



Press release



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A poorly balanced immune system increases the risk of dying from covid-19 almost five-fold.

- ***Patients admitted for SARS-CoV-2 infection with unbalanced levels of two immune system cells, CD4 and CD8 T-lymphocytes have a worse prognosis and a higher risk of dying.***
- ***Having more than two times as many CD4 than CD8 lymphocytes increases the likelihood of dying from the infection by 4.6 times and doubles the likelihood of suffering from respiratory distress, according to a study by physicians and researchers from Hospital del Mar, Hospital del Mar Institute of Medical Research and Pompeu Fabra University, published in the journal *Frontiers in Medicine****
- ***This leads the signatories of the study to recommend a more aggressive therapeutic approach in these patients upon admission. In addition, they consider that this situation may be seen in other viral infections.***

Barcelona, September 9th 2022. – People who have an **imbalanced immune system** prior to infection with covid-19 have a worse prognosis than those whose body's defence system is stable. So reveals a study published recently in the journal *Frontiers in Medicine* involving physicians and researchers from Hospital del Mar, Hospital del Mar Institute of Medical Research (IMIM-Hospital del Mar), Pompeu Fabra University and the Autonomous University of Barcelona, as well as the CIBER of Infectious Diseases (CIBERINFEC).

One of the elements of the immune system in its fight against pathogens are T-lymphocytes, which confer cellular immunity. Among them, the most representative are **CD4 T lymphocytes**, which focus on organizing the immune response, and cytotoxic **CD8 T lymphocytes**, which undertake destroying the invaders. In an ideal situation, there are between 1 and 1.5 CD4 lymphocytes to each CD8 lymphocyte. But this **balance is not stable** and its imbalance poses a risk in the event of becoming infected with SARS-CoV-2 and developing covid-19. As Dr. Robert Güerri, head of section of the Infectious Diseases Service and researcher at the IMIM-Hospital del Mar and CIBERINFEC explains, **"having a balanced immune system in the acute phase of infection offers the best prognosis, with the lowest mortality and the least likelihood of complications. But if the balance between CD4 and CD8 is high, with inadequate CD8 expansion, there is a worse response to the acute phase of infection and therefore a worse prognosis, more respiratory distress and mortality"**.

In this study, researchers analysed the levels of these cells and their balance in 388 patients admitted to Hospital del Mar for this disease during the first wave of the pandemic. Those with a **higher than normal CD4/CD8 ratio** were **4.6 times more likely to die** and twice as likely to suffer from respiratory distress and require support. If the CD4/CD8 ratio is lower than normal, the risk also increases, but more moderately (2.7 times greater likelihood of death).

Early therapeutic approach

"In the case of people who have less CD8 than required during the acute phase, the virus can affect them more. In addition, since the number does not expand well, the prognosis is worse", notes Ana Pascual, principal author of the study, which constitutes her degree final project on the joint bachelor's degree in Medicine of Pompeu University and the Autonomous University of Barcelona with Hospital del Mar. This conclusion is independent of patient age and sex. The evolution of the number of lymphocytes is regulated by genetic aspects of each individual, although it has been shown that SARS-CoV-2 can attack CD8 lymphocytes, preventing them from multiplying to cope with infection and disease.

In the light of this, having information on the balance of the immune system at the time of patient admission may allow selecting those for whom there will be a need to apply a more aggressive



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therapeutic approach to get ahead of the possible complications that may occur. For Dr. Güerri, the results obtained demonstrate the importance of **"focusing on the importance of monitoring immune response, because having a balanced, equilibrated immune response affects prognosis"**. This is currently not taken into account when dealing with patients. At the same time, the authors of the study point out that this may apply to other viral infections, thus achieving an early prognostic marker of patient evolution.

This work also involved professionals from the Endocrinology and Nutrition and Geriatrics services at Hospital del Mar.

Reference article:

Pascual-Dapena A, Chillaron JJ, Llauradó G, Arnau-Barres I, Flores J, Lopez-Montesinos I, Sorlí L, Luis Martínez-Pérez J, Gómez-Zorrilla S, Du J, García-Giralt N and Güerri-Fernández R (2022) *Individuals With Higher CD4/CD8 Ratio Exhibit Increased Risk of Acute Respiratory Distress Syndrome and In-Hospital Mortality During Acute SARS-CoV-2 Infection. Front. Med. 9:924267. doi: [10.3389/fmed.2022.924267](https://doi.org/10.3389/fmed.2022.924267)*

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