Colinic motility QSP model MATLAB code

2023-05-12

Welcome!

This folder contains MATLAB code to simulate the colonic motility quantitative systems pharmacology model developed by Applied BioMath, LLC and Takeda Pharmaceuticals. The model is descibed in this publication: https://pubmed.ncbi.nlm.nih.gov/31432345/

License

Installation

Ensure that you have a recent version of MATLAB. This code has been tested with Release 2018b on PC and Mac.

1. Copy/download this entire folder to a convenient location on your machine.
2. Start MATLAB. Navigate to this folder.
3. Run the script `runMeFirst`. ⟵ **Always run this at the start of a session**. This will update your MATLAB path and print a short description on the console

Contents

There are several demo scripts included:

- `runHealthy`
  Simulate colon physiology for healthy phenotype. This will produce Fig. 2A of GI motility manuscript.
- `runSTC`
  Simulate colon physiology for STC phenotype. This will produce Fig. 2B of GI motility manuscript.
- `doseResponseHealthy`
  Simulate dose response for healthy phenotype. This will produce Fig. 4C of GI motility manuscript.
- `doseResponseSTC`
  Simulate dose response for STC phenotype. This will produce Fig. 4D of GI motility manuscript.

- `GImodeldemo`
  Run all of the above demos.

These scripts use parameters defined in the following files:

- `parameter-table-healthy.csv`
  Parameter table for healthy phenotype
- `parameter-table-stc.csv`
  Parameter table for STRC phenotype
- `hapc-schedule.csv`
  Timings for HAPCs and defecation checks

The recommended way to change simulation parameters is to create a new copy of a parameter file and update the simulation scripts to use the new parameter file. The file `parameter-table-test.csv` is included for this purpose. To change parameters programmatically, see the examples in `runParameterChange.m`