbance of the hypophyseal-thyroid system can be an important clinical manifestation⁽¹²⁻¹³⁾.

EPILEPSY

The disturbance of neuroelectricity in the children exposed to leaked radiation is reported⁽¹⁴⁾. Irritated EEG change with paroxysmal activity shifted to the left frontotemporal region is the main finding⁽¹⁵⁾. The cause of this observed pattern has not been yet clarified. However, this might be due to the direct disturbance on neuroelectrical conduction system due to the absorbed nuclides. The anterior part of cerebrum might be the most stimulated area. Focusing on the clinical complaint, the spectrum includes headache, dizziness, nightmares, early waking up in the mornings and seizure⁽¹⁴⁾.

CONCLUSION

Exposure to contaminated nuclides can result in neurological problem in pediatric population. Although there is still no clear evidence there are several reports on induction of neurological cancer, congenital neurological defect, deterioration of cognitive function, deterioration of neuroendocrinological disorder and induction of epilepsy. Hence, it is important to follow up the exposed children in the present nuclear crisis.

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