References

1 European Commission. *Internal market, industry, entrepreneurship and SMEs: Personal protective equipment (PPE)*. European Commission, 2020. https://ec.europa.eu/growth/sectors/mechanical-engineering/personal-protective-equipment_en
2 Health and Safety Executive. *Fit testing face masks to avoid transmission during the coronavirus pandemic*. HSE, 2020. www.hse.gov.uk/coronavirus/ppe-face-masks/face-mask-ppe-rpe.htm
3 Liu M, Cheng S, Xu K *et al*. Use of personal protective equipment against coronavirus disease 2019 by healthcare professionals in Wuhan, China: cross sectional study. *BMJ* 2020;369:m2195.
4 Health and Safety Executive. *INDG174: Personal protective equipment (PPE) at work*. HSE, 2013.
5 Health and Safety Executive. *The control of substances hazardous to health regulations 2002*, 6th edn. HSE, 2013:31.
6 TUC. *Personal protective equipment and women: Guidance for workplace representatives on ensuring it is a safe fit*. TUC, 2020. www.tuc.org.uk/sites/default/files/PPEandwomenguidance.pdf
7 Foereland S, Robertsen O, Hegseth M. Do various respirator models fit the workers in the Norwegian smelting industry? *Safety and Health at Work* 2019;10:370–6.
8 Lin Y, Chen C. Characterization of small-to-medium head-and-face dimensions for developing respirator fit test panels and evaluating fit of filtering facepiece respirators with different faceseal design. *PLoS One* 2017;12:e0188638.
9 Bailey S, West M. *Ethnic minority deaths and COVID-19*. The King's Fund, 2020. www.kingsfund.org.uk/blog/2020/04/ethnic-minority-deaths-covid-19

Von Willebrand factor

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Editor – Ladikou *et al* have elegantly shown in their series that levels of factor VIII and von Willebrand factor (VWF) are markedly raised in patients with COVID-19 and that there is a reduced level of ADAMTS13 which may be secondary to depletion of the enzyme through consumption.[1] Similar results have been reported by others and there is a growing recognition that COVID-19 may trigger a 'thrombo-inflammatory' cascade that should be targeted.[2–5] Endothelialitis, whether caused by COVID-19 or another septic process, triggers the release of VWF, including the highly biologically active and more adhesive ultra-long VWF that can bind platelets spontaneously via glycoprotein Ib receptors. The ultra-long VWF multimers released from the Weibel–Palade bodies have a lower shear stress for unfolding and therefore may represent the initiating molecules for this self-assembly process which leads to hyper-adhesive strings capturing platelets and the microthrombosis that is now well established as part of the disease.[6–10] This represents the first step in platelet activation and thrombus growth. Under normal conditions ADAMTS13 cleaves VWF and regulates the VWF/platelet interaction, however, this regulatory mechanism may be overwhelmed by the degree of microthrombosis seen in COVID-19 as is suggested by the results presented by Ladikou *et al*. We believe that targeting the initial VWF/platelet interaction with caplacizumab presents an attractive target that may prevent widespread microthrombosis and its clinical sequelae and that this drug may prove be particularly effective for patients that present with abnormally raised VWF, and abnormal VWF / factor VIII ratio or reduced ADAMTS13. We believe that investigation of caplacizumab in these patients warrants urgent investigation. Anfibatide represents an alternative drug with a similar mode of action to caplacizumab and should also be considered high on the list of drugs to be investigated. ■

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References

1 Ladikou EE, Sivaloganathan H, Milne KM *et al*. Von Willebrand factor (vWF): marker of endothelial damage and thrombotic risk in COVID-19? *Clin Med* 2020;20:e178–82.
2 Helms J, Tacquard C, Severac F *et al*. High risk of thrombosis in patients with severe SARS-CoV-2 infection: a multicenter prospective cohort study. *Intensive Care Med* 2020;46:1089–98.
3 Goshua G, Pine AB, Meizlish ML *et al*. Endotheliopathy in COVID-19-associated coagulopathy: evidence from a single-centre, cross-sectional study. *Lancet Haematol* 2020;7:E575–82.
4 Escher R, Breakey N, Lämmle B. Severe COVID-19 infection associated with endothelial activation. *Thromb Res* 2020;190:62.
5 Guglielmetti G, Quaglia M, Sainaghi PP *et al*. 'War to the knife' against thromboinflammation to protect endothelial function of COVID-19 patients. *Crit Care* 2020;24:365.
6 Carsana L, Sonzogni A, Nasr A *et al*. Pulmonary post-mortem findings in a series of COVID-19 cases from northern Italy: a two-centre descriptive study. *Lancet Infect Dis* 2020;20:P1135–40.
7 Tee A, Wong A, Yusuff T, Rao D, Sidhu P. Contrast-enhanced ultrasound (CEUS) of the lung reveals multiple areas of microthrombi in a COVID-19 patient. *Intensive Care Med* 2020 [Epub ahead of print].
8 Ciceri F, Beretta L, Scandroglio AM *et al*. Microvascular COVID-19 lung vessels obstructive thromboinflammatory syndrome (MicroCLOTS): an atypical acute respiratory distress syndrome working hypothesis. *Crit Care Resusc* 2020;22:95–7.
9 Fox SE, Akmatbekov A, Harbert JL *et al*. Pulmonary and cardiac pathology in covid-19: the first autopsy series from New Orleans. *medRxiv* 2020;2020.04.06.20050575.
10 Jung EM, Stroszczynski C, Jung F. Contrast enhanced ultrasonography (CEUS) to detect abdominal microcirculatory disorders in severe cases of COVID-19 infection: First experience. *Clin Hemorheol Microcirc* 2020;74:353–61.