Modeling Rate of Change in Renal Function for Individual Patients: A Longitudinal Model Based on Outinely Collected Data

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Modelling biomedical signals

- Very noisy
  - Affected by daily fluctuation
    - Circadian rhythm (body’s biological clock)
    - Foot intake, especially protein
    - Activities performed prior to the measurement being taken
  - Also affected by interventions
    - Medications
    - Co-morbidities
Renal function

- Measured by estimated glomerular filtration rate (eGFR), which is a function of a serum creatinine that can be measured from a blood sample.

- The rate of change of eGFR is crucially important for general physicians to refer to specialists.
  - Take the difference of 2 consecutive eGFR and make decision.

- Our objective: Give a better estimate of the rate of change of eGFR.
Let’s look at the data
First derivative

\[ g' \]

\[ eGFR \]

\[ eGFR \text{ rate change} \]

Estimate \[ p(g'|g,t) \]