COVID-19 and Peripheral Smear Chat

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A relatively low-level T-helper cell came rushing through, making a fuss about a virus. Before a crowd started gathering around, a natural killer cell (NK cell) confronted her, obviously bothered by any talk of a virus. “You, lymphocyte! What is your designation?” Before continuing, the T-helper cell stammered, “C-CD4+ T_{CM}.” The NK cell grunted, satisfied with the answer. With her out of the way, the T-helper cell resumed, “We have gotten reports of a new sickness, caused by a virus that has spread around the world in only months! This comes straight from the prefrontal cortex; we need to brief the rest of the Immune Department immediately!” At the mention of the frontal cortex, many of the bystanders grumbled. The brain never interfered with the Immune Department, let alone gave it orders! Still, a new virus that had spread so quickly was nothing to sneeze at; so, many cells began rushing to their respective sections to spread the news that a meeting was being called in the peripheral blood.

It took some time, but after representatives from the RBCs, monocytes, neutrophils (PMNs), eosinophils, and lymphocytes (B and T) arrived, the meeting was able to start. After the greetings and glares were through, the cells began asking who had the nerve to distract the cells from their work. The T-helper cell stood up and, after catching the mistrustful eye of the NK cell, started by introducing herself, “Hello everyone, I am a T-helper cell, designation CD4+ T_{CM}. Sorry to interrupt, but I have just gotten word

from the frontal cortex of a new virus that has spread, and it could severely damage our body if things are not handled properly. It infects the body mainly through droplets in the respiratory tract and damages lung parenchyma as well as other organs. The origin of the virus has been identified as Wuhan, China, and its infectivity is very high. This would not be that big of a deal, but the problem is the mortality rate is around 2.2%. The patients with the highest risk are the elderly, immunocompromised individuals, and those with chronic diseases” [1–3]. As she finished the sentence a ruckus started up, “Why should we care? We do not fall into any of those categories.” The CD4+ T_{CM} allowed the noise to die down before continuing, “We should care because members of all age-groups have been affected and some have even died” [1–3]. The room quieted. “Now that I have your undivided attention,” the CD4+ T_{CM} continued, “let’s discuss some of the technical details about this virus.”

With that the CD4+ T_{CM} passed the stage over to her colleague, CD8+ T_{EMRA}. “What we know so far is that patients who are severely affected suffer from a form of severe acute respiratory syndrome (SARS) which is relatively similar to the previously known SARS-CoV and the Middle East respiratory syndrome. The causative agent was identified as an enveloped, positive-sense, single-stranded RNA virus that belongs to the *Coronaviridae* family and higher classification of *Nidovirales*” [1–3]. The

Fig. 1. Multiple high-power views of the peripheral smear attendees.

attending monocyte interrupted, stating that the WHO recently classified the disease as a pandemic due to its widespread infectivity and alarmingly high contagion rate [1–3]. A B-lymphocyte spoke up, saying the WHO officially designated the virus as SARS-CoV-2, and the disease it caused was called coronavirus disease 2019 (COVID-19) [1–3]. An eosinophil asked about transmission and the clinical picture of this pandemic. The CD4+ T_{CM} immediately clarified, “So far and as much as we know about this virus’ pathogenesis, the disease is spread from human to human by contact with any environmental surfaces that contain the virus. Hand hygiene and wearing protective personal equipment are an absolute necessity that will help decrease the rate of spread.” An RBC butted in, “Is that why you guys are wearing those weird masks?” (Fig. 1). The eosinophil asked again about symptoms and how to tell if someone is sick. With this, the CD8+ T_{EMRA} sighed. She stated, “As far as we know, there are many asymptomatic patients, making it impossible to tell if someone carries the virus without testing, but those who are symptomatic usually present with flu-like symptoms such as dry cough, fever, sore throat, general weakness, difficulty breathing, headache, conjunctivitis, and sometimes gastrointestinal symptoms” (1). The

neutrophil commented, “After reviewing this disease in the literature, around 15–20% of infected people will need hospitalization and approximately 3–5% may need intensive care unit treatment” [1–3]. The CD4+ continued reading off the report, stating “as of June 15, 2020, the current total number of confirmed cases is approaching 7.8 million people, out of which there were approximately 431,000 deaths from this disease, and the disease has been reported in 216 countries” [4].

For the first time the NK cell spoke up, “What about testing? How can we tell for sure that someone is sick?” The CD4+ T_{CM} composed herself before answering, “According to the report, currently there are 2 methods of testing. One is used to detect a current infection, and the other is for determining whether a previous infection has occurred due to SARS-CoV-2. In order to detect a current infection, we use a method called PCR. This method detects if the virus’ RNA is currently within the human body. To test previous infections, a simple antibody test is used; we take a sample of blood and use an assay to determine if antibodies against SARS-CoV-2 are present. Having said that, the antibody test has a high rate of false-positive and false-negative results. Therefore, the current standard and best diagnostic test is PCR” [5].

“What about treatment and vaccination?” the monocytes inquired. The CD8+ T_{EMRA} answered that after thorough literature review, it was concluded that the mainstay of treatment for symptomatic patients is isolation and supportive therapy. She added that few tried broad-spectrum antiviral agents. Occasional success was reported utilizing chloroquine, although this treatment was later declared controversial. It was concluded by the CD8+ T_{EMRA} that thus far there is no specific treatment and efforts to produce a vaccine are still underway [1–3]. The CD8+ T_{CM} and CD4+ T_{CM} asserted that part of the pathogenesis that was found in severe cases of COVID-19 is an abnormally exaggerated immune response in the form of a cytokine storm that is thought to be injurious to many organs [3].

The CD8+ T_{EMRA} thanked all members of the peripheral blood family, reminding them the next meeting would be conducted online (Fig. 1), and reminded them of the old days of celebration and love, wishing all colleagues a safe passage through the year 2020 [6, 7]. The CD4+ T_{CM} announced the end of the meeting and asked all colleagues to be vigilant and to follow the safety precautions to hamper the spread of this virus.

References

- 1 Pascarella G, Strumia A, Piliago C, Bruno F, Del Buono R, Costa F, et al. COVID-19 diagnosis and management: a comprehensive review. *J Intern Med*. 2020 Aug;288(2):192–206.
- 2 Adhikari SP, Meng S, Wu YJ, Mao YP, Ye RX, Wang QZ, et al. Epidemiology, causes, clinical manifestation and diagnosis, prevention and control of coronavirus disease (COVID-19) during the early outbreak period: a scoping review. *Infect Dis Poverty*. 2020;9(1):29.
- 3 Rothan HA, Byrareddy SN. The epidemiology and pathogenesis of coronavirus disease (COVID-19) outbreak. *J Autoimmun*. 2020;109:102433.
- 4 Jerrold L. Do web-site postings qualify as learned treatises? *Am J Orthod Dentofacial Orthop*. 2017;151(4):821–3.
- 5 Loeffelholz MJ, Tang YW. Laboratory diagnosis of emerging human coronavirus infections: the state of the art. *Emerg Microbes Infect*. 2020;9(1):747–56.
- 6 Al-Quran SZ, Al-Abbadi M, Braylan RC. In hematopathology, love is everywhere. *Arch Pathol Lab Med*. 2004;128(11):1309.
- 7 Yassin DF, Al-Abbadi MA. Cytology formation: “a neutrophilic happy new year”. *Acta Cytol*. 2018;62(1):1–2.

Statement of Ethics

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Internal Review Board

This is just an editorial or commentary and not a clinical study; therefore, it did not need an internal ethical review.