

A POSSIBLE ASSOCIATION BETWEEN EXPOSURE TO IONIZING RADIATION AND SARS COV-2 INFECTION WITH SCHIZOPHRENIA SPECTRUM DISORDERS DEVELOPMENT: A NEW CHALLENGE FOR NEUROPSYCHIATRIC RESEARCH

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Dear Editors:

The disease caused by SARS CoV-2 infection started recently. Indeed, the pandemic was officially declared by World Health Organization (WHO) on March 11, 2020 only that is why currently there are yet no systematic and epidemiological studies on schizophrenia spectrum disorders in COVID survivors. At the same time, there is an increasing number of cases and case series reports on psychotic schizophreniform disorders following SARS CoV-2 infection (Smith et al., 2020; DeLisi, 2021; Oloniniyi et al., 2021). These psychoses were diagnosed as COVID-19-associated brief psychotic disorder (Smith et al., 2020), first-episode, acute and transient psychotic disorder (Oloniniyi et al., 2021). Taken together, these papers support the viral hypothesis of schizophrenia, while considering it result of both prenatal and postnatal exposure to different viruses, beginning from the first reports about an increase in psychoses subsequent to the 1918–1920 influenza pandemic, and supported by a multiplicity of data until now. Obviously, schizophrenia spectrum disorders related to exposure to SARS CoV-2 in prenatal period cannot appear as yet, so that neurodevelopmental viral hypothesis cannot be tested, as all described cases were among infected adults. Moreover, taking into account the short period after infection and psychosis onset, these reported cases series could be considered also as COVID encephalitis with psychotic

symptoms. We are of the opinion that patients with schizophrenia spectrum disorders onset after COVID should be immunologically tested for viral antibodies and inflammatory markers, they should have MRI examination for neuroinflammation, and together with psychopharmaceutical medications, should be perhaps treated with antiviral medications and steroids.

There is another issue in psychiatric research: whether ionizing radiation is a risk factor of schizophrenia spectrum disorders (Loganovsky et al., 2005). The prevalence rate of schizophrenia in A-bomb survivors in Nagasaki was very high – 6.00 % (Nakane and Ohta, 1986). Currently, the mean worldwide lifetime prevalence of all psychotic disorders is estimated at about 0.72 %, among which disorders of the spectrum of schizophrenia – 0.57 %, and schizophrenia – 0.53 % (Moreno-Küstner et al., 2018). The lifetime prevalence of schizophrenia among people prenatally exposed to A-bomb radiation was also increased – 1.09 %, especially among people irradiated in the middle stage of pregnancy (Imamura et al., 1995). According to the Jerusalem Perinatal Study, offspring of mothers exposed to X-ray radiation during the third and fourth months of pregnancy may have an increased risk of developing schizophrenia (Gross et al., 2018). Beginning in 1990, in 4 years after the Chernobyl catastrophe (April, 26, 1986) there has been a significant increase in the incidence of schizophrenia in the Chernobyl exclusion zone (30-km zone

around the Chernobyl NPP) personnel in comparison to the general population (5.4 per 10,000 in the exclusion zone versus 1.1 per 10,000 in Ukraine in 1990). Those irradiated by moderate to high doses (more than 0.30 Sv), had significantly more schizophreniform syndromes (Loganovsky and Loganovskaja, 2000). The neural diathesis-stressor hypothesis of schizophrenia, where neurobiological genetic predisposition to schizophrenia can be triggered by environmental stressors in predisposed individuals or ionizing radiation indeed causes schizophrenia-like disorders were considered as models of the radiation cerebral effects (Loganovsky and Loganovskaja, 2000; Loganovsky et al., 2005). Recently we observed the clinical case of organic schizophrenia-like disorder in the liquidator who was ill with COVID-19.

We would like to propose to study an interaction between previous exposure (so-called “past exposure”) to ionizing radiation, further SARS CoV-2 infection and schizophrenia spectrum disorders development following both radiation and viral impacts. There are over-irradiated cohorts for these studies as follows: A-bombing and radiation emergencies (nuclear testing; Three-Mile Island, Chernobyl, and Fukushima and other radiation accidents) survivors, nuclear workers, medical radiologists (especially, interventional radiologists), patients after radiological diagnostic and radiation therapy procedures, people living at areas with high natural radioactive background (i. e. Kerala, India). The Chernobyl catastrophe survivors present several radiological scenario: exposed in adulthood, childhood, and prenatally, as well as the next generations of irradiated people. These past exposed persons with following SARS CoV-2 infection are the unique sample for comprehensive neurobiological and epidemiological studies of radiation-COVID-associated schizophrenia spectrum disorders. Thus, a new challenge for psychiatric / neuropsychiatric research is proposed: the study of a possible association between exposure to ionizing radiation and SARS CoV-2 infection with schizophrenia spectrum disorders development, that is waiting for realization. The linkage between schizophrenia spectrum disorders following past exposure to ionizing radiation and SARS CoV-2 infection seems to exist and should be studied on the irradiated cohorts with following COVID-19.

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