XRNA SARS-CoV-2 Orange

Virus RNA FISH

Order No.:
R-0101-020-OR

Description

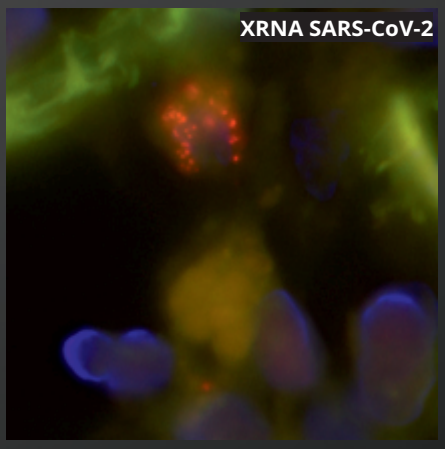
The XRNA SARS-CoV-2 probe kit comprises 96 oligos detecting the spike glycoprotein mRNA of SARS-CoV-2 and a portion of the viral ORF1 mRNA. We are using the proprietary HuluFISH enzymatic multi fluorophore labeling technique enabling the detection of RNA at the single-cell, single-molecule level in cell and tissue samples. The probe kit is labeled in orange (Atto565).

Clinical Details

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), a novel human-pathogenic coronavirus causing coronavirus disease 2019 (COVID-19), was first reported in December 2019. The virus spread quickly, leading to the global COVID-19 pandemic. SARS-CoV-2 primarily causes respiratory infections but is also known to affect other organ systems. While most patients show mild clinical symptoms, severe COVID-19 is characterized by viral pneumonia and acute respiratory distress syndrome. In addition to respiratory symptoms, systemic inflammation and cytokine storm can lead to multiorgan failure and death.

Coronavirus particles consist of four structural proteins called spike (S), envelope (E), membrane (M) and nucleocapsid (N) protein. The SARS-CoV-2 genome is approximately 30kb in size and consists of a positive-sense, single-stranded RNA. It functions not only as viral genome but also as mRNA. The genome contains 10 open reading frames (ORFs) which encode 24-27 genes.

A well-studied cell entry mechanism of SARS-CoV-2 is mediated by the viral S protein, which uses angiotensin-converting-enzyme (ACE2) on the surface of host cells as an attachment receptor. After viral attachment, the S protein is cleaved by the host transmembrane serine protease TMPRSS2 leading to membrane fusion and the release of the viral genome into the cytoplasm.



XRNA SARS-CoV-2 probe (orange) is hybridized to tissue of a SARS-CoV-2 positive patient. DAPI (blue) was used for nucleus staining.

Note

For Research Use Only (RUO). Not for diagnostic procedures.
Powered by HuluFISH technology from PixelBiotech.

Literature

- Nishiga et al (2020) Nat Rev Cardiol 17:543-558
- Khailany et al (2020) Gene Rep 19:100682
- Liu et al (2020) JCI Insight 5:e139042

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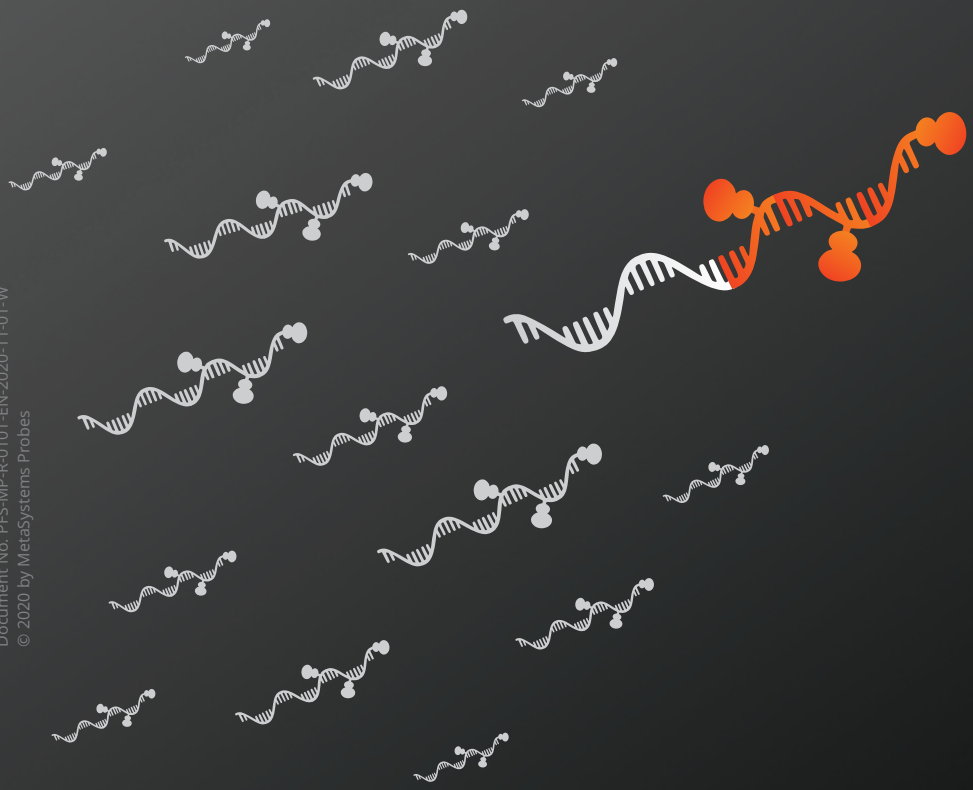
The first viral proteins translated are the polyproteins pp1a and pp1ab which are then cleaved into non-structural proteins by viral proteases. One of them is the RNA-dependent RNA polymerase (RdRP), which replicates the viral genome. After replication, the viral RNA and N proteins are assembled into nucleocapsids within the cytoplasm. Budding of new particles takes place at the membrane of the endoplasmic reticulum–Golgi intermediate compartment. Finally, the new viral particles are assembled and released via exocytosis.

The viral replication machinery uses the genomic positive-sense RNA as a template to synthesize a negative-sense antigenomic RNA. This negative-sense RNA then serves as a matrix for genomic RNA synthesis. Therefore, the presence of minus-strand RNA indicates viral RNA replication. RNA in situ hybridization and multiplex FISH analysis have shown differential distribution of the positive- and negative strand RNA within the cell. The positive-sense RNA showed distribution in the cytoplasm, while the negative-sense RNA was detected in perinuclear inclusion bodies, corresponding to the localization of the viral RNA replicase-transcriptase complex.

XRNA SARS-CoV-2 opens up manyfold possibilities for COVID-19 research:

Semi-quantitative virus identification on a cellular level, application in pre-clinical studies for vaccines and therapeutics and analysis of cell-, tissue-, and organ-tropism are some examples of the possible applications. And the list goes on: analysis of the cell response to infection, analysis of sub-cellular RNA distribution, analysis of the end of infectivity and more!



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