

# Biomedical Control Strategies for Inflammation in SARS-CoV-2-Induced Complement Activation

## Supplementary File S2

### GENETIC ALGORITHM

The GA algorithm proceeds through the following steps:

- Generate an initial population with random values for the tuning parameters.
- Assess the fitness of each individual in the population based on the integral absolute error (IAE) objective function.
- Repeat until a stopping criterion is met: 1) Select the fittest individuals from the population using a selection operator. 2) Generate new offspring using a crossover operator. 3) Mutate the offspring using a mutation operator. 4) Evaluate the fitness of the new offspring. 5) Replace the least fit individuals in the population with the new offspring.
- Output the best individual with the lowest IAE value as the optimal solution.

The GA employs the following operators:

- Selection operator: The algorithm employs the Roulette wheel selection method to give higher priority to individuals with greater fitness values during reproduction.
- Crossover operator: New offspring are created using the Uniform crossover method, which randomly selects tuning parameters from both parents.
- Mutation Operator: The algorithm applies Gaussian mutation to introduce small random variations in the offspring's tuning parameters.

The algorithm produces optimal tuning parameter values that minimize the objective function ISE, which plays a vital role in improving the performance of DISMC.

Fig. 1 presents a flowchart outlining the steps of the algorithm.

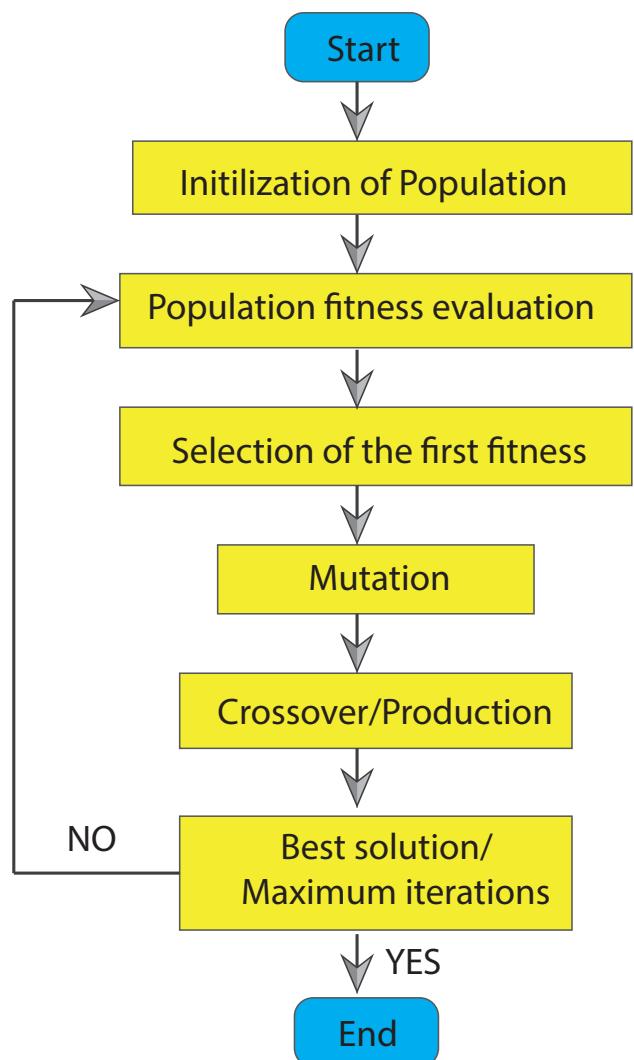


Fig. 1: Flowchart of genetic algorithm.