


LETTER TO THE EDITOR

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C-reactive protein in water leakage from gas exhaust of polypropylene oxygenators



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Main text

We present the results of C-reactive protein (CRP) on condensation and water loss from gas outlet of oxygenator during cardiopulmonary bypass (CPB).

According to these previous studies, blood plasma can evaporate at the liquid–membrane interface and diffuse as water vapor diffuses across the pores into the intraluminal gas phase [1].

In this correspondence, we emphasize that little is known about the propagation of the condensation formed at the level of oxygenator and how potentially it can contaminate the surrounding environment. We have recently quantified the production of water vapor produced by the oxygenators, comparing different types of polypropylene fibers for conventional CPB and polymethylpentene (PMP) for ECMO management, with different results in oxygenation in relation to temperature management and to the evacuation with negative pressure of the oxygenator gas outlet. The aspiration use in the gas outlet could favor both the elimination of condensation, particularly in PMP oxygenators, and gas exchange. In other words, if the heat exchanger of the oxygenator was used for a long time, this resulted in an increased production of steam and a reduced oxygenating performance with an accumulation of condensed liquid of 6 mL after 120 min [2]. Our analysis, which sets a cutoff at 120 min, suggests trying to contain CPB time, but if the intervention requires longer CPB times, this obviously will be done without limiting the completeness and accuracy of the procedure.

In the human body, amyloids have been linked to the development of various diseases. About 10% of amyloid deposits are made up of C-reactive protein (7–13 nm in diameter), normally found in the blood, which increases in inflammatory states [2].

Twenty water loss samples were collected at the Anthea Hospital institution for the polypropylene fiber oxygenating modules (10 inspire 6F, LivaNova, UK, and 10 Alone, Eurosets, IT), after 120 min of extracorporeal circulation during cardiac surgery procedures. For samples, we used a sterile tube connected to the gas outlet of oxygenator to a sterile container subjected to control negative pressure of – 8 mmHg [2]. Six milliliters of condensate was collected per oxygenator at the end of the procedures, which were subjected to a quantitative spectrophotometric determination of C-reactive protein (CRP). The analysis was performed on an automated AU480 analyzer by Beckman Coulter with a turbidimetric method; the measurement of the decrease in the intensity of the light transmitted through suspended particles in solution is the result of complexes formed during the antigen-anti-CRP antibody reaction. In the 20 condensate samples analyzed for the quantitative spectrophotometric determination of C-reactive protein (CRP), for samples was found 0.15 (± 0.3) mg/L almost 10% of the serum value. These measured values show indirectly a possible smaller pathogen passage with condensation through polypropylene oxygenator fiber; however, further investigations are needed to confirm these preliminary results.

Abbreviations

CRP: C-reactive protein; CPB: Cardiopulmonary bypass; PMP: Polymethylpentene; ECMO: Extracorporeal membrane oxygenation

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Authors' contributions

IC designed the work with the acquisition analysis and interpretation of data. AF gives supervision and support for the data collection. GS did the statistical analysis and language support. MM gave contribution for the laboratory analysis and data interpretation. GS gave supervision and logistic support. The authors read and approved the manuscript.

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