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## **July COVID-19 Report**

### **COVID-19 Forecasts – Antimicrobial Coatings Market 2020-2024 – July 28, 2020**

<https://www.businesswire.com/news/home/20200728005743/en/Research-Report-COVID-19-Forecasts---Antimicrobial-Coatings>

- The antimicrobial coatings market is expected to grow by USD 682.06 million during 2020-2024
- In order to reduce the incidence of nosocomial infections caused by unhygienic conditions in hospitals and hospital environments, hospitals are increasing the use of antimicrobial coated catheters, surgical instruments, and wall cavities as they inhibit the growth of microbes
  - o This is contributing to the growth of the global antimicrobial coatings market
- There is also an increased demand for antimicrobial coated packaging materials
  - o To improve shelf life and reduce wasting of food
- Antimicrobial coatings are also used in vessels and containers that are used to process, store, ship, and pack food products
- The increasing consumption of packaged food is expected to have a positive impact on the growth of the global antimicrobial coatings market
- The North American region led the antimicrobial coatings market in 2019
  - o Followed by Europe, Asia-Pacific, South America, and Middle East and Africa

### **EU sees deeper recession with less steep rebound due to COVID-19 – July 7, 2020**

<https://ca.reuters.com/article/businessNews/idCAKBN2480ZG>

- The euro zone economy will drop deeper into recession this year and rebound less steeply in 2021 than previously thought
- France, Italy, and Spain struggle the most due to the COVID-19 pandemic
- There is also concern that the U.S. recovery may also be faltering due to surges of new COVID-19 cases prompts states to delay and reverse plans to let stores reopen and activities resume
- In early May, the Commission had a forecast a 2020 downturn of 7.7% and a 2021 rebound of 6.3% in the EU
  - o This has now been revised due to lockdown measures in euro zone countries proceeding less swiftly than anticipated
- The now expected downturns in excess of 10% this year in France, Italy, and Spain
- In Germany, the Commission moderated its estimates both of 2020's downturn (6.3% from 6/5% forecast in May) and next year's rebound
  - o Widespread testing in Germany has helped limit fatalities
- Economics Commissioner Paolo Gentiloni has states that to reduce risks of a second recession EU fiscal rules could remain frozen even after growth returns next year
  - o Requirements that states keep fiscal deficits below 3% of gross domestic product and reduce high debt have been suspended during the pandemic
  - o This is an unprecedented move
- Inflation forecasts were little changed at 0.3% this year and 1.1% in 2021



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- The still rising rate of infections on the global level, particularly in the U.S., has deteriorated the global outlook and is expected to act as a drag on the European economy

### **Study: Coronavirus antibodies may last only few months affect infection – July 14, 2020**

<https://weather.com/en-IN/india/coronavirus/news/2020-07-14-coronavirus-antibodies-may-last-only-few-months-infection-study>

- German researchers suggest that coronavirus antibodies may not remain in the body for long
  - o May only last a few months in recovered patients
- New results reduce hope for a vaccine or collective immunity
- 4 out of 9 patients showed a significant drop in the number of neutralizing antibodies in a special test that was carried out in a high-security laboratory
  - o This was done at a clinic in Munich
- This study suggests that recovered patients could become re-infected, although further tests have yet to confirm this
- This finding is consistent with other studies around the world
  - o Another study published in the journal Nature Medicine revealed the same results
  - o A Spanish study published this month in the journal The Lancet also found that only 5% of the population in Spain has developed antibodies (nowhere near the levels needed to achieve “herd immunity”)

### **Company in Markham, Ontario Canada developed forecasting model to manage second wave of COVID-19 – July 21, 2020**

<https://www.yorkregion.com/news-story/10079382-markham-company-develops-forecasting-model-to-manage-second-wave-of-covid-19/>

- A Markham-based company, Scarsin, has developed a modelling platform that can help plan and predict the evolution of the diseases, help reduce the spread of infection and inform public and private policies in terms of prevention
- Founder and chief executive Paul Minshull states that within minutes, decision makers will be able to get a forecast that will help them understand the best moved to keep citizens safe and manage the spread of the virus while stimulating the economy
- Since March, the group of data scientists and modelling experts have been working on a platform that bring together multiple sources of data to help forecast for numerous COVID-19 variables
- The company’s modelling feed in factors such as commuting, international travel, occupation, density, gender, age, presymptomatic transmission, how people live and congregate and contact tracing to study different scenarios, various infection rates and environmental factors



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- Scarsin is currently working with a large Ontario municipality to help predict and plan for a number of scenarios, including reopening schools and flue season in the fall
- Modelling and simulation tools can help governments, companies, school boards, and universities weight the risks of different reopening options with the goal being to reduce the probability of indoor contagion
- Scarsin recently shared its platform with various health units but hasn't seem much interest at the federal or provincial level

### **Bad UK winter could cause 120,000 hospital deaths linked to COVID-19 – July 14, 2020**

<https://www.newscientist.com/article/2248691-a-bad-uk-winter-could-cause-120000-hospital-deaths-linked-to-covid-19/>

- The Academy of Medical Sciences report predicts a worse-case scenario that a particularly challenging winter could bring a second wave of COVID-19 infections that leads to around 120,000 deaths in UK hospitals
  - o This is twice as many as the first wave
- The R number (average number of people 1 person with the virus goes on to infect) could rise from the current estimate of between 0.7 and 0.9 to 1.7 by September
- This would lead to a second wave of infections peaking in January and February of next year
- The team considered the known impact of COVID-19 on healthcare resources, combined with that of flue and other seasonal infections
- They also looked to the experiences of other countries
- They estimate that the UK can expect around 119,900 hospital death related to COVID-19 over the winter
  - o This figure could lie somewhere between 24,500 and 251,000
  - o This does not include deaths that occur outside hospitals
  - o This is more of an estimate than a prediction
- One important approach will be limiting the impact of seasonal flue
  - o An adequate supply of the flu vaccine will be vital in the autumn
- Widespread flu and COVID-19 testing will be important so people know which virus they have and so their care can be managed appropriately
- Researchers also suggest that the UK use facilities made available during the coronavirus outbreak to clear the backlog of routines and elective procedures that have accumulated since the spring
- It will also be important to ensure that hospitals and care home have enough personal protective equipment
- They say that if measures successfully limited the R number to 1.1, the outcome would be very different

### **The effect of Dexamethasone on COVID-19 patients**

<https://www.newscientist.com/term/dexamethasone/>

- Dexamethasone is the first medicine shown to reduce deaths from COVID-19
  - o Is a steroid which damps down the immune system
- For people with severe COVID-19, the immune system overreacts
  - o Immune cells congregate in the lungs, releasing high levels of immune signaling chemicals called cytokines, which attract more immune cells
  - o This is called a cytokine storm and leads to excessive inflammation in the lungs with fluid leaking into the air spaces, hindering intake of oxygen
- Steroid drugs like dexamethasone are often used to treat other diseases caused by an overreactive immune system such as allergies
  - o They have also been used previously to treat people in intensive care with lung inflammation
- However, since steroids reduce the immune system's ability to fight bacteria, it is unclear if they would be beneficial overall in COVID-19, as there is a risk that patients develop secondary bacterial infections
- In a large randomized trial, patients with severe COVID-19 were given dexamethasone or placebo in the UK
- In people who were on ventilators, 41% of those who got the placebo died, while 29% of those who got the steroid died
  - o This is a relatively large effect, compared with drug treatments for other diseases
- There was also a smaller survival advantage in people who were less severely ill and needed supplementary oxygen but weren't on a ventilator
- Dexamethasone gave no survival benefit for hospital patients with COVID-19 who were not sick enough to need extra oxygen
- This is the first medicine shown to lower the death rate in COVID-19 patients
- Full report: <https://www.medrxiv.org/content/10.1101/2020.06.22.20137273v1>

### **The potential role of T-cells in the fight against COVID-19 – July 20, 2020**

<https://www.bbc.com/future/article/20200716-the-people-with-hidden-protection-from-covid-19>

- Scientists first discovered patients who had recovered from infection with COVID-19 but didn't have any antibodies against it
  - o This was then found to be the case for a significant number of people
- Then, there were findings that many of those who develop antibodies seem to lose them again after a couple of months
- This points to the fact that antibodies do not have the leading role in immunity that was once thought
- Researchers have started to realize that an enigmatic type of white blood cell may prove to be crucial in the fight against COVID-19
- T cells are a kind of immune cell, whose main purpose is to identify and kill invading pathogens or infected cells
  - o It does this by using proteins on its surface, which can bind to proteins on the surface of imposters



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- Each T cell is highly specific
  - o There are trillions of possible versions of these surface proteins and each recognizes a different target
- Since T cells hang in the blood for years after an infection, they also contribute to the immune system's "long term memory"
  - o This allows it to mount a faster and more effective response when its exposed to a virus it has already encountered
- Several studies have shown that people infected with COVID-19 tend to have T0cells that can target the virus
  - o This is regardless of whether they have experienced symptoms
- Scientists have also recently discovered that some people can test negative for antibodies against COVID-19 and positive for T cells that can identify the virus
- Bizarrely, when researchers tested blood samples taken years before the pandemic started, they found T cells which were specifically tailored to detect proteins on the surface of COVID-19
  - o This suggests that some people already had pre-existing degree of resistance against the virus
  - o 40-60% of unexposed individuals had these cells
- Looking at COVID-19 patients, it is clear that there are T cell responses
  - o This is great news for those who are interested in vaccines because it is possible to make antibodies and T cells that see the virus
- One vaccine developed by the University of Oxford has already been shown to trigger the production of these cells, in addition to antibodies
  - o Still too early to know how protective the response will be, but the results are promising
- In many patients who are hospitalized with more serious COVID-19, the T cell response hasn't quite gone to plan
  - o Seeing that the cells are disappearing from the blood
- Autopsies of COVID-19 patients are revealing necrosis – a sort of rotting
  - o This is particularly evident in the areas of the spleen and lymph glands where T cells normally live
  - o Spleen necrosis is a hallmark of T cell disease, in which the immune system themselves are attacked
- Dwindling T cells may also be why the elderly are much more severely affected by COVID-19
- NO one has ever verified if people make T cells against any of the coronaviruses that give rise to the common cold
  - o Getting funding to study this could be difficult as research into the common cold fell out of fashion in the 1980s
- If old exposure to cold viruses really are leading to milder cases of COVID-19, this could aid in the development of a vaccine
  - o As it is proof that lingering T cells can provide significant protection, even years after they were made



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- Even if this is not the case, the involvement of T cells could be beneficial

### **COVID-19 Vaccine developed by Oxford University – July 21, 2020**

<https://www.bbc.com/future/article/20200721-coronavirus-vaccine-trial-what-its-like-to-participate>

- A trial involving 1077 people showed that the vaccine, ChAdOx1, Co-V-19, developed by the University of Oxford, led to them making antibodies and T cells that can fight the coronavirus
- This finding is hugely promising - but still too soon to know if this is enough to offer protection
  - o Larger trials are under way
  - o The UK has already ordered 100 million doses of the vaccine
- The vaccine is made from a genetically engineered virus that causes the common cold in chimpanzees
  - o Has been heavily modified so it cannot cause infections in people and to “look” more like coronavirus
  - o Did this by transferring the genetic instructions for the coronavirus’ “spike protein” to the vaccine
  - o This means the vaccine resembles the coronavirus and the immune system can learn how to attack it
- Levels of T cells peaked 14 days after vaccination and antibody levels peaked after 28 days
  - o The study has not run for long enough to know how long they may last
- The study shows 90% of people developed neutralizing antibodies after one dose
- Only 10 people were given 2 doses and all of them produced neutralizing antibodies
- There are no dangerous side-effects from taking the vaccine, however, around 17% had fever and more than 6 in 10 patients had a headache
  - o This could be managed with paracetamol
- The study cannot show whether the vaccine can either prevent people from becoming ill or lessen their symptoms of COVID-19
- More than 10,000 people will take part in the next stage of the trials in the UK
  - o Trial has also been expanded to other countries
  - o There will be a large trial involving 30, 000 people in the US and 2,000 in South Africa and 5,00 in Brazil
- It is possible a coronavirus vaccine will be proven effective before the end of the year, however, it will not be widely available
  - o Health care workers and people deemed at high risk of COVID-19 due to age or medical conditions will likely be prioritized
- Widespread vaccination is likely to be, at the earliest, next year
- There are a total of 23 coronavirus vaccines in clinical trials around the world and another 140 in early stage development
- The UK government has struck deals for 190 million doses of different vaccines
  - o 100 million doses of the Oxford vaccine





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- 30 million doses of the BioNtch/Pfizer vaccine (injects part of the coronavirus' genetic code)
- 60 million of the Valneca inactivated coronavirus

### **Pfizer and BioNtech announce early positive data from an ongoing phase ½ study of mRNA-based vaccine candidate against SARS-CoV-2 – July 1, 2020**

- Full report: <https://www.medrxiv.org/content/10.1101/2020.06.30.20142570v1>
- Pfizer and BioNTech's BNT162 program is evaluating at least 4 experimental vaccines
  - Each represents a unique combination of mRNA format and target antigen
- The preliminary data demonstrates that BNT162b1 could be administered in a dose that was well tolerated and generated dose dependent immunogenicity, as measured by RBD-binding IgG concentrations and SARS-CoV-2 neutralizing antibody titers
- This study provides an initial signal that BNT162b1 targeting the RBD SARS-CoV-2 is able to produce neutralizing antibody responses in humans at or above the levels observed in convalescent sera, at a relatively low dose levels
- The ongoing U.S. Phase ½ randomized, placebo-controlled, observer-blinded study is evaluating the safety, tolerability, and immunogenicity of escalating dose levels of BNT162b1
  - Initial part of the study included 45 healthy adults 18-55 years of age
- Preliminary data for BNT162b1 was evaluated for 24 subjects who received 2 injections of 10µg, 12 subjects who received a single injection of 100 µg, and 9 patients who received 2 doses of placebo control
- The participants received 2 doses, 21 days apart of placebo, 10 µg or 30 µg of BNT162b1, or received a single dose of 100 µg of the vaccine candidate
- The highest neutralizing titers were observed 7 days after the second dose on day 28 after vaccination
  - The neutralizing GMTs were 168 and 267 for the 10 µg and 30 µg dose levels, respectively
  - This corresponds to 1.8 and 2.8 times the neutralizing GMT of 94 observed in a panel of 38 sera from subjects who had contracted SARS-CoV-2
- In all 24 subjects who received 2 vaccinations at 10 µg and 30 µg dose level of BNT162b1, elevation of RBD-binding IgG concentrations was observed after the second injection with respective GMCs of 4,813 and 27,872 units/ml at day 28
  - These concentrations are 8- and 46.3 times the GMC of 602 units/ml in a panel of 38 sera from subjects who had contracted SARS-CoV-2
- After day 21 after a single injection, the 12 subjects who received 100 µg of BNT162b1 had an RBD-binding IgG GMC of 1,778 units/ml and a SARS-CoV-2 neutralizing GMT of 33, which are 3 times and 0.35 times, respectively, the GMC and GMT of the convalescent serum panel
- At the 10 µg and 30 µg dose levels, adverse reactions such as low-grade fever, were more common after the second dose than the first

- The most commonly reported local reaction was injection site pain – mild to moderate except in 1 of 12 subjects who received a 100 µg dose, which was severe
- Since a higher number of subjects experiencing local reactions and systematic events after a single 100 µg dose with no significant increases in immunogenicity compared to the 30 µg dose level, the 12 participants in the 100 µg group were not administered a second dose
- The BNT162b1 candidate remains under clinical study and is not currently approved for distribution anywhere in the world
- If ongoing studies are successful and the vaccine candidate received regulatory approval, the companies expect to manufacture up to 100 million doses by the end of 2020
  - o Potentially more than 1.2 billion doses by the end of 2021
- The development of the vaccine is supported by partners like Acuitas Therapeutics – they provide lipid nanoparticles (LNP) for the formulation of various mRNA vaccines

### **How COVID-19 may affect the brain – June 2020**

<https://www.bbc.com/future/article/20200622-the-long-term-effects-of-covid-19-infection>

- A doctor at Strasbourg University Hospital in northeast France in early March 2020 noticed that many of the patients in the ICU with COVID-19 were agitated and had neurological problems – mainly confusion and delirium
  - o Julie Helms and her colleagues published a small study in the New England Journal of Medicine documenting the neurological symptoms in their COVID-19 patients
- Researchers in Wuhan had noticed that same in their patients in February
- Now more than 300 studies world-wide have found a prevalence of neurological abnormalities in COVID-19 patients
  - o Including mild symptoms like headaches, loss of smell and tingling sensations
  - o Up to more severe ones like aphasia (inability to speak), strokes, and seizures
- There have also been findings that the virus can also have an adverse effect on the kidney, liver, and heart
- It is estimated that roughly 50% of patients diagnosed with Sars-Co-V-2 have experienced neurological problems
- There is a significant percentage of COVID-19 patients whose only symptom is confusion – no cough or fatigue
- The novel coronavirus also disproportionately affects men: up to 70% of people admitted to ICUs worldwide have been male
  - o Although men and women have been infected at equal rates
- A large number of COVID-19 patients have been found to have oxygen saturation levels below 70%, even below 60%, yet remain fully conscious and cognitively functional



- COVID-19 virus can affect many different organ systems and patients can die from lung or kidney failure, blood clots, liver abnormalities, and neurological manifestations
- COVID-19 patients also seem to have a lack of sensitivity to the drug normally used – need to be administered 5 to 10 times the amount of drugs for sedation than normal
- Most researchers believe the neurological effect of the virus are an indirect result of either oxygen starvation to the brain or the byproduct of the body's inflammatory response
  - o Researchers believe the neurological effects are cytokine-mediated
- However, others are uncertain as there is evidence starting to accumulate demonstrating that the virus can actually invade the brain itself
- In some countries like Japan, China, and Italy, the Sars-CoV-2 virus has been found in the cerebrospinal fluid and in the endothelial cells lining the blood vessels of the brain
- Some scientists suspect that the virus causes respiratory failure and death not through damage to the lungs but through damage to the brainstem
- If Sars-CoV-2 can cross the blood-brain barrier, this suggests that not only can the virus get into the core of central nervous system, but that it may remain there, with the potential to return years down the line
- In Baltimore, a long-term study is being planned for COVID-19 patients discharged from the ICU, which will conduct brain scans as well as detailed cognitive tests on functions such as memory capacity
- Through the Global Consortium Study of Neurological Dysfunction in COVID-19, Sherry Chou, a neurologist at the University of Pittsburgh, has coordinated scientists from 17 countries to collectively monitor the neurological symptoms of the pandemic, including through brain scans

### **COVID-19 and heart failure – May 15, 2020**

<https://onlinelibrary.wiley.com/doi/full/10.1002/ejhf.1871>

- Patients with cardiovascular disease and, namely, heart failure are more susceptible to coronavirus disease 2019 and have a more clinical course once infected
- Heart failure and myocardial damage, shown by increased troponin plasma levels, occurs in at least 10% of patients hospitalized for COVID-19
  - o With higher percentages of 25% to 35% or more, when patients who are critically ill or with concomitant cardiac disease are considered
- In some cases, myocarditis have been shown in COVID-19 patients
- Angiotensin -converting enzyme 2 (ACE2) may be up-regulated in patients with cardiac disease and treated with ACE inhibitors or angiotensin receptor blockers
  - o ACE2 up-regulation may increase the susceptibility of COVID-19 but may be also protective against angiotensin II-mediated vasoconstriction and inflammatory activation
- Recent data shows lacks of untoward effects of ACE inhibitors or angiotensin receptor blockers for COVID-19 infection and severity

- The study concludes that there is a high prevalence of cardiac injury following COVID-19
  - o This may be diagnosed only through biomarker measurements
- The clinical implications of the detection of myocardial injury remain uncertain
- No specific treatment is available

### **Flu Vaccine orders up amid COVID-19 fears – July 29, 2020**

<https://www.timescolonist.com/news/local/flu-vaccine-orders-up-amid-covid-fears-1.24176396>

- The government of Canada has increased their orders for the influenza vaccine this year in preparation for a second surge of COVID-19 and simultaneous outbreak of seasonal flu
  - o Order have been placed with suppliers for more than 13 million doses of the influenza vaccine
  - o Last year: 11.2 million were ordered
- The Public Health Agency of Canada also plans to promote the flue vaccine in populations at higher risk of complications from influenza
- In the southern hemisphere, which is experiencing winter, there are very low levels of influenza right now due to protocols put in place for COVID-19 prevention
  
- Post-mortem examinations were done on 14 people who died with COVID-19 at the King County Medical Examiner’s Office in Seattle USA and Snohomish County Medical Examiner’s Office (Everett, USA)
- The median age was 73-75 years
- All patients had clinically significant comorbidities
  - o Most common: hypertension, chronic kidney disease, obstructive sleep apnoea, diabetes, obesity
- The major pulmonary finding was diffuse alveolar damage in the acute or organizing phases
  - o 5 patients showed focal pulmonary microthrombi
- Coronavirus-like particles were detected in the respiratory system, kidney, and gastrointestinal tract
- Lymphocytic myocarditis was observed in one patient with viral RNA detected in the tissue

### **Nanoparticle COVID-19 vaccine elicits immune response in pre-clinical studies – July 21, 2020**

<https://stm.sciencemag.org/content/12/555/eabc9396>

- The vaccine, repRNA-CoV2S, incorporates repRNAs – a type of RNA that elicits a stronger immune response than messenger RNAs
  - o Based on the spike protein of the SARS-CoV-2 coronavirus and the emulsion of nanoparticles to enhance the vaccines immunogenicity and stability
- This vaccines candidate has shown efficacy in pre-clinical trials



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- In experiments involving mice and pigtail macaques the vaccine safely induced antibody production and antiviral T cell responses
- The vaccine generated robust immune responses after a single injection in mice and a second booster injection heightened the vaccine's effects in older mice
- The booster injection also generated strong T cell responses in the spleen and lungs
- Both the single-shot and booster approaches were safe and produced similar responses in macaques that lasted for at least 70 days
- Antibodies from the macaques neutralized quantities of the SARS-COV-2 virus similar to the concentrations observed in the serum of people recovering from the infection
- More studies will be needed to establish whether the vaccine can protect against COVID-19
- They plan to begin clinical development of the vaccine under the name HDT-301

### **Repurposing drug for acute lung injury in COVID-19 – July 2, 2020**

<https://www.news-medical.net/news/20200702/Repurposed-drug-for-acute-lung-injury-in-COVID-19.aspx>

- Drug repurposing is being widely investigated as a way to find treatments rapidly
- A new study addresses the possible use of an FDA-approved monoclonal antibody, called fostamatinib – a spleen tyrosine kinase inhibitor (SYK), to reduce the levels of mucin-1, a molecule associated with acute lung injury and acute respiratory distress syndrome (ARDS)
  - People who have severe COVID-19 disease may develop ARDS
- In June 2020, a research paper titled 'A High Content Screen for Mucin-1-Reducing Compounds Identifies Fostamatinib as a Candidate for Rapid Repurposing for Acute Lung Injury during the COVID-19 pandemic' was published
  - This is not peer-reviewed and therefore, should not be regarded as conclusive
- Drug repurposing has a much lower risk of toxicity compared to newly developed drugs as they have already passed safety trials
- They also take a much shorter time to produce on market scale as several stages of drug development are already complete
- Mucin-1 is an essential protein in restricting the size of the airway passage and is secreted from most of the mucosal epithelium
  - Goblet cells can rapidly secrete mucus which is exocytosed to form a mucus layer over the epithelial lining of the airways when stimulated by specific triggers
  - In a healthy person, mucus in the airways protects the lungs from inhaled bacteria, fungi, and viruses, as well as toxins and dust particles, but too much mucus can sharply reduce the lumen available for air to pass
  - This is therefore associated with more frequent and prolonged infections, impairment of lung function, and a higher number of deaths after a respiratory infection

- The criteria for an acceptable repurposed drug in the study included:
  - o Dose-dependent reduction of mucin-1
  - o Favorable toxicity profile
  - o Non-transcriptional mechanism of action, since transcriptional inhibitors like vitamin D agonists, did not work in clinical situations
  - o FDA-approved
- They then identified the prodrug fostamatinib, which is rapidly converted to the active metabolite R406, as a potential compound for repurposing
  - o They found that this decreased the levels of mucin-1 from epithelial cells while preserving cell viability
  - o The control molecule was the bromodomain inhibitor JQ1, which completely suppresses transcription of mucin 1
- Experiments on animal models have shown this drug to be effective in severe inflammatory conditions such as immune glomerulonephritis or vasculitis disorders
- It is currently undergoing phase II trials to evaluate the effect of SYK suppression in an inflammatory renal disorder called IgA nephropathy
- The drug was approved for the treatment of chronic immune thrombocytopenia and has also been used safely to treat over 3000 patients with rheumatoid arthritis
- Apart from mucin-1, it also regulates the abundance of the gel-like mucin MUC5AC in the human nasal epithelium, and human mucin-producing cells
- The deletion of the Muc1 gene in airway epithelial cells in rats and human lung epithelium causes reduced hypersecretion of mucin, which in turn protects against lung injury
- The researchers supplied a compound called fostamatinib disodium or R788, a methylene phosphate prodrug of R406, that can be orally ingested, to mice and studied the lung tissue
  - o They found that ischemic-reperfusion injury caused acute lung injury, which in turn led to high levels of mucin-1 in the lung epithelium
    - This is consistent with previous reports that excess MUC1 is injurious
  - o When they examined the lung tissue of mice treated with R788, they found significantly reduced mucin-1, as seen by immunohistochemical imaging and quantitative image analysis
- The study thus shows that R406 could be used to reduce mucin-1 levels in the lung epithelium in patients with acute lung injury
  - o This molecule powerfully inhibits SYK, which is a protein tyrosine kinase in the cell cytoplasm, mediating the expression of multiple inflammatory chemicals
- Recent studies show that KL-6/MUC1 levels are reliable prognostic biomarkers of disease severity in patients with COVID-19 related acute lung injury