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Editorial – Differences and similarities between Severe Acute Respiratory Syndrome (SARS)-CoronaVirus (CoV) and SARS-CoV-2. Would a rose by another name smell as sweet?

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The new year began with a new threat to the human health, Severe Acute Respiratory Syndrome (SARS)-CoronaVirus (CoV)-2. SARS-CoV-2 is a novel virus, belonging to the CoronaVirus family, the 7th recognized as a human pathogen and the 3rd causing a severe clinical syndrome after SARS-CoV and Middle East Respiratory Syndrome (MERS)-CoV[1].

Immediately, the spreading of this new virus caused panic and fear among the population, and the amount of contrasting information published each and every day did not help. Moreover, fear and panic were increased by the fact that this new virus seems to be shed from asymptomatic people. But, is this panic really justified?

Let's state the facts. SARS-CoV-2 is a highly diffusible virus, spread by droplets, direct contact and contact with infected objects, whose time of incubation is 1 to 14 days and is shed also by asymptomatic infected people[1-3]. Most of the infected people only show mild-to-moderate respiratory symptoms, or nothing at all[4]. Only 5-10% of the infected individuals shows the complete severe respiratory syndrome called CoronaVirus Disease (COVID)-19[4]. Moreover, the mortality of COVID-19 is 0.2% in young healthy individuals, while it grows with age and comorbidities, being the highest in people older than 80 years with pre-existing heart disease[5]. To put everything in perspective, SARS-CoV has a mortality of about 10% and MERS-CoV have a mortality of about 35%[6,7].

During the winter season, more than ten different viruses can cause pneumonia and severe respiratory symptoms, alone or, more frequently, by bacterial super-infection[1]. Among them, different strains of influenza virus, adenovirus, other coronaviruses (229E, NL63, OC43), human bocavirus, human metapneumovirus, parainfluenza virus (1, 2 and 3), rhinovirus and respiratory syncytial virus (A and B)[1]. Probably, SARS-CoV-2 will enter the group of this "seasonal infections" in the years to come. Therefore, it is important to know this virus and the differences between SARS-CoV and SARS-CoV-2 to promptly suspect and recognize them.

The knowledge we currently have on SARS-CoV-2 is scarce, and most of it comes from deductions more than actual data. SARS-CoV-2 is a betacoronavirus belonging to the 2B group[8]. It shares around 70-80% of its genome with SARS-CoV, but it shows to have the highest level of similarity with a horseshoe bat coronavirus[1,8]. Therefore, it is thought to be a recombinant virus transmitted from bats to human hosts by the mean of an intermediate host[9]. Being an RNA-virus with an RNA-dependent RNA polymerase (RNRP)-based replication, mutation and recombination are not infrequent events[9]. Moreover, despite the name and genetic similarities, SARS-CoV-2 shows genetic and clinical differences with SARS-CoV.

First of all, its spike (S) protein. SARS-CoV-2 has been demonstrated to interact with Angiotensin Converting Enzyme 2 (ACE-2), the same receptor used by SARS-CoV and CoV-NL63, to enter the host's cells, and in particular alveolar epithelial cells[10,11]. However, SARS-CoV-2 S protein is longer than

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Table I. Most relevant clinical similarities and differences between SARS-CoV and SARS-CoV-2.

Characteristic	SARS-CoV	SARS-CoV-2
Target receptor	ACE-2	ACE-2
N protein	IFN-γ inhibitor	Unknown
R0	0.4	1.4-2.5
Chest X-ray	Ground glass opacities	Bilateral, multilobar ground glass opacities
Chest CT-scan	Lobar consolidation	
	Nodular opacities	No nodular opacities
Prevention	Hand hygiene, cough etiquette	Possibly hand hygiene, cough etiquette
Transmission	Droplets	Droplets
	Contact with infected individuals	Contact with infected individuals, even asymptomatic ones
Case fatality rate (overall)	9.6%	2.3%

Abbreviations: SARS-CoV = Severe Acute Respiratory Syndrome Coronavirus; SARS-CoV-2 = Severe Acute Respiratory Syndrome Coronavirus 2; N protein = Nucleocapsid protein; IFN-γ = interferon-γ; R_0 = R through; X-ray = radiography; CT-scan = computerized tomography.

SARS-CoV S protein, and its receptor binding region is completely different according to the first studies published[8]. Moreover, SARS-CoV nucleocapsid (N) protein has the ability to neutralize the immune response of the host, acting as an antagonist to the action of IFN-g, and it is still not known if SARS-CoV-2 N protein shares the same ability. If not, this would partly explain why SARS-CoV has a higher mortality rate than SARS-CoV-2[12].

Secondly, the R_0 (R through) of SARS-CoV-2 is 2- to 3-fold higher than the R_0 of SARS-CoV (< 1)[10]. Usually, a high R_0 is associated with highly diffusible infections, which at the same time have a long incubation time, are characterized by mild-to-moderate symptoms or latent infection and are associated with a low mortality rate[13].

There are no actual data on SARS-CoV-2 survival in the environment[14]. Knowledge about the other viruses of this species let us assume that it might survive in the environment for days (up to 9 days, like CoV-229E), that it is inactivated by heat, like MERS-CoV, which survival in the environment is reduced at 30-40°C, and that a higher humidity in the environment favor its survival[14]. Table I summarizes the differences between SARS-CoV and SARS-CoV-2.

Given the current epidemic trend, with more people who have a mild-to-moderate disease than a severe one, the number of asymptomatic individuals who tested positive, especially in Italy, and never showed the signs of the disease, and the fact that we have more people recovering from the infection than people dying from it, it is possible to say that maybe the panicking was not justified by this new virus. Probably, the name chosen for this new CoV was bearer of fear and it caused what we could call a mass hysteria over this virus also fed by the impressive media coverage. However, we still have only a partial knowledge, so we should pay attention to the developments of this epidemic but remember to always keep our calm and rationality.

Conflict of Interest

The Authors declare that they have no conflict of interests.

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