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Special section involvement of lipids in the occurrence of COVID-19

In relation to the current COVID-19 pandemic caused by severe acute respiratory syndrome-coronavirus-2 (SARS-CoV-2), there has been an explosion in the number of scientific projects and associated publications on this topic. Together with the members of the scientific council of the GERLI (Groupe d'Etude et de Recherche en Lipidomique, www.gerli.com), the French lipidomics society, we realized however that very few relevant ideas and articles were based on the potential roles of lipid molecules in the occurrence of COVID-19. The starting idea of the present special section was therefore to put lipids back at the heart of scientific hypotheses aimed at understanding and potentially fighting the pandemic that is currently hitting us. Yet, lipids may interact at different levels of the viral infection, e.g. either on the membrane organization of the host cells for the potential retention of the virus inside the cell or at the physiological level *via* the role of obesity. Lipids may also provide beneficial effects against the infection by anti-inflammatory fatty acids and derivatives. To illustrate this hot topic, the present special section of Biochimie, entitled "Involvement of lipids in the occurrence of COVID-19", presents 7 articles (3 Review articles and 4 Hypothesis articles) focusing on the involvement of lipid molecules at different levels of the SARS-CoV-2 infection and COVID-19 occurrence and consequences.

The first review article of this special section, by Zhang et al., summarizes the current knowledge on how coronavirus remodels host membranes during replication and assembly, focusing on the formation of coronaviral double-membrane vesicles (DMV). Then, in relation to the worldwide burning debate about antiviral efficacy of chloroquine and hydroxychloroquine, the Hypothesis article by Carrière et al. reveals the "phospholipidosis" effect of chloroquine, and describes the endosomal specific lipid Bis(Monoacylglycerol)-Phosphate (BMP) as a potential key player in the mechanism of action of the chloroquine molecule. The following review by Luquain-Costaz et al. additionally focus on the role of BMP in lipid sorting and degradation along the endocytic pathway, potentially affecting virus infection.

Noting the high prevalence for obesity in patients with severe COVID-19, the Hypothesis article by Dugail et al. describes thereafter the possible molecular links between excess of adipose tissue and the severity of the disease, and proposes some aspects of obese patients' metabolic phenotyping, to help stratification of

individuals with high risk of severe disease. Considering now the possible adverse consequences of treatments in COVID-19 patients with pre-existing metabolic dysfunction-associated fatty liver disease, the following Hypothesis article by Ferron et al. warns against the risk of hepatotoxicity and liver injury of some drugs whose metabolic side effects are not fully understood.

Next, the Hypothesis article by Thibault et al. suggests that, due to their described anti-inflammatory effect, dietary supplementation with omega-3 polyunsaturated fatty acids may be beneficial to reduce the risk of coronavirus complications, progressing to Acute Respiratory Distress Syndrome, with the need for artificial ventilation in Intensive Care Unit. Finally, the Review article by Lagarde et al. focuses on specific dihydroxy-derivatives from polyunsaturated fatty acids called poxytrins and suggests that these molecules, especially protectin DX derived from docosahexaenoic acid (DHA), may inhibit inflammation associated with cyclooxygenase activities and reactive oxygen species formation.

We thank all the researchers who have answered our invitation to contribute to this special section. We also thank the regional editor of Biochimie, Dr Claude Forest, and the editorial assistant Malika Hassini for handling the review process and assembling this special section. We hope that the ideas and hypotheses developed in this special section will contribute to the scientific emulation necessary to advance in the fight against COVID-19.

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