Scoping review of Augmented N-Acetylcysteine (ANAC) as an adjunct to base spike protein detoxification for post-acute sequelae of SARS-CoV-2 infection and COVID-19 illness.

Jess Armine DC, RN[1]*, Peter McCullough MD[2]

[1]Director Institute for Bio Individualized Medicine, USA.

[2]Department of Cardiology, Epidemiology, and Public Health, McCullough Foundation Dallas, USA.

Abstract

This scoping review investigates the potential role of Augmented N-Acetylcysteine (ANAC) in addressing Post-Acute Sequelae of SARS-CoV-2 infection (PASC), commonly referred to as Long COVID, as well as post-vaccine injury syndromes. Emphasis is placed on the integration of ANAC into existing spike protein detoxification protocols, particularly the McCullough Protocol, for spike protein degradation. ANAC enhances glutathione synthesis denatures spike protein tertiary structures supports mitochondrial function and modulates immune responses. Clinical and laboratory data suggest that ANAC combined with proteolytic agents such as nattokinase, bromelain, and curcumin offers a synergistic approach to mitigating spike protein toxicity. This review systematically consolidates current evidence, identifies knowledge gaps, and outlines directions for future research.

Introduction

Long-term symptoms following acute COVID-19 infection and adverse events post-vaccination have generated considerable interest in detoxification strategies targeting persistent spike protein fragments. Augmented N-Acetylcysteine (ANAC), a bioavailable enhanced form of NAC, is posited to offer therapeutic benefits via enhancement of glutathione synthesis denaturation of spike protein conformations, mitochondrial protection, and immune modulation. These biological effects potentially mitigate oxidative stress and inflammatory pathways implicated in post-acute sequelae of SARS-CoV-2 infection (PASC) and post-vaccine syndromes [1]. This review aims to consolidate emerging findings on ANAC, especially its integration into the McCullough Protocol, which combines proteolytic and anti-inflammatory agents to facilitate spike protein detoxification. By mapping current evidence and highlighting research gaps, this scoping review informs clinical application and future investigation[2].

Objectives

The objectives of this scoping review are:

- To summarize existing literature on the therapeutic role of ANAC for PASC and post-vaccine syndromes.
- To evaluate proposed mechanisms of ANAC in spike protein degradation and immune modulation.
- To identify gaps in current research and suggest future directions.

Methods

A structured literature search was conducted from January 2020 to March 2025 across databases including PubMed, Google Scholar, ScienceOpen, and Zenodo. Keywords such as 'Augmented N-Acetylcysteine,' 'ANAC,' 'spike protein detoxification,' 'Long COVID,' 'post-vaccine syndrome,' and 'McCullough Protocol' were employed[3,4].

Inclusion criteria encompassed:

- Articles or reports focused on ANAC and its detoxification role.
- Case studies or clinical vignettes reporting outcomes of ANAC use.
- In vitro studies evaluating spike protein denaturation or immune modulation.

Exclusion criteria included:

- Articles not involving ANAC.
- Narrative reviews without empirical data.

Data extraction focused on study design, dosage, clinical and laboratory outcomes, and proposed mechanisms. Findings were thematically synthesized.

Results

Results from reviewed literature are organized into mechanistic insights, clinical reports, and integration with the McCullough Protocol.

***Correspondence to:** Jess Armine, Director Institute for Bio Individualuzed Medicine, USA, E-mail: jess@drjessarmine.com

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Mechanisms of Action

- Glutathione Enhancement : ANAC donates cysteine to promote intracellular glutathione synthesis supporting redox balance and cellular resilience [5].
- Spike Protein Denaturation: Laboratory data indicate ANAC disrupts spike protein tertiary structure, reducing its biological activity.
- Mitochondrial Protection and Immune Modulation : ANAC supports cellular energetics, protects mitochondrial function, and modulates inflammatory pathways [6,7].

Clinical Reports:

Case reports and observational data (e.g., ZeroSpike.org) suggest symptomatic improvements including reduced cognitive dysfunction, fatigue, and improved endothelial health when ANAC is used alongside the McCullough Protocol [8].

Integration with the McCullough Protocol:

- Nattokinase : A serine protease that supports fibrinolysis and may degrade spike protein fragments.
- Bromelain : Provides proteolytic and anti-inflammatory effects enhancing spike protein clearance.
- Curcumin: Acts as an antioxidant and anti-inflammatory agent, protecting endothelial function and reducing oxidative stress [9].

Augmented N-Acetylcysteine (ANAC) in Spike Protein Denaturation:

Augmented N-Acetylcysteine (ANAC) represents an enhanced formulation of standard N-Acetylcysteine (NAC), designed to improve bioavailability and cellular uptake, thereby increasing its therapeutic efficacy. Standard NAC is widely recognized for its role as a cysteine donor, facilitating intracellular glutathione synthesis, and acting as a disulphide bond reducer to break down protein tertiary structures, including viral proteins [10].

Several in vitro studies and emerging clinical reports indicate that ANAC has a significantly greater capacity to denature the SARS-CoV-2 spike protein compared to standard NAC. This enhanced activity is believed to stem from its optimized delivery system (e.g., liposomal encapsulation) and molecular modifications that increase quantum coherence effects, resulting in more effective disruption of spike protein disulfide bonds.

Quantitative comparisons from experimental assays reveal that while standard NAC achieves approximately 12% spike protein denaturation under controlled conditions, ANAC formulations can achieve 99.8% denaturation efficiency within similar timeframes and concentrations. This near doubling of efficacy suggests that ANAC may more rapidly and thoroughly inactivate spike protein fragments, thereby reducing their pathological interaction with host cells and immune activation [11].

The enhanced spike protein denaturation by ANAC contributes to improved downstream effects, including:

- Greater mitigation of spike protein-induced endothelial dysfunction and microclot formation.
- Accelerated detoxification when used alongside proteolytic enzymes such as nattokinase and bromelain, as outlined in the McCullough Protocol.
- Enhanced restoration of redox balance and immune modulation via upregulated glutathione synthesis

McCullough Protocol

The McCullough Protocol is a comprehensive, evidence-based regimen designed to address the pathophysiological impacts of the SARS-CoV-2 spike protein, which has been implicated in various post-acute sequelae following COVID-19 infection and vaccination. This protocol integrates a combination of proteolytic enzymes and anti-inflammatory agents to mitigate the detrimental effects associated with spike protein persistence in the body [12].

Nattokinase

Nattokinase is a fibrinolytic enzyme derived from the Japanese food natto . It has been shown to degrade fibrin a protein involved in blood clot formation, and is believed to play a role in breaking down spike protein-induced microclots. Studies suggest that nattokinase can cleave the spike protein potentially reducing its pathogenic effects.

Bromelain

Bromelain is a mixture of proteolytic enzymes found in pineapple stems. It possesses anti-inflammatory properties and has been observed to modulate the body's production of proinflammatory compounds. Bromelain may also inhibit the binding of the spike protein to host cells by blocking ACE2 receptors, thereby preventing viral entry [13].

Curcumin

Curcumin, the active compound in turmeric, exhibits antioxidant and anti-inflammatory effects. It has been suggested that curcumin can inhibit the entry of the spike protein into cells by blocking ACE2 receptors. Additionally, curcumin may downregulate the NF-kB signaling pathway leading to reduced inflammation.

Dosage Recommendations

- Nattokinase: 2000 FU (100 mg) twice daily, possibly advancing to 8000 FU (400 mg) twice daily.
- Bromelain: 500 mg once daily, possibly advancing to twice daily.
- Curcumin: 500 mg twice daily (nano/liposomal formulation recommended).

These components work synergistically to degrade spike protein, reduce inflammation, and mitigate downstream effects of its toxicity [14,15].

Discussion

Preliminary evidence suggests that ANAC enhances spike protein detoxification efficacy when combined with enzymatic and anti-inflammatory agents in the McCullough Protocol. Despite encouraging clinical anecdotes and in vitro findings, there remains a lack of robust randomized controlled trials. Further research is necessary to standardize assays quantifying spike protein fragments and to better elucidate ANAC's clinical efficacy and safety profiles. The combined biochemical actions of ANAC and complementary proteolytic agents provide a multifaceted approach addressing intracellular and extracellular pathways, oxidative stress, and immune dysregulation associated with Long COVID and post-vaccine syndromes [16-19].

Gaps and Recommendations

- Absence of large-scale randomized controlled trials evaluating ANAC's efficacy.
- Limited peer-reviewed clinical data specifically addressing ANAC in spike protein detoxification.
- Need for standardized, validated assays to detect and quantify spike protein fragments in biological samples.
- Further investigation into optimal dosing protocols and long-term safety.

Conclusion

This scoping review highlights the promising therapeutic potential of ANAC as part of an integrated strategy for managing Long COVID and post-vaccine injury syndromes. By enhancing glutathione synthesis denaturing spike protein, protecting mitochondria, and modulating immune responses, ANAC complements proteolytic and anti-inflammatory interventions. A comprehensive detoxification approach incorporating ANAC with the McCullough Protocol may accelerate recovery and restore homeostasis. Well-designed clinical trials are necessary to substantiate these findings and optimize treatment protocols.

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