

# Exploring the Correlation Between Sars-CoV-2 Vaccinations and Myocarditis Diagnoses



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## Background

Myocarditis diagnoses have increased since the introduction of the SARS-CoV-2 vaccine. Myocarditis is a heart condition often triggered by viral infections

Left untreated, myocarditis has the potential to progress into serious complications such as dilated cardiomyopathy or heart failure (Morgan et al. 2022).

## Sar-Cov-2 Vaccine Mechanism

- 1) Pfizer and Moderna vaccine use novel nucleosides with base modifications (Altman et al. 2023).
- 2) Contains lipid nanoparticles that enhance mRNA stability and facilitate delivery to cells (Altman et al. 2023).
- 3) Straightforward manufacturing process. Initial animal experiments completed within two months of identifying the spike coding sequence (Altman et al. 2023).
- 4) Antigen-presenting cells internalize S1 and present the antigen to T-cells. (Altman et al. 2023).
- 5) Cells are then activated, leading to the production of neutralizing antibodies and conferring long-term vaccine-mediated immunity (Altman et al. 2023).

## Methods

Comprehensive research of 36 primary and secondary peer-reviewed journal articles on SARS-CoV-2 vaccine and myocarditis was conducted, with only the most credible studies included by assessing each journal's impact factor.

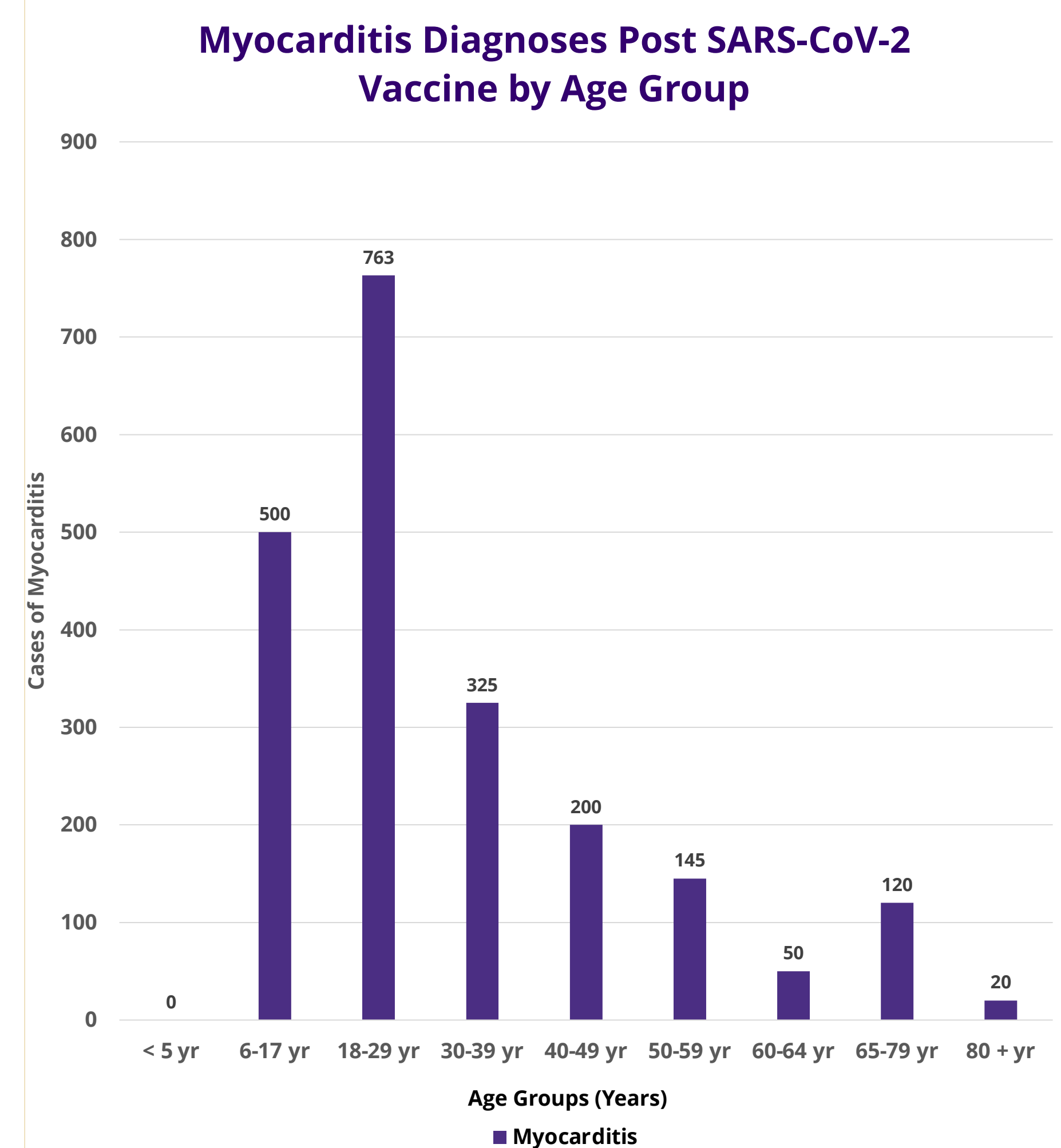
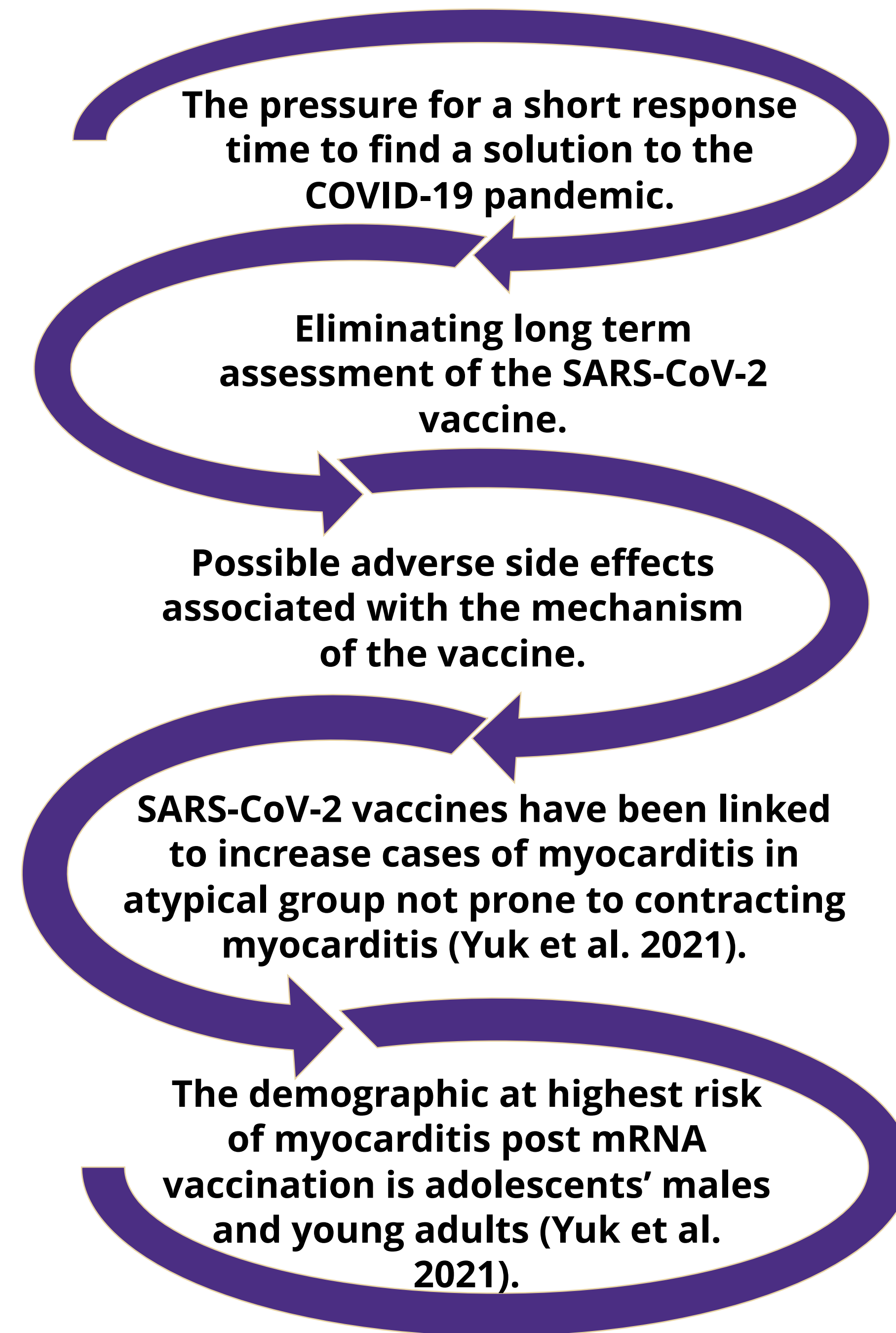
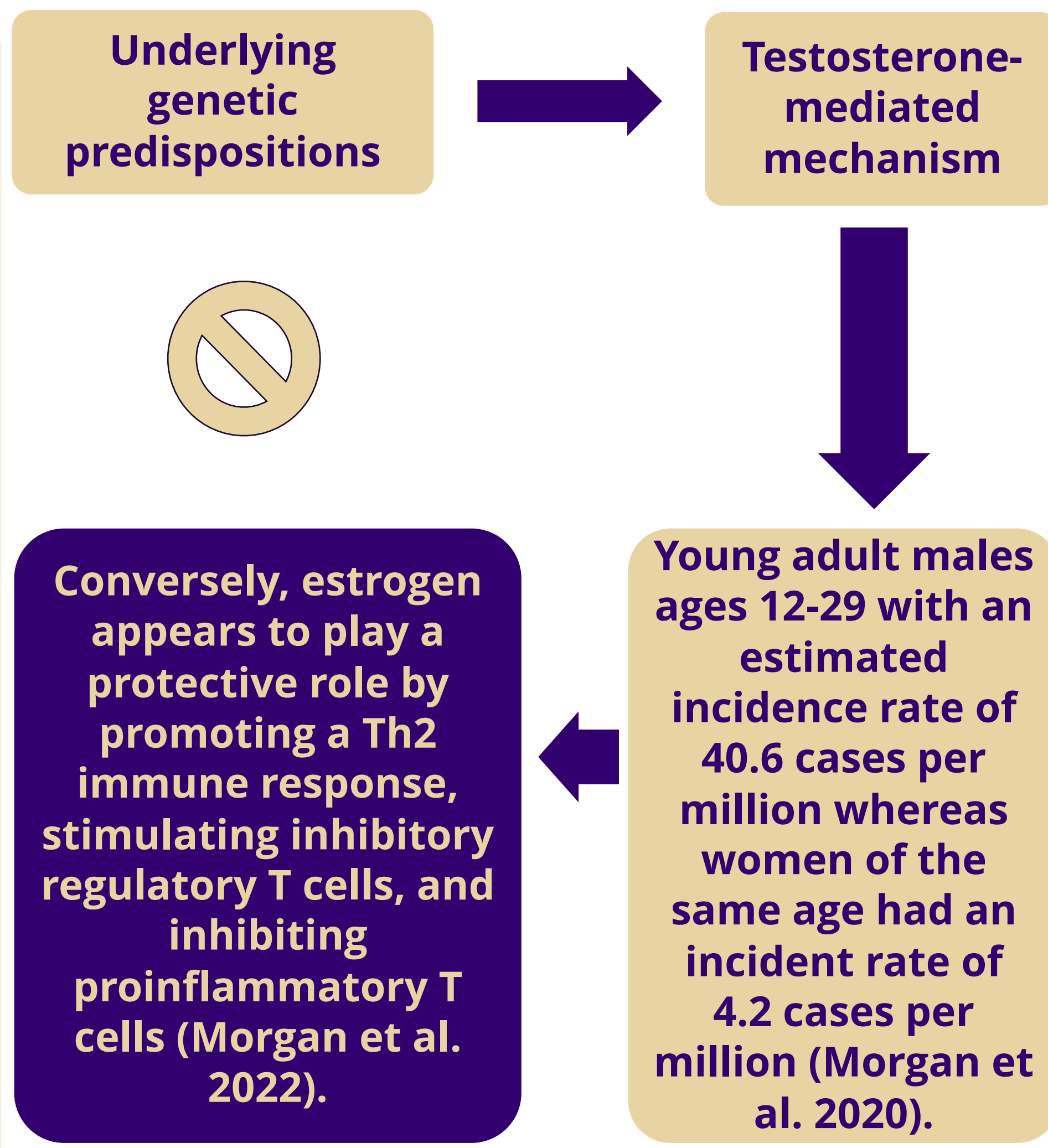


Figure 2: Adverse events reported per age of myocarditis post Covid vaccination. 18-29 showed the highest rate of contracting myocarditis post vaccination. SARS-CoV-2 vaccine-mediated myocarditis appears within a week of receipt of the vaccine, most commonly after the second dose of an mRNA vaccine. (Morgan et al. 2022).

## Genetic Factors



## Possible Mechanism of Sar-Cov-2 Vaccine-Meditated Myocarditis

- Polymorphisms in interleukin-6 causing autoinflammatory dysregulation (Morgan et al. 2022).
- Direct immune activation by mRNA causing generalized inflammatory response involving multiple organ systems (Bozkurt et al. 2021).
- Proinflammatory immune cascades and cytokine activation (Altman et al. 2023).
- Molecular mimicry which involves immunological cross-reactivity between spike proteins and self-antigens (Altman et al. 2023).
- The hypothesized mechanism shows common overlap associated with a proinflammatory cascade (Morgan et al. 2022).

## Discussion

In the general population not during a global pandemic, it is estimated that approximately 10 to 20 people per hundred thousand are diagnosed with myocarditis each year (Law et al. 2021).

Affected young men are predominately healthy individuals without a history of COVID-19 infection or comorbidities (Morgan et al. 2020)

Pfizer and Moderna vaccines were associated with a substantial increased risk of myocarditis with the highest risk in 0-7 days after dose 2 in the 18-39-year-olds demographic (Goddard et al. 2022).

The age group 18-29 had the highest number of cases (763) reported for myocarditis (Morgan et al. 2020)

The data suggest strong correlations between young adult males and testosterone playing a major role in the development of myocarditis (Morgan et al. 2020).

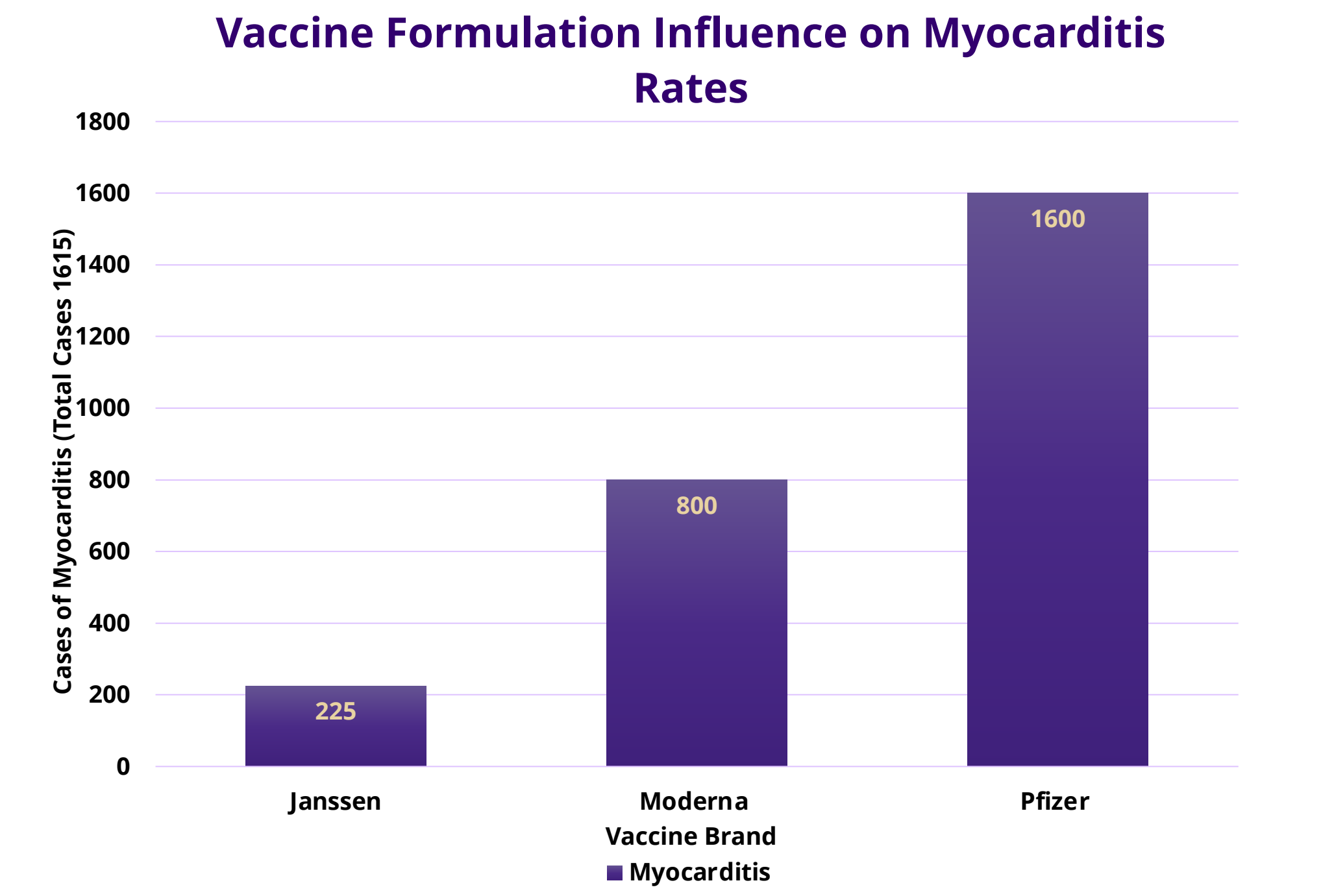


Figure 3: Represents the vaccination type used and the adverse events from each vaccine type. Vaccine containing mRNA, such as Pfizer and Moderna showed the highest rate of Myocarditis injuries. Whereas janssen a vector vaccine shows significantly less injuries. Bias: vaccine formulation were not administered at equal rates (Morgan et al. 2022).

## Future Direction

- Research to identify predisposing factors in vaccine recipients (Bozkurt et al. 2021).
- Determining testosterone and estrogens roles in vaccine-mediated myocarditis (Morgan et al. 2022).
- Investigation of the mechanisms on development of myocarditis post-SARS-CoV-2 mRNA vaccination (Bozkurt et al. 2021).
- Prospective screening programs initiated to evaluate incidence of vaccine-mediated myocarditis in different populations (Bozkurt et al. 2021).
- Longitudinal follow-up studies to comprehensively assess short- and long-term outcomes of SAR-CoV-2 vaccine-mediated myocarditis (Bozkurt et al. 2021).

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