

An ancient coronavirus from individuals in France, circa 16th century.

Hamadou Oumarou Hama¹, Thomas Chenal²., Olivier Pible³, Guylaine Miotello³, Jean Armengaud³, Michel Drancourt¹.

1. Aix Marseille Univ., IRD, MEPHI, IHU Méditerranée Infection, Marseille, France.
2. CNRS, UMR 6298 ArTeHiS, France.
3. Université Paris-Saclay, CEA, INRAE, Département Médicaments et Technologies pour la Santé (DMTS), SPI, 30200 Bagnols sur Cèze, France.

Abstract

Background

At the time when the COVID-19 pandemic was responsible for more than six million deaths worldwide, the antiquity of Coronaviruses remains undefined. We investigated individuals buried in 16th century in France, for the direct and paleoserological diagnosis of Coronavirus.

Methods

The 2011-2012 excavation of abbey Saint-Pierre in Baume-les-Messieurs, France uncovered 12 skeletons of individuals ranging from the 13th-18th centuries. Total proteins extracted from dental pulps were subjected to microbial paleoserology targeting the Coronavirus SARS-CoV-2, HCoV-229E and OC43 antigens and for Coronavirus peptide research using metaproteomics; in parallel to negative controls.

Results

Three peptide sequences totaling 36 amino acids indicative of a Coronavirus were retrieved from dental pulp remains collected from two individuals buried circa at 16th century, in whom paleoserology confirmed a specific immunological response against modern-day SARS-CoV-2 and HCoV-229E.

Conclusions

We provide serological and proteomic evidence for a betacoronavirus with no modern correspondent, infecting 16th century populations, extending the antiquity of coronaviruses by more than three centuries. Historical, archaeozoological and paleoproteomic data suggested close contacts between these two individuals and domestic swine, cattle, and poultry, suggesting an ancient zoonotic coronavirus. Coronaviruses have been undesirable companions of populations long before the ongoing coronavirus disease 2019 outbreak emerged.

Keywords: Coronavirus, dental pulp, paleoserology, paleoproteomic, SARS-CoV-2, 229E.