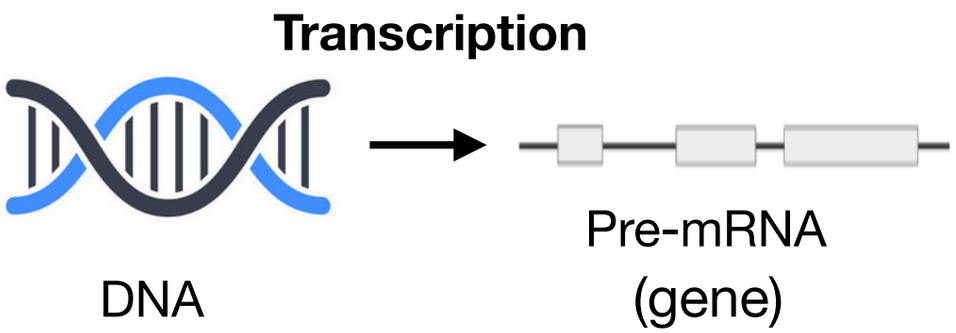
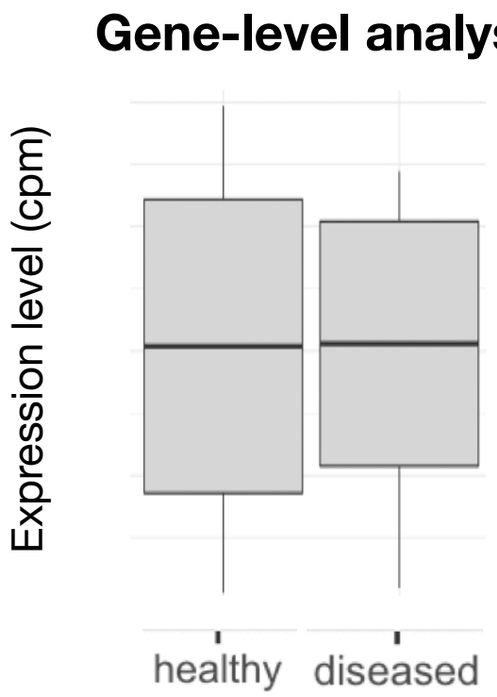
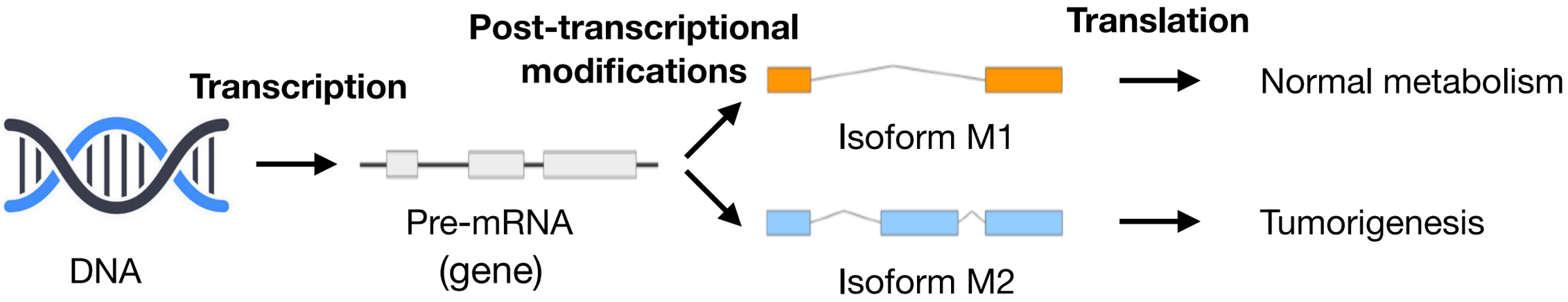
Differential Transcript Usage (DTU)



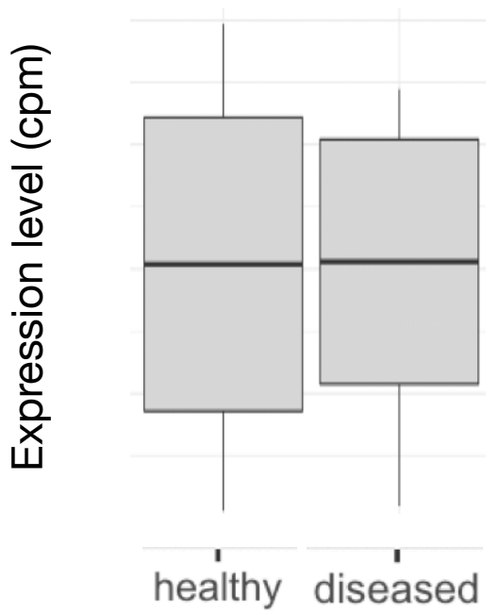


slide courtesy Jeroen Gilis

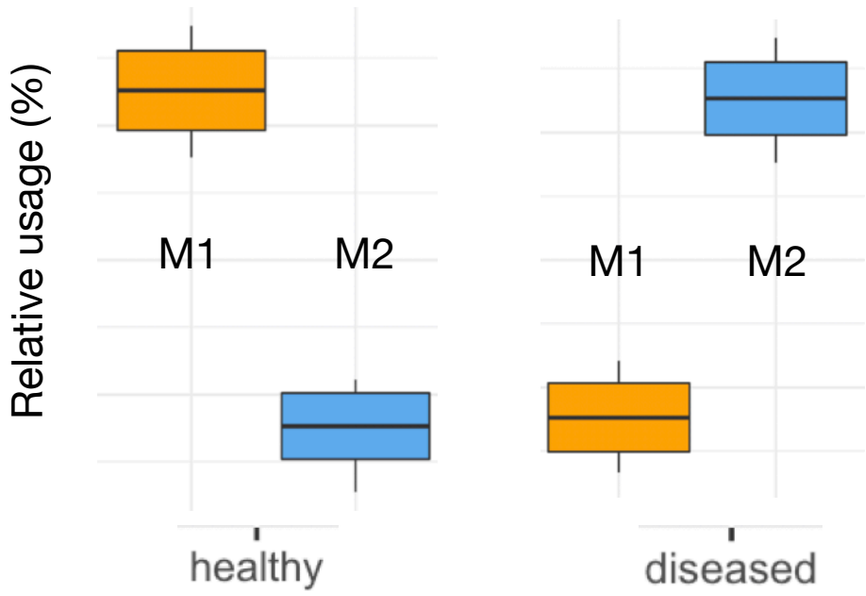
Differential Transcript Usage (DTU)



Gene-level analysis



Transcript-level DTU analysis



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Software development

- Denote the expression of transcript *t* of gene *g* in sample *i* as Y_{gti}
- Denote the usage of transcript *t* of gene *g* in sample *i* as:

$$U_{gti} = \frac{Y_{gti}}{Y_{g.i}}$$

- Describe the **quasi-binomial** GLM:

$$\begin{cases} E\left[U_{gti} \middle| \boldsymbol{X_i}, Y_{g.i}\right] = \pi_{gti} \\ \log\left(\frac{\pi_{gti}}{1-\pi_{gti}}\right) = \eta_{gti} \\ \eta_{gti} = \boldsymbol{X_i^T \beta_{gt}} \end{cases}$$

- With variance:

$$Var\left[U_{gti} \middle| \boldsymbol{X_i}, Y_{g.i}\right] = \frac{\pi_{gti} * (1-\pi_{gti})}{Y_{g.i}} * \phi_{gt}$$

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