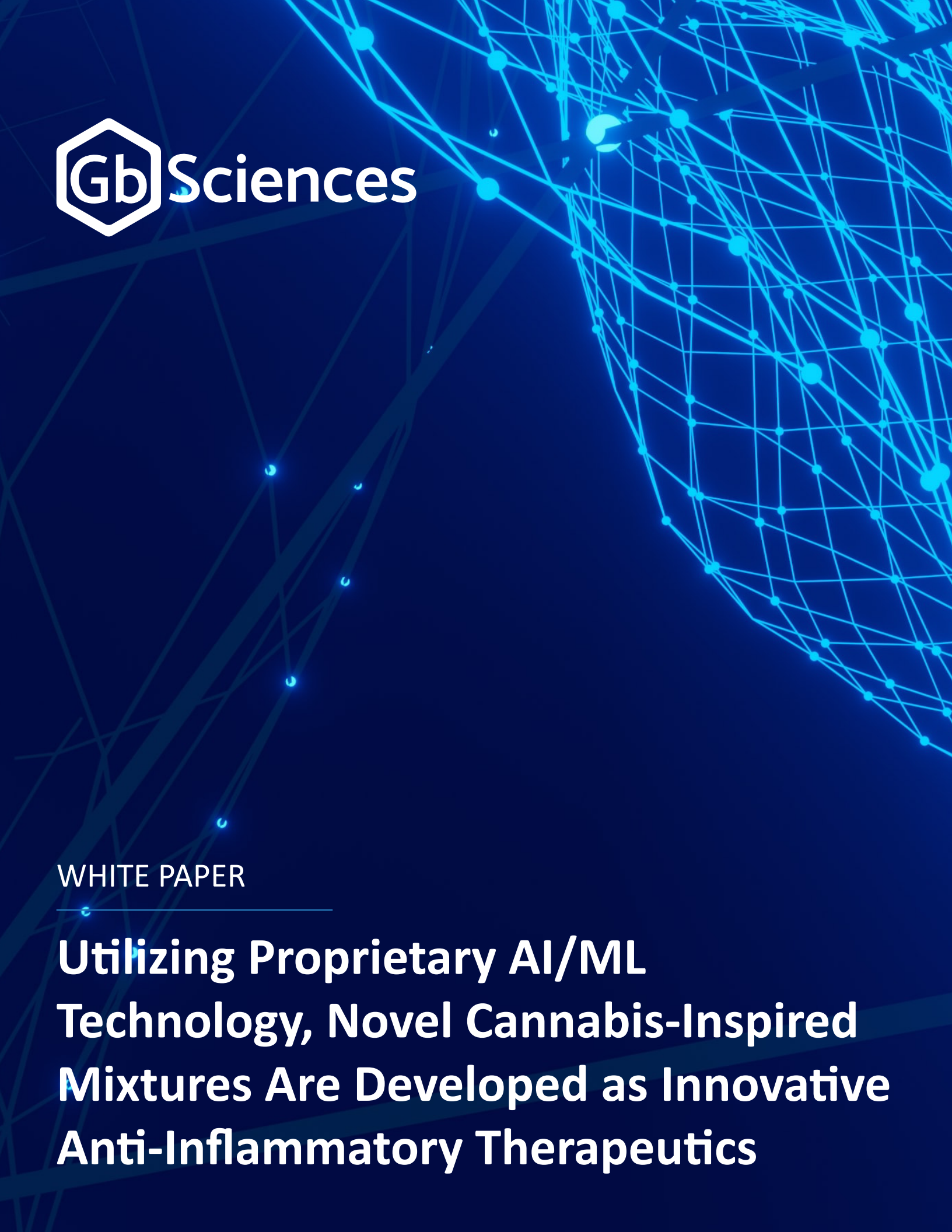

GbSciences

WHITE PAPER

Utilizing Proprietary AI/ML Technology, Novel Cannabis-Inspired Mixtures Are Developed as Innovative Anti-Inflammatory Therapeutics

Gb Sciences' alternative approach to medicines harnesses the power of plant-inspired treatments as simplified mixtures that target dangerous hyperinflammatory responses to viruses.

COVID-19 and the Rise in Viral-Induced Hyperinflammatory Syndromes

More than 540 million people across the world have contracted COVID-19 and 6.3 million have died from the illness since the SARS-CoV-2 virus emerged in late 2019. A hallmark symptom of COVID-19 is massive inflammation throughout the body as the virus infects and alters critical immune cell functions, which sets off a chain reaction often referred to as a 'cytokine storm'. This dangerous phenomenon is also known as cytokine release syndrome (CRS) or hyperinflammation.

Hyperinflammation is the primary cause of many serious adverse reactions and deaths related to COVID-19 and other viral infections, which illustrates the importance of developing new anti-inflammatory drugs. Long COVID symptoms have also been linked to inflammation. Inflammation is a major factor contributing to the progression of many serious chronic conditions such as heart disease, diabetes, neurodegenerative diseases, and cancers, among others. The global market for anti-inflammatory therapies is expected to grow to $191.42 billion by 2027 due to the increasing prevalence of auto-immune and chronic inflammatory disorders.

Gb Sciences, a leading plant-inspired, biopharmaceutical research company, is developing anti-inflammatory, cannabinoid-based therapeutics to help combat viral infections in the future. Its formulations are being developed to treat Cytokine Release Syndrome (CRS). CRS is primarily an immune response caused by infections and by the side effects of certain cancer therapeutics such as Bispecific T-cell engaging (BiTE) single-chain antibody constructs and chimeric antigen receptor (CAR) T-cells that leads to hyperinflammation.

These new CAR T-cell therapies have shown remarkable efficacy in cancer clinical trials, and some have already received regulatory approval. However, as these potent immunotherapeutic agents come into wider use, there is greater awareness of their inherent and potentially fatal adverse effects - most notably, the aforementioned CRS.

Gb Sciences' Plant-Inspired Therapies for Cytokine Release Syndrome

Cytokine release syndrome (CRS) is a severe systemic hyperinflammatory response to infection in which the body responds too aggressively to infection, causing symptoms like fevers and body aches that can rapidly accelerate to life-threatening issues such as reduced heart function and shortness of breath. It can affect multiple systems of the body at once, which can cause organ failure and death.

Gb Sciences has received positive results from the preclinical study of the company's novel CRS therapies, which have demonstrated their potential to reset the body's immune system after hyperinflammation has been triggered. These CRS therapies were designed to reduce the dangerous levels of cytokines triggered by viruses while preserving the immune functions necessary to fight viral diseases.

Gb Sciences' novel CRS therapies are designed to be preventative and taken after exposure or at the first suggestion of illness, instead of being administered when late-stage symptoms developed.

For example, a patient would begin the therapy immediately after exposure to COVID-19, continuing until test results are complete. If the patient tested negative, the treatment would have been moot, with no side effects. However, had the patient tested positive, the Gb Sciences' drug would have been actively working in the background to prevent the hyperinflammatory response that would have accompanied the viral progression.

In May 2022, Gb Sciences announced that FHI Clinical will consult and write Gb Sciences' draft clinical trial protocol for the first-in-human trial of these proprietary cannabinoid-containing formulations. Gb Sciences' therapeutics target the human immune response to viruses, and they could potentially be used to protect against the adverse effects of any sort of viral infection that triggers hyperinflammation.

Research Supports Effectiveness of Gb Sciences' Novel Mixtures

Gb Sciences' data supports the potential of cannabinoids as a treatment option for hyperinflammation. A proof-of-concept study by researchers at Michigan State University evaluated

the potential for Gb Sciences' cannabis-derived mixtures to suppress immunological responses that contribute to virus symptoms.

Gb Sciences utilized its AI-driven drug discovery platform to develop cannabis-inspired minimum essential mixtures (MEM) designed to reduce the levels of specific cytokines and pro-inflammatory processes triggered by the COVID-19 virus, while preserving the immune functions and cytokines necessary to fight the disease.

The Michigan State study, completed in August 2021, tested the potential efficacy of those MEMs using a state-of-the-science human immune model. Immune cells from human donors were co-cultured together in one of four treatment groups: untreated (no inflammatory stimulus), inflammatory stimulus, control (inflammatory stimulus + vehicle from cannabinoid mixtures), or pre-treatment with the cannabinoid mixture + inflammatory stimulus.

Then, a panel of cytokines and inflammatory markers was measured from each of these treatment groups from different immune cell types within the co-cultured cells at four time points to determine whether Gb Sciences' cannabinoid mixtures were able to alter the levels of pro-inflammatory cytokines or other inflammatory agents.

The study found that specific formulations of the MEMs reduced cytokine release syndrome biomarkers. Mixtures of multiple synthetic copies of molecules from cannabis plants performed better than single cannabinoid molecules alone, and the ratios of those molecules also greatly influenced results.

The preclinical data indicates that the MEMs may be effective anti-inflammatory therapies for CRS and other conditions such as macrophage activation syndrome (MAS) and acute respiratory distress syndrome (ARDS)-- all leading causes of death in COVID-19 patients.

Further study is needed to validate both the types of compounds and their specific ratios in mixtures that will successfully battle hyperinflammation triggered by COVID-19 and other illnesses.

Long-Term Potential of Cannabis-Derived Anti-Inflammatories

The cannabis plant contains many bioactive molecules with the potential to help combat inflammation. Gb Sciences' sponsored research and others have demonstrated that cannabinoids and terpenes are able to modulate multiple aspects of

the immune system. These cannabis-derived compounds can target different immune cells and inflammatory processes in ways that make them good candidates for use in the suppression of cytokines and for reducing the negative effects caused by hyperinflammation.

Positive preclinical data suggest that Gb Sciences' cannabis-inspired minimum essential mixtures are uniquely poised to address CRS, the "cytokine storm" effect of COVID-19.

"COVID variants are not going away anytime soon, and they will continue to cause health complications, particularly in older people and those who are unvaccinated," said Dr. Andrea Small-Howard, president and chief science officer of Gb Sciences. "Our strategy works because it provides relief by targeting the hyperinflammatory response to a virus, but it's not tied to recognizing the virus itself because viruses mutate and change."

As a pioneer in their field, Gb Sciences has developed a broad intellectual property portfolio of therapies based on plant-inspired minimum essential mixtures, which covers over 60 serious medical conditions. In Gb Sciences' drug development pipeline, their lead candidate drug for Parkinson's disease is being prepared for a first-in-human trial. Gb Sciences has also achieved preclinical proof-of-concept for drug candidates treating hyperinflammation, chronic pain, heart disease and anxiety.

"Gb Sciences has demonstrated that we can profoundly change the way that cannabinoids and other plant-inspired compounds are used effectively within optimized therapeutic mixtures designed for the management of inflammation, pain, and other unmet medical needs," said Dr. Small-Howard.

To learn more about how Gb Sciences is advancing biopharmaceutical research, visit https://gbsciences.com.

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