ISSN: 2652-4414

Annals of
Medical & Surgical Case Reports

Short Commentary

Karpas A. Ann Med &Surg Case Rep: AMSCR-100053

Passive Immunotherapy for Corona Virus (Sars-Cov-2)

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Citation: Karpas A (2020) Passive Immunotherapy for Corona Virus (Sars-Cov-2). Ann Med &Surg Case Rep: AMSCR-100053

Received date: 29 March 2020; **Accepted date:** 01 April, 2020; **Published date:** 10 April, 2020

Introduction

For many disease-causing viruses in man protection is achieved through vaccination in childhood which confers life-long immunity to such as the polio viruses, measles, rubella and mumps. For other viruses such as influenza which continuously mutate, for protection an annual vaccination against the newly emerging strain is needed.

Of the relatively recently discovered disease-causing viruses of man the retro-oncovirus HTLV/ATLV, which was found to cause of Adult T-cell leukaemia (ATL) in Japan [1] and subsequently in some people of African origin, is not easily transmissible, although a significant percentage of the population in some villages in south-west Japan has been found to be infected. It was discovered that most infections occurred shortly after birth during the lactation period through HTLV-infected cells in the milk of mothers, making it possible to achieve a significant reduction of the virus spread in Japan by testing pregnant women for HTLV and preventing positive mothers from breast feeding their newborns (YorioHinuma personal communication).

In contrast enormous efforts and the expenditure of vast sums over the past 35 years have so far failed to develop a vaccine for the zoonotic infection of man with the primate retro-lentiviruses HIV-1 and HIV-2. The reason is that, since HIV is a retrovirus, through its reverse transcriptase it makes a DNA copy that integrates into the DNA of the infected cell and as a result maintains an infectious state for life[2]. Being cytopathic it kills CD4+ T-cells essential for the body's immune responses and by continuously mutating it also escapes thethose defences, in time killing an increasing number of $CD4^+$ T-cells, thereby leading to AIDS [3]. Early on we were able to establish that although both AIDS patients and healthy HIV-infected individuals tested positive for anti-HIV antibodies, AIDS patients had far lower levels of them and, more significantly, were devoid of antibodies that were actually capable of neutralising the virus.

Since during the 80s and 90s there was no beneficial treatment available for HIV we were led to initiate a trial of passive immunotherapy in Cambridge in 1985 [4]. Plasma from healthy HIV-positive individuals who still had a high number of $CD4^+$ T-cells (which we had found to correlate with high level of neutralising antibodies to the virus) was collected by plasmapheresis and given by infusion to patients with advanced AIDS[4-7]. Right from the beginning it appeared that the infusion of the plasma improved the well-being of the AIDS patients; subsequent double-blind controlled studies confirmed a longer-term benefit [8,9]. Long-term treatment with PIT depended on many donors continuing to donate at monthly or bimonthly intervals; and when this was undertaken in London we felt it essential to determine whether repeated donation was detrimental to the donors themselves. Detailed study of the various lymphocyte populations showed no ill effects [10].

Conclusion

Hence what we learned from the treatment of AIDS patients over several years with PIT is that collection of plasma through a plasmapheresis machine, though labour intensive, can be readily done on a substantial scale. Is there any place for it in treating corona-infected individuals, in order to save life and relieve some of the enormous amount of medical and nursing time that it takes to care for the sick? Corona virus is a RNA virus, not a retrovirus, so it does not cause life-long infection. As far as we know the virus cannot be detected in individuals who have recovered from the infection, so it is likely that recovered individuals have developed high levels of antibodies effective against the virus. Until there are effective drugs against coronaviruses, let alone a vaccine, a reasonable suggestion might be to collect plasma from willing healthy young individuals who have recovered from the infection; and use it to infuse firstly into the most vulnerable infected individuals irrespective of clinical symptoms and those who are already symptomatic. (Needless to say subject to all the usual quality controls for blood transfusion).It should not take a

preliminary trial long to establish whether PIT is worth pursuing further.

One can also use a whole blood donation from a virus recovered donor for a patient with the same blood group. The white blood cells of the donor might add further protection

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