# Depressive and Anxious Mood Disorder at COVID Long: A Case Report

**José Augusto Camargo[1,2]\* and Stéfani Augustoli Morcillo[3]**

*[1]Neuroscience Research Institute, Newclin Medical Clinic, Sorocaba, São Paulo, Brazil*

*[2]Professor, Faculty of Medicine, Pontifical Catholic University of Sao Paulo, Brazil*

*[3]Medical Student, Faculty of Medicine, Pontifical Catholic University of Sao Paulo, Brazil*

**\*Corresponding Author:** José Augusto Camargo, Neuroscience Research Institute, Newclin Medical Clinic, Sorocaba, São Paulo, Brazil.

## Abstract

Depression and anxiety are prevalent diseases and have their clinical diagnosis. The etiologies and classifications are diverse, and both have been associated with some types of infections, including COVID-19. We report a case of a 49-year-old man who developed a depressive and anxious mood disorder as a sequel to a long covid infection.

*Keywords: Long Covid; Depression; Anxiety; PET/CT*

## Abbreviations

PET/CT: Positron Emission Tomography; MRI: Magnetic Resonance Imaging

## Introduction

In Brazil, depression has a prevalence of approximately 15.5% in its population. Furthermore, according to the World Health Organization (WHO), the percentage understood in primary care is 10.4%, whether correlating the pathology with some physical impairment. The disease appears more in the third decade of life and affects more women. Its causes include changes in brain chemistry, genetic susceptibility and life events that can also be considered risk factors such as psychological trauma and stress. The diagnosis is clinical [1] and according to the DSM-5 it includes cognitive and somatic changes with empty, sad or irritable mood, impairing the individual's life [2]. The therapeutic approaches are multiple, including physical exercise [3], cognitive-behavioral therapy [4], use of antidepressants [5]; and studies have suggested CD4+6 T cells, brief solution-focused therapy [6,7] among others. Depressive disorders can be classified as persistent, major, disruptive due to mood changes, premenstrual dysphoric, due to another pathology or substance, as well as unspecified. As for the previous medical condition, for diagnosis it is necessary that there is a direct relationship with an avolition or constancy of depressive mood that is not better defined by another disorder, does not occur with current delirium and causes social distortions and suffering [8].

Anxiety disorders have a worldwide prevalence of 3.6% and in Brazil of 9.3% [9]. They refer to behavioral changes, fear and excessive anxiety. They can also be derived from another medical condition, but have other etiologies such as: Obsessive-compulsive, panic, post-traumatic, social phobia, among others. The diagnosis is also based on clinical findings and correlated with the patient's history [8,9]. The

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association of these depressive and anxiety (mixed) disorders with other pathologies includes *Toxoplasma gondii* [10], viral infections, for example the human immunodeficiency virus (HIV) and hepatitis C (HCV) [11] and currently COVID-19. Within the context of the psychiatric conditions explored, we aim to report the case of a 49-year-old man who developed a depressive and anxiety mood disorder as a sequela of an infection by this agent.

## Case Report

Male patient, 49, physical education teacher and athlete of sports competitions, performed earlier in good physical and mental conditions, denying comorbidities or even the previous use of medicines, alcohol, and drugs.

According to family reports, the patient in mid-2020 was affected by the covid-19 pandemic, in his moderate form, with high fever symptomatology, headache and change in taste and smell. After searching for emergency care, it was treated at home by Approximately 14 days with general care, water and nutritional support, antibiotic therapy, painkillers, and anti-inflammatory drugs. Presented significant improvement of the clinical condition after this period.

After 45 days of the episode, the patient began to present significant headache and emotional changes. He was taken to psychiatric medical consultation, in which he received the diagnosis of depressive and anxious mood disorder. Therefore, he received medications and was referred to our service for neurological evaluation. At first, we requested examination of tomography and magnetic resonance imaging (MRI) of skull, which did not show significant changes. Therefore, in view of the large number of reports in the worldwide literature of important late functional changes in COVID Long, we request a neurological PET/CT (Positron Emission Tomography) exam using the $^{18}$F-FDG ($^{18}$F-Fluoro-2-desoxi-D-glucoses) that showed a bilateral glycolytic hypometabolism in areas frontobasal and frontal mesial.
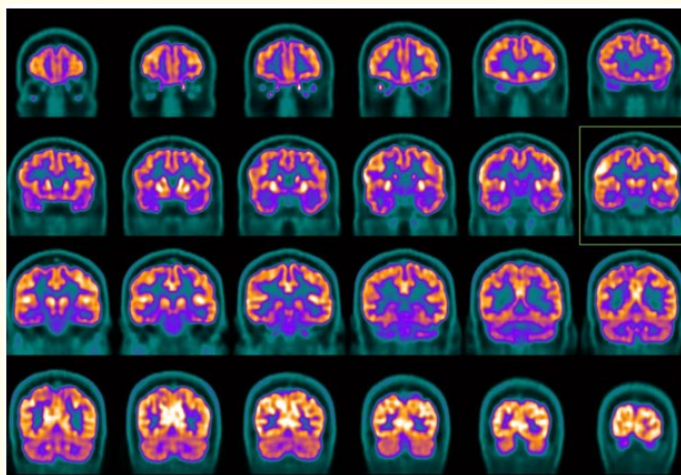


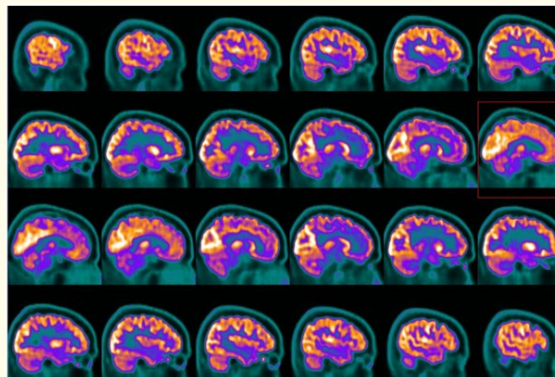*Figure 1:* *Neurological PET/CT: Coronal images.*

***Figure 2:*** *Neurological PET/CT: Sagittal images.*

## Discussion

The COVID-19 pandemic has significantly reduced life expectancy globally, although Southeast Asia and the Americas were the most affected regions, especially between 2020 and 2021. At this historic global moment, there were approximately 13 million deaths [12]. Updates for 2024 showed a total of 38,883,865 confirmed cases in Brazil, with 713,026 deaths from the disease up to the present study [13].

The post-COVID-19 condition can also be called post-acute sequelae of SARS COV-2 (PASC), long COVID or post-COVID-19 syndrome, defined by symptoms that, according to the WHO, occur approximately three months after a COVID-19 infection that lasts for at least two months [14,15] and has divergences in the literature that point to at least a duration of 12 weeks and may be intermittent. It is a multifactorial condition with an estimated prevalence of 10% in individuals who contract the disease [16], with an estimated 65 to 200 million people affected [17].

Long Covid has respiratory impairment, such as coughing and expectoration, and changes in sleep, memory, and cognition as its main symptoms. The pathophysiology behind this condition is still uncertain, but there are hypotheses regarding immunological decline, changes in the intestinal microbiota, production of microthrombi, remnants of viral tissue in the tissues [18], impairment of neurological signaling, and endothelial damage. These complications are independent of the severity of the condition at the beginning [19], and doctors may identify individuals at risk for the condition by analyzing predisposing factors related to the number of consultations and observation periods, for example [20].

To date, the sequelae described by long COVID describe changes in the oral microbiota of patients, a strong relationship with body mass index [16-18], changes in concentration and memory, associated with cough, fatigue, myalgia, mental confusion, anosmia, ageusia, headache, neuropathy and dizziness [14,15,21,22] as well as the ability to generate prothrombotic antiphospholipid antibodies or even the onset of vasculitis and Kawasaki disease [23]. In the reported case, the patient presented at the time of acute infection with high fever, anosmia, ageusia and headache, and this headache became more intense and long-lasting.

In the field of neurological specialty, several reports have been published correlating SARS-COV-2 infection with later COVID and the onset of diseases such as Guillain-Barré Syndrome, Sydenham's Chorea, Parkinsonism and Dysphoric and Psychotic Mental Disorders [23-27]. Cognitive and psychiatric impairment after COVID-19 infection has been increasingly studied [28,29], with a prevalence of between 30 and 80% and can last for years. In addition, the consequences include, despite a lower incidence, post-traumatic mood disorder,

anxiety and depression [30-37], and the neuropsychiatric clinic overlaps with other signs and symptoms and persists more in women [17,38]. Thus, the negative impact on the well-being and mental health of individuals facing long COVID has been increasing [39]. It is noted that the patient's depressive and anxious episodes began after COVID-19 infection, reinforcing the diagnosis of the disorder directly associated with this medical condition, mainly because the patient had never had previous episodes. In addition to the emotional changes, the persistence of the headache added to the chronicity of the symptoms to correspond to the current long COVID.

Promising studies have been presented with treatments that appear to be appropriate for Long Covid. Pulmonary rehabilitation, including telemedicine, has also been an important factor in helping in the multidisciplinary monitoring of these cases [40-45].

Corroborating with the world literature and the short- and long-term changes and mutations suffered by Covid-19, we suggest that the reported patient developed depressive and anxious mood disorder after viral infection by SARS-COV-2. This neuropsychiatric change, compromising his functionality and quality of life, had a pattern similar to the "bilateral frontobasal glycolytic hypometabolism" seen in neurological PET/CT when equivalent to other cases of long Covid described.

PET/CT has been widely used in Covid-19 infection [43,46-50]. Changes in brain metabolism have been described during SARS-COV-2 infection, with a strong association with long COVID, since hypometabolism was seen, for example, in the brainstem, cerebellum and limbic areas, linked to complaints during the examination period [47,48]. Asymmetric prefrontal affections were also seen in addition to the parietal, temporal, pontine and frontal regions [49,50]. The findings are diverse, and research continues to grow, but the vast majority, as well as the report we describe, imply a clear relationship between SARS-COV-2 infection and its consequences on PET/CT.

## Conclusion

Analyzing and correlating clinical data manifested with growing research on covid-19 sequelae, we could conclude that depression and anxiety, by the patient's developmental time and previous history of excellent health, took place from a long covid. PET/CT images corroborate this statement. Further studies on the subject are mandatory, as new discoveries will come about the consequences that pandemic has brought worldwide.

## Ethics Approval and Consent to Participate

Not applicable.

## Human and Animal Rights

Not applicable.

## Consent for Publication

Patient's consent to report this case has been obtained on the condition that all details that would enable any reader to identify the person have been omitted.

## Availability of Data and Materials

The data supporting the findings of the article is recorded in the medical records of the treating service (Neuroscience Research Institute, Newclin Medical Clinic, Sorocaba, São Paulo, Brazil) and is confidential.

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## Conflict of Interest

Dr. José Augusto Camargo is an Editorial Board Member of EC Neurology.

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