**Tutorial Supplement**

**for**

**Circulatory Autogen**

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**THIS TUTORIAL IS A WORK IN PROGRESS, IF YOU HAVE ANY CORRECTIONS PLEASE SEND THEM TO finbar.argus@auckland.ac.nz**

1. **Creating a new model**

**There is some information that needs to add in the tutorial that let the readers know before they run ‘run\_autogeneration.sh’ to generate models:**

**1) the new model usually named ‘[model\_name]\_modules.cellml’, and only include different modules, not include connection relationship and units, if include specific new define units, need add it into ‘./module\_config\_user/user\_units.cellml’, also, the model file usually put in ‘‘./module\_config\_user/’ address;**

**2) each module in the model also called vessel in biochemical system;**

**3) if 2 vessels share the same parameter, such as vessel\_1 output p1 (parameter) convey to vessel\_2, and in vessel\_2 ‘variables\_and\_units’ [define in module\_config.json], the type of p1 cannot ‘variable’ or ‘constant’, it should be ‘boundary\_condition’;**

**4) if vessel\_1 and vessel\_2 share [p1, p2] 2 parameters, in vessel\_2, p1 is calculated result, p2 is input result, so in vessel\_1 p1 is input result, p2 is output result, then they can share vessel\_port in vessel\_1 entrance port, in vessel\_2 as exit port;**

**5) if vessel\_x can convey pn parameter to many different vessels, must add "multi\_port":"True" in ‘exit\_ports’ define;**

**6) if everything is fine, the parameters and connection relationship set correct as above, the ‘run\_autogenertic.py’ script can generate model files in a specific address (set in user\_inputs.yaml), and if ‘modelname.cellml’ file can open well and simulation in OpenCOR, and ‘[file\_modelname]\_params\_for\_id.csv’ and ‘[file\_modelname]\_obs\_data.json’ also set well, the ‘run\_param\_id.sh’ script can automatically calibrate preset parameters;**

**7) if ‘plot\_param.id.sh’ script cannot run or report an error, do not check the responding error [showing in terminal], usually an error in ‘[file\_modelname]\_obs\_data.json file’!!!, and often is the issue such as lack a comma;**

**8) there is a bug in ‘paramID.py’ file, if the ground true value that I want to calibrate parameter is not a variable during the time, is just a value, it will not automatically generate an array as time changes, so maybe cannot plot the final results, need to add an ODE with time and multiply with 0 in model code, to make sure the generated result is also an array;**