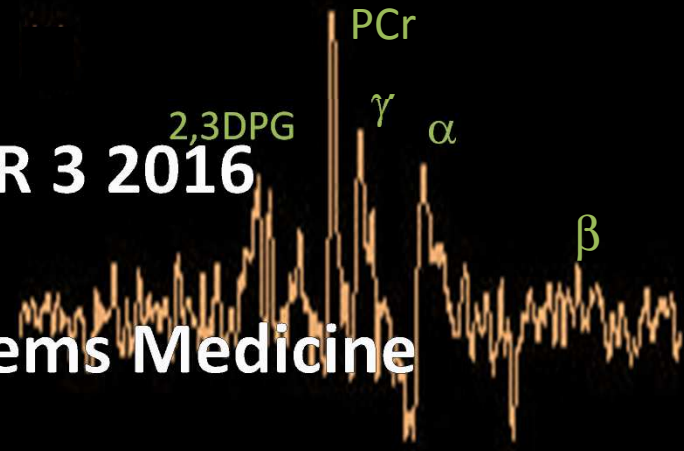
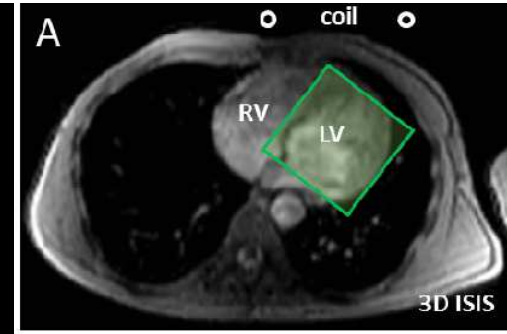


do you measure?  
do you model?

SAVE THE DATE: OCTOBER 3 2016  
WORKSHOP

Magnetic Resonance and Systems Medicine  
UMC UTRECHT



The model is expressed in terms of the following set of differential equations:

$$d[H^+]_i/dt = \beta \cdot [H^+]_i \cdot (+J_{in} - 5J_{ex} - 2J_{ca} - 4J_{cy} + (n_1 - 1)J_{e1} + 2J_{in} - J_{ex} + J_{in})/W_1$$

$$d[K^+]_i/dt = (+J_{in})/W_2$$

$$d[Mg^{2+}]_i/dt = (-J_{in})/W_3$$

$$d[NADH]_i/dt = (+J_{in} - J_{ex})/W_4$$

$$d[QH_2]_i/dt = (+J_{in} - J_{ex})/W_5$$

$$d[cyC(res)^{2+}]_i/dt = (+2J_{ca} - 2J_{cy})/W_6$$

$$d[ATP]_i/dt = (+J_{in} - J_{ex})/W_7$$

$$d[mATP]_i/dt = (+J_{in})/W_8$$

$$d[mADP]_i/dt = (+J_{in})/W_9$$

$$d[P_i]_i/dt = (-J_{ex} + J_{in})/W_{10}$$

$$d[ATP]_i/dt = (+J_{in} + J_{ex} + J_{in})/W_{11}$$

$$d[ADP]_i/dt = (+J_{in} - J_{ex} - 2J_{ca})/W_{12}$$

$$d[AMP]_i/dt = (+J_{in} + J_{in})/W_{13}$$

$$J_{in} = X_{in} \left( \frac{1 + [P_i]_i}{1 + [P_i]_i + [ATP]_i} \right)$$

Complex I flux

$$J_{ex} = X_{ex} \cdot e^{-(k_{ex} - k_{in}) \cdot t}$$

Where  $\Delta G_{ex} = F\Delta\psi + RT \ln([H^+]_i/[H^+]_o)$

Complex III flux

$$J_{ca} = X_{ca} \left( \frac{1 + [P_i]_i}{1 + [P_i]_i + [ATP]_i} \right) \times [cyC(res)^{2+}]_i$$

Complex IV flux

$$J_{cy} = X_{cy} \left( \frac{[O_2]_i}{[O_2]_i + K_{O_2}} \right) \times [cyC(res)^{2+}]_i$$

where  $[O_2]_i$  is the  $O_2$  concentration

constant of  $3.62 \times 10^{-5}$  M.

F/F<sub>0</sub>-ATPase flux

$$J_{in} = \frac{K_{in} \cdot [mADP]_i \cdot [P_i]_i}{K_{in} + [mADP]_i + [P_i]_i} - (1 - \theta) \cdot [mATP]_i$$

Ring fluxes

$$J_{in} = X_{in} \cdot ([ATP]_i/[Mg^{2+}]_i - K_{eq,ATP})$$

$$J_{ex} = X_{ex} \cdot ([ADP]_i/[Mg^{2+}]_i - K_{eq,ADP})$$

$$J_{ca} = X_{ca} \cdot ([ATP]_i/[Mg^{2+}]_i - K_{eq,ATP})$$

$$J_{cy} = X_{cy} \cdot ([ADP]_i/[Mg^{2+}]_i - K_{eq,ADP})$$

[ADP]<sub>i</sub>, [ATP]<sub>i</sub>, and [ADP]<sub>i</sub> denote magnesium in the matrix, ADP in the matrix, ATP in the inter-

space, and ADP in the intermembrane space, respectively.

$$J_{in} = \gamma P_e ([ATP]_i - [ATP]_o)$$

$$J_{ex} = \gamma P_e ([ADP]_i - [ADP]_o)$$

$$J_{in} = \gamma P_e ([AMP]_i - [AMP]_o)$$

$$J_{ex} = \gamma P_e ([P_i]_i - [P_i]_o)$$

side translocase (ANT) flux

```

if (settings)
  if (name.compareTo(
    name += " ";
  ) else if (settings[0].compareTo("e")
    if (name.compareTo("n") != 0) {
      name += "e";
    }
    name += DateUtils.format(etr.getDate(settings[0])
  ) else if (settings[0].compareTo("n") == 0) {
    if (name.compareTo("n") != 0) {
      name += "n";
    }
    comSysNumber = etr.getDouble(
      f = NumberFormat.
    (false);
  }

```

