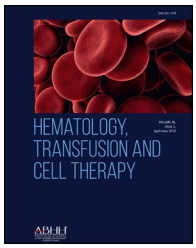
HEMATOLOGY, TRANSFUSION AND CELL THERAPY

www.htct.com.br



Special article

Suggested guidelines for convalescent plasma therapy for the treatment of COVID-19

Gil Cunha De Santis[a,b], *Alfredo Mendrone*[a,c,d], *Dante Langhi Jr.*[a,e,*], *Dimas Tadeu Covas*[a,b], *Antônio Fabron Jr.*[a,f], *Afonso José Pereira Cortez*[a,g], *Carla Luana Dinardo*[a,c], *Eugênia Maria Amorim Ubiali*[a,b], *José Francisco Comenalli Marques Jr.*[a,h], *José Orlando Bordin*[a,e,i], *Marilia Alvares Rugani*[a,j]

[a] *Associação Brazileira de Hematologia, Hemoterapia e Terapia Celular(ABHH), São Paulo, SP, Brazil*
[b] *Hemocentro de Ribeirão Preto, Hospital das Clínicas da Faculdade de Medicina de Ribeirão Preto da Universidade de São Paulo (HCFMRP-USP), Ribeirão Preto, SP, Brazil*
[c] *Fundação Pró-Sangue, Hospital das Clínicas da Faculdade de Medicina da Universidade de São Paulo (HCFMUSP), São Paulo, SP, Brazil*
[d] *Hospital Sírio Libanês, São Paulo, SP, Brazil*
[e] *Universidade Federal de São Paulo (UNIFESP), São Paulo, SP, Brazil*
[f] *Faculdade de Medicina de Marilia (FAMEMA), Marília, SP, Brazil*
[g] *Associação Beneficente de Coleta de Sangue (Colsan), São Paulo, SP, Brazil*
[h] *Hemocentro da Universidade Estadual de Campinas (Unicamp), Campinas, SP, Brazil*
[i] *Hospital Alemão Oswaldo Cruz, São Paulo, SP, Brazil*
[j] *Instituto Estadual de Hematologia Arthur de Siqueira Cavalcanti (HEMORIO), Rio de Janeiro, RJ, Brazil*

ARTICLE INFO

Article history:
Received 4 March 2021
Accepted 13 March 2021
Available online 20 March 2021

COVID-19 progresses with a heterogeneous clinical course that is mild to moderate in most cases, and severe in approximately 10–15% of patients.

Patients with comorbidities (diabetes mellitus, hypertension, heart disease, obesity, and immunosuppression), in general elderly, can evolve with higher frequency to severe cases of the disease, with severe respiratory failure, requiring intensive care in most cases.

As yet, there is no specific therapy for covid-19. Thus, as an alternative, there is the transfusion of plasma obtained from individuals who are convalescent from covid-19, referred to as convalescent plasma (CP), which contains neutralizing antibodies against SARS-CoV-2O virus.[1]

The use of CP seeks to passively transfer antibodies to the patient until the affected organism has the time to mount their own immune response.

Observational studies and controlled studies, suggest that CP can be useful, especially units which contain high-titer

* *Corresponding author at*: Department of Clinical and Experimental Oncology, Federal University of São Paulo (UNIFESP), Rua Dr. Diogo de Faria, 824 - Vila Clementino, CEP: 5539-7289, São Paulo, SP, Brazil.
E-mail address: dlanghi@uol.com.br (D. Langhi Jr.).

https://doi.org/10.1016/j.htct.2021.03.001

Table 1 – Tests for anti-SARS-CoV-2 antibodies.

Tests Acceptable for Use in the Manufacture of High Titer COVID-19 Convalescent Plasma

Manufacturer (listed alphabetically)	Assay	Qualifying Result
Abbott	SARS-CoV-2 IgG (ARCHITECT and Alinity i)	Index (S/C) ≥ 4.5
Beckman Coulter	Access SARS-CoV-2 IgG	S/CO ≥ 3.3
EUROIMMUN	Anti-SARS-CoV-2 ELISA (IgG)	Ratio ≥ 3.5
GenScript	cPass SARS-CoV-2 Neutralization Antibody Detection Kit	Inhibition ≥ 68%
Kantaro	COVID-SeroKlir, Kantaro SemiQuantitative SARSCoV-2 IgG Antibody Kit	Spike ELISA > 47 AU/mL
Mount Sinai	COVID-19 ELISA IgG	Spike ELISA titer ≥ 1:2880
Ortho	VITROS Anti-SARSCoV-2 IgG	S/C ≥ 9.5
Roche	Elecsys Anti-SARSCoV-2	≥ 132 U/mL
Siemens	ADVIA Centaur SARS-CoV-2 IgG (COV2G)	Index ≥ 4.8

Source: Hinton-FDA, 2021.

neutralizing antibodies, with patients presenting a better clinical course.[2,3]

Recent publications have shown better results with the use of CP in the early days of symptom onset, up to 72 h, before clinical worsening has occurred, as late transfusion seems not to provide clinical benefits.[4,5]

Most studies used a single dose of PC, ranging from 200 to 500 mL, infused over one or more days.

Altogether, those studies suggest that CP transfusion, containing high-titer neutralizing antibodies, can be of clinical benefit, for specific groups of patients, if administered early.

Potential risks associated with PC transfusion are no greater than those of plasma use in other situations.[6] It is worth mentioning, in specific ways, the possibility of circulatory overload risk, especially in elderly patients and in those with renal failure or heart disease, who are less able to tolerate sudden increase in circulating volume and TRALI. For the latter situation, it is considered prudent to use plasma from nulliparous donors, or from donors who had not previously received a hemocomponent transfusion.

Finally, it is determined that the collected CP units contain adequate levels of neutralizing anti-SARS-CoV-2 antibodies. The ideal test for determining these titers is the neutralizing antibody activity test.[7] However, this test is labor-intensive, hard-to-perform and scarcely available, and requires a level III biosafety laboratory.

There have been some studies reporting satisfactory results with results obtained by traditional enzyme immunoassay methods, such as Elisa and chemiluminescence, where the intensity of the reading (OD) seems to correlate well with neutralizing antibody titers[8,9] (Table 1).

In summary, consider using CP, in patients with COVID-19, in the situations and ways described below:

1 Immunosuppressed patients (especially those treated with anti-CD20 monoclonal antibodies).
2 Elderly patients (≥ 60 years old).
3 Patients with comorbidities: diabetes mellitus, hypertension, coronary heart disease and obesity.
4 CP with high-titer neutralizing antibodies (≥ 80), or high DO.
5 Within 72 h of symptom onset.

Conflicts of interest

The authors declare no conflicts of interest.

REFERENCES

1. Casadevall A, Pirofski LA. The convalescent sera option for containing COVID-19. J Clin Invest. 2020;130(4):1545–8.
2. Maor Y, Cohen D, Paran N, Israely T, Ezra V, Axelrod O, et al. Compassionate use of convalescent plasma for treatment of moderate and severe pneumonia in COVID-19 patients and association with IgG antibody levels in donated plasma. EClinicalMedicine. 2020;26(September):100525.
3. Joyner MJ, Carter RE, Senefeld JW, Klassen SA, Mills JR, Johnson PW, et al. Convalescent plasma antibody levels and the risk of death from Covid-19. N Engl J Med. 2021;(January):NEJMoa2031893, http://dx.doi.org/10.1056/NEJMoa2031893 [Epub ahead of print].
4. Libster R, Pérez Marc G, Wappner D, Coviello S, Bianchi A, Braem V, et al. Early high-titer plasma therapy to prevent severe Covid-19 in older adults. N Engl J Med. 2021;384(7):610–8.
5. Simonovich VA, Burgos Pratx LD, Scibona P, Beruto MV, Vallone MG, Vázquez C, et al. A randomized trial of convalescent plasma in Covid-19 severe pneumonia. N Engl J Med. 2020;(November):NEJMoa2031304.
6. Joyner MJ, Wright RS, Fairweather D, Senefeld JW, Bruno KA, Klassen SA, et al. Safety indicators of COVID-19 convalescent plasma in 5,000 patients. J Clin Invest. 2020;130(9):4791–7.
7. Muecksch F, Wise H, Batchelor B, Squires M, Semple E, Richardson C, et al. Longitudinal analysis of clinical serology assay performance and neutralising antibody levels in COVID19 convalescents. medRxiv [Preprint]. 2020;(August), http://dx.doi.org/10.1101/2020.08.05.20169128, 2020.08.05.20169128.
8. Mendrone-Junior A, Dinardo CL, Ferreira SC, Nishya A, Salles NA, de Almeida Neto C, et al. Correlation between SARS-COV-2 antibody screening by immunoassay and neutralizing antibody testing. Transfusion. 2021, http://dx.doi.org/10.1111/trf.16268 [Epub ahead of print].
9. USA. Food and Drug Administration (FDA). Hinton DM The Authorized COVID-19 Convalescent Plasma. Available at: https://www.fda.gov/media/141477/download. [Accessed 26 February 2021].