Supplementary Information

Firczuk et al. 2012

Table of Content

Full mathematical model

$$\frac{d[\mathrm{eIF2\_GDP}]}{dt} = -(\mathrm{k1_{r1}} \cdot [\mathrm{eIF2\_GDP}] \cdot [\mathrm{eIF2B}] - \mathrm{k2_{r1}} \cdot [\mathrm{eIF2\_GDP\_eIF2B}]) + \mathrm{k_{r18}} \cdot [\mathrm{60S}] \cdot [\mathrm{48S\_Ded1\_eIF5B\_GTP}] \cdot \mathrm{mRNA\_init\_free}$$

$$\frac{d[\mathrm{eIF2B}]}{dt} = -(\mathrm{k1_{r1}} \cdot [\mathrm{eIF2\_GDP}] \cdot [\mathrm{eIF2B}] - \mathrm{k2_{r1}} \cdot [\mathrm{eIF2\_GDP\_eIF2B}]) + (\mathrm{k1_{r2}} \cdot [\mathrm{eIF2\_GDP\_eIF2B}] - \mathrm{k2_{r2}} \cdot [\mathrm{eIF2\_GTP}] \cdot [\mathrm{eIF2B}])$$

$$\frac{d[\mathrm{eIF2\_GDP\_eIF2B}]}{dt} = +(\mathrm{k1_{r1}} \cdot [\mathrm{eIF2\_GDP}] \cdot [\mathrm{eIF2B}] - \mathrm{k2_{r1}} \cdot [\mathrm{eIF2\_GDP\_eIF2B}]) - (\mathrm{k1_{r2}} \cdot [\mathrm{eIF2\_GDP\_eIF2B}] - \mathrm{k2_{r2}} \cdot [\mathrm{eIF2\_GTP}] \cdot [\mathrm{eIF2B}])$$

$$\frac{d[\mathrm{eIF2\_GTP}]}{dt} = \mathrm{k1_{r2}} \cdot [\mathrm{eIF2\_GDP\_eIF2B}] - \mathrm{k2_{r2}} \cdot [\mathrm{eIF2\_GTP}] \cdot [\mathrm{eIF2B}] - (\mathrm{k1_{r3}} \cdot [\mathrm{eIF2\_GTP}] \cdot [\mathrm{Met\text{-}tRNA}] - \mathrm{k2_{r3}} \cdot [\mathrm{eIF2\_GTP\_Met\text{-}tRNA}])$$

$$\frac{d[\mathrm{eIF2\_GTP\_Met\text{-}tRNA}]}{dt} = \mathrm{k1_{r3}} \cdot [\mathrm{eIF2\_GTP}] \cdot [\mathrm{Met\text{-}tRNA}] - \mathrm{k2_{r3}} \cdot [\mathrm{eIF2\_GTP\_Met\text{-}tRNA}] - (\mathrm{k1_{r5}} \cdot [\mathrm{eIF2\_GTP\_Met\text{-}tRNA}] \cdot [\mathrm{eIF3\_eIF5}] - \mathrm{k2_{r5}} \cdot [\mathrm{eIF3\_eIF5\_eIF2\_GTP\_Met\text{-}tRNA}])$$

$$\frac{d[\mathrm{eIF3}]}{dt} = \mathrm{k_{r18}} \cdot [\mathrm{60S}] \cdot [\mathrm{48S\_Ded1\_eIF5B\_GTP}] \cdot \mathrm{mRNA\_init\_free} - (\mathrm{k1_{r4}} \cdot [\mathrm{eIF3}] \cdot [\mathrm{eIF5}] - \mathrm{k2_{r4}} \cdot [\mathrm{eIF3\_eIF5}])$$

$$\frac{d[\mathrm{eIF5}]}{dt} = \mathrm{k_{r18}} \cdot [\mathrm{60S}] \cdot [\mathrm{48S\_Ded1\_eIF5B\_GTP}] \cdot \mathrm{mRNA\_init\_free} - (\mathrm{k1_{r4}} \cdot [\mathrm{eIF3}] \cdot [\mathrm{eIF5}] - \mathrm{k2_{r4}} \cdot [\mathrm{eIF3\_eIF5}])$$

$$\frac{d[\mathrm{eIF3\_eIF5}]}{dt} = \mathrm{k1_{r4}} \cdot [\mathrm{eIF3}] \cdot [\mathrm{eIF5}] - \mathrm{k2_{r4}} \cdot [\mathrm{eIF3\_eIF5}] - (\mathrm{k1_{r5}} \cdot [\mathrm{eIF2\_GTP\_Met\text{-}tRNA}] \cdot [\mathrm{eIF3\_eIF5}] - \mathrm{k2_{r5}} \cdot [\mathrm{eIF3\_eIF5\_eIF2\_GTP\_Met\text{-}tRNA}])$$

$$\frac{d[\mathrm{eIF3\_eIF5\_eIF2\_GTP\_Met\text{-}tRNA}]}{dt} = \mathrm{k1_{r5}} \cdot [\mathrm{eIF2\_GTP\_Met\text{-}tRNA}] \cdot [\mathrm{eIF3\_eIF5}] - \mathrm{k2_{r5}} \cdot [\mathrm{eIF3\_eIF5\_eIF2\_GTP\_Met\text{-}tRNA}] - (\mathrm{k1_{r6}} \cdot [\mathrm{eIF1}] \cdot [\mathrm{eIF3\_eIF5\_eIF2\_GTP\_Met\text{-}tRNA}] - \mathrm{k2_{r6}} \cdot [\mathrm{eIF1\_eIF3\_eIF5\_eIF2\_GTP\_Met\text{-}tRNA}])$$

$$\frac{d[\mathrm{eIF1}]}{dt} = \mathrm{k_{r18}} \cdot [\mathrm{60S}] \cdot [\mathrm{48S\_Ded1\_eIF5B\_GTP}] \cdot \mathrm{mRNA\_init\_free} - (\mathrm{k1_{r6}} \cdot [\mathrm{eIF1}] \cdot [\mathrm{eIF3\_eIF5\_eIF2\_GTP\_Met\text{-}tRNA}] - \mathrm{k2_{r6}} \cdot [\mathrm{eIF1\_eIF3\_eIF5\_eIF2\_GTP\_Met\text{-}tRNA}])$$

$$\frac{d[\mathrm{eIF1\_eIF3\_eIF5\_eIF2\_GTP\_Met\text{-}tRNA}]}{dt} = \mathrm{k1_{r6}} \cdot [\mathrm{eIF1}] \cdot [\mathrm{eIF3\_eIF5\_eIF2\_GTP\_Met\text{-}tRNA}] - \mathrm{k2_{r6}} \cdot [\mathrm{eIF1\_eIF3\_eIF5\_eIF2\_GTP\_Met\text{-}tRNA}] - \mathrm{k1_{r8}} \cdot [\mathrm{eIF1\_eIF3\_eIF5\_eIF2\_GTP\_Met\text{-}tRNA}] \cdot [\mathrm{40S\_eIF1A}]$$

$$\frac{d[\mathrm{40S}]}{dt} = \mathrm{k1_{r33}} \cdot [\mathrm{80S\_eRF1\_eRF3\_GTP}] - \mathrm{k1_{r7}} \cdot [\mathrm{40S}] \cdot [\mathrm{eIF1A}]$$

$$\frac{d[\mathrm{eIF1A}]}{dt} = \mathrm{k_{r18}} \cdot [\mathrm{60S}] \cdot [\mathrm{48S\_Ded1\_eIF5B\_GTP}] \cdot \mathrm{mRNA\_init\_free} - \mathrm{k1_{r7}} \cdot [\mathrm{40S}] \cdot [\mathrm{eIF1A}]$$

$$\frac{d[\mathrm{40S\_eIF1A}]}{dt} = \mathrm{k1_{r7}} \cdot [\mathrm{40S}] \cdot [\mathrm{eIF1A}] - \mathrm{k1_{r8}} \cdot [\mathrm{eIF1\_eIF3\_eIF5\_eIF2\_GTP\_Met\text{-}tRNA}] \cdot [\mathrm{40S\_eIF1A}]$$

$$\begin{aligned}\frac{\mathrm{d}[\text{43S}]}{\mathrm{d}t} &= \mathrm{k1}_{\mathrm{r8}} \cdot [\text{eIF1\_eIF3\_eIF5\_eIF2\_GTP\_Met-tRNA}] \cdot [\text{40S\_eIF1A}] \\ &\quad - \mathrm{k1}_{\mathrm{r14}} \cdot [\text{43S}] \cdot [\text{eIF4E\_eIF4G\_mRNA\_Pab1\_eIF4A\_eIF4B}]\end{aligned}$$

$$\begin{aligned}\frac{\mathrm{d}[\text{eIF4E}]}{\mathrm{d}t} &= \mathrm{k}_{\mathrm{r18}} \cdot [\text{60S}] \cdot [\text{48S\_Ded1\_eIF5B\_GTP}] \cdot \text{mRNA\_init\_free} \\ &\quad - (\mathrm{k1}_{\mathrm{r9}} \cdot [\text{eIF4E}] \cdot [\text{eIF4G}] - \mathrm{k2}_{\mathrm{r9}} \cdot [\text{eIF4E\_eIF4G}])\end{aligned}$$

$$\begin{aligned}\frac{\mathrm{d}[\text{eIF4G}]}{\mathrm{d}t} &= \mathrm{k}_{\mathrm{r18}} \cdot [\text{60S}] \cdot [\text{48S\_Ded1\_eIF5B\_GTP}] \cdot \text{mRNA\_init\_free} \\ &\quad - (\mathrm{k1}_{\mathrm{r9}} \cdot [\text{eIF4E}] \cdot [\text{eIF4G}] - \mathrm{k2}_{\mathrm{r9}} \cdot [\text{eIF4E\_eIF4G}])\end{aligned}$$

$$\begin{aligned}\frac{\mathrm{d}[\text{eIF4E\_eIF4G}]}{\mathrm{d}t} &= \mathrm{k1}_{\mathrm{r9}} \cdot [\text{eIF4E}] \cdot [\text{eIF4G}] - \mathrm{k2}_{\mathrm{r9}} \cdot [\text{eIF4E\_eIF4G}] \\ &\quad - (\mathrm{k1}_{\mathrm{r11}} \cdot [\text{eIF4E\_eIF4G}] \cdot [\text{mRNA\_Pab1}] - \mathrm{k2}_{\mathrm{r11}} \cdot [\text{eIF4E\_eIF4G\_mRNA\_Pab1}])\end{aligned}$$

$$\begin{aligned}\frac{\mathrm{d}[\text{mRNA\_cap}]}{\mathrm{d}t} &= \mathrm{k}_{\mathrm{r18}} \cdot [\text{60S}] \cdot [\text{48S\_Ded1\_eIF5B\_GTP}] \cdot \text{mRNA\_init\_free} \\ &\quad - (\mathrm{k1}_{\mathrm{r10}} \cdot [\text{mRNA\_cap}] \cdot [\text{Pab1}] - \mathrm{k2}_{\mathrm{r10}} \cdot [\text{mRNA\_Pab1}])\end{aligned}$$

$$\begin{aligned}\frac{\mathrm{d}[\text{Pab1}]}{\mathrm{d}t} &= \mathrm{k}_{\mathrm{r18}} \cdot [\text{60S}] \cdot [\text{48S\_Ded1\_eIF5B\_GTP}] \cdot \text{mRNA\_init\_free} \\ &\quad - (\mathrm{k1}_{\mathrm{r10}} \cdot [\text{mRNA\_cap}] \cdot [\text{Pab1}] - \mathrm{k2}_{\mathrm{r10}} \cdot [\text{mRNA\_Pab1}])\end{aligned}$$

$$\begin{aligned}\frac{\mathrm{d}[\text{mRNA\_Pab1}]}{\mathrm{d}t} &= \mathrm{k1}_{\mathrm{r10}} \cdot [\text{mRNA\_cap}] \cdot [\text{Pab1}] - \mathrm{k2}_{\mathrm{r10}} \cdot [\text{mRNA\_Pab1}] \\ &\quad - (\mathrm{k1}_{\mathrm{r11}} \cdot [\text{eIF4E\_eIF4G}] \cdot [\text{mRNA\_Pab1}] - \mathrm{k2}_{\mathrm{r11}} \cdot [\text{eIF4E\_eIF4G\_mRNA\_Pab1}])\end{aligned}$$

$$\begin{aligned}\frac{\mathrm{d}[\text{eIF4E\_eIF4G\_mRNA\_Pab1}]}{\mathrm{d}t} &= \mathrm{k1}_{\mathrm{r11}} \cdot [\text{eIF4E\_eIF4G}] \cdot [\text{mRNA\_Pab1}] - \mathrm{k2}_{\mathrm{r11}} \cdot [\text{eIF4E\_eIF4G\_mRNA\_Pab1}] \\ &\quad - (\mathrm{k1}_{\mathrm{r12}} \cdot [\text{eIF4A}] \cdot [\text{eIF4E\_eIF4G\_mRNA\_Pab1}] \\ &\quad\quad - \mathrm{k2}_{\mathrm{r12}} \cdot [\text{eIF4A\_eIF4E\_eIF4G\_mRNA\_Pab1}])\end{aligned}$$

$$\begin{aligned}\frac{\mathrm{d}[\text{eIF4A}]}{\mathrm{d}t} &= \mathrm{k}_{\mathrm{r18}} \cdot [\text{60S}] \cdot [\text{48S\_Ded1\_eIF5B\_GTP}] \cdot \text{mRNA\_init\_free} \\ &\quad - (\mathrm{k1}_{\mathrm{r12}} \cdot [\text{eIF4A}] \cdot [\text{eIF4E\_eIF4G\_mRNA\_Pab1}]\end{aligned}$$

$$\begin{aligned}\frac{\mathrm{d}[\text{eIF4A\_eIF4E\_eIF4G\_mRNA\_Pab1}]}{\mathrm{d}t} &= \mathrm{k1}_{\mathrm{r12}} \cdot [\text{eIF4A}] \cdot [\text{eIF4E\_eIF4G\_mRNA\_Pab1}] \\ &\quad - \mathrm{k2}_{\mathrm{r12}} \cdot [\text{eIF4A\_eIF4E\_eIF4G\_mRNA\_Pab1}] \\ &\quad - (\mathrm{k1}_{\mathrm{r13}} \cdot [\text{eIF4B}] \cdot [\text{eIF4A\_eIF4E\_eIF4G\_mRNA\_Pab1}] \\ &\quad\quad - \mathrm{k2}_{\mathrm{r13}} \cdot [\text{eIF4E\_eIF4G\_mRNA\_Pab1\_eIF4A\_eIF4B}])\end{aligned}$$

$$\begin{aligned}\frac{\mathrm{d}[\text{eIF4B}]}{\mathrm{d}t} &= \mathrm{k}_{\mathrm{r18}} \cdot [\text{60S}] \cdot [\text{48S\_Ded1\_eIF5B\_GTP}] \cdot \text{mRNA\_init\_free} \\ &\quad - (\mathrm{k1}_{\mathrm{r13}} \cdot [\text{eIF4B}] \cdot [\text{eIF4A\_eIF4E\_eIF4G\_mRNA\_Pab1}] \\ &\quad\quad - \mathrm{k2}_{\mathrm{r13}} \cdot [\text{eIF4E\_eIF4G\_mRNA\_Pab1\_eIF4A\_eIF4B}])\end{aligned}$$

$$\begin{aligned}\frac{\mathrm{d}[\text{eIF4E\_eIF4G\_mRNA\_Pab1\_eIF4A\_eIF4B}]}{\mathrm{d}t} &= \mathrm{k1}_{\mathrm{r13}} \cdot [\text{eIF4B}] \cdot [\text{eIF4A\_eIF4E\_eIF4G\_mRNA\_Pab1}] \\ &\quad\quad - \mathrm{k2}_{\mathrm{r13}} \cdot [\text{eIF4E\_eIF4G\_mRNA\_Pab1\_eIF4A\_eIF4B}]) \\ &\quad - \mathrm{k1}_{\mathrm{r14}} \cdot [\text{43S}] \cdot [\text{eIF4E\_eIF4G\_mRNA\_Pab1\_eIF4A\_eIF4B}]\end{aligned}$$

$$\begin{aligned}\frac{\mathrm{d}[\text{48S}]}{\mathrm{d}t} &= \mathrm{k1}_{\mathrm{r14}} \cdot [\text{43S}] \cdot [\text{eIF4E\_eIF4G\_mRNA\_Pab1\_eIF4A\_eIF4B}] \\ &\quad - (\mathrm{k1}_{\mathrm{r15}} \cdot [\text{48S}] \cdot [\text{Ded1}] - \mathrm{k2}_{\mathrm{r15}} \cdot [\text{48S\_Ded1}])\end{aligned}$$

$$\begin{aligned}\frac{\mathrm{d}[\text{Ded1}]}{\mathrm{d}t} &= \mathrm{k}_{\mathrm{r18}} \cdot [\text{60S}] \cdot [\text{48S\_Ded1\_eIF5B\_GTP}] \cdot \text{mRNA\_init\_free} \\ &\quad - (\mathrm{k1}_{\mathrm{r15}} \cdot [\text{48S}] \cdot [\text{Ded1}] - \mathrm{k2}_{\mathrm{r15}} \cdot [\text{48S\_Ded1}])\end{aligned}$$

$$\begin{aligned}\frac{\mathrm{d}[\text{48S\_Ded1}]}{\mathrm{d}t} &= \mathrm{k1}_{\mathrm{r15}} \cdot [\text{48S}] \cdot [\text{Ded1}] - \mathrm{k2}_{\mathrm{r15}} \cdot [\text{48S\_Ded1}] \\ &\quad - (\mathrm{k1}_{\mathrm{r17}} \cdot [\text{48S\_Ded1}] \cdot [\text{eIF5B\_GTP}] - \mathrm{k2}_{\mathrm{r17}} \cdot [\text{48S\_Ded1\_eIF5B\_GTP}])\end{aligned}$$

$$\frac{\mathrm{d[eIF5B\_GDP]}}{\mathrm{d}t} = \mathrm{k_{r18}} \cdot \mathrm{[60S]} \cdot \mathrm{[48S\_Ded1\_eIF5B\_GTP]} \cdot \mathrm{mRNA\_init\_free} - (\mathrm{k1_{r16}} \cdot \mathrm{[eIF5B\_GDP]} - \mathrm{k2_{r16}} \cdot \mathrm{[eIF5B\_GTP]})$$

$$\frac{\mathrm{d[eIF5B\_GTP]}}{\mathrm{d}t} = \mathrm{k1_{r16}} \cdot \mathrm{[eIF5B\_GDP]} - \mathrm{k2_{r16}} \cdot \mathrm{[eIF5B\_GTP]} - (\mathrm{k1_{r17}} \cdot \mathrm{[48S\_Ded1]} \cdot \mathrm{[eIF5B\_GTP]} - \mathrm{k2_{r17}} \cdot \mathrm{[48S\_Ded1\_eIF5B\_GTP]})$$

$$\frac{\mathrm{d[48S\_Ded1\_eIF5B\_GTP]}}{\mathrm{d}t} = \mathrm{k1_{r17}} \cdot \mathrm{[48S\_Ded1]} \cdot \mathrm{[eIF5B\_GTP]} - \mathrm{k2_{r17}} \cdot \mathrm{[48S\_Ded1\_eIF5B\_GTP]} - \mathrm{k_{r18}} \cdot \mathrm{[60S]} \cdot \mathrm{[48S\_Ded1\_eIF5B\_GTP]} \cdot \mathrm{mRNA\_init\_free}$$

$$\frac{\mathrm{d[60S]}}{\mathrm{d}t} = \mathrm{k1_{r33}} \cdot \mathrm{[80S\_eRF1\_eRF3\_GTP]} - \mathrm{k_{r18}} \cdot \mathrm{[60S]} \cdot \mathrm{[48S\_Ded1\_eIF5B\_GTP]} \cdot \mathrm{mRNA\_init\_free}$$

$$\begin{aligned}\frac{\mathrm{d[eEF1A\_GDP]}}{\mathrm{d}t} = {} & \mathrm{k23f} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_1]} \\ & + \mathrm{k23f} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_2]} \\ & + \mathrm{k23f} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_3]} \\ & + \mathrm{k23f} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_4]} \\ & + \mathrm{k23f} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_5]} \\ & + \mathrm{k23f} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_6]} \\ & + \mathrm{k23f} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_7]} \\ & + \mathrm{k23f} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_8]} \\ & + \mathrm{k23f} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_9]} \\ & + \mathrm{k23f} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_10]} \\ & + \mathrm{k23f} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_11]} \\ & + \mathrm{k23f} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_12]} \\ & + \mathrm{k23f} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_13]} \\ & + \mathrm{k23f} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_14]} \\ & + \mathrm{k23f} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_15]} \\ & + \mathrm{k23f} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_16]} \\ & + \mathrm{k23f} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_17]} \\ & + \mathrm{k23f} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_18]} \\ & + \mathrm{k23f} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_19]} \\ & - (\mathrm{k1_{r19}} \cdot \mathrm{[eEF1A\_GDP]} \cdot \mathrm{[eEF1B]} - \mathrm{k2_{r19}} \cdot \mathrm{[eEF1A\_GDP\_eEF1B]})\end{aligned}$$

$$\frac{\mathrm{d[eEF1B]}}{\mathrm{d}t} = \mathrm{k1_{r20}} \cdot \mathrm{[eEF1A\_GDP\_eEF1B]} - \mathrm{k2_{r20}} \cdot \mathrm{[eEF1A\_GTP]} \cdot \mathrm{[eEF1B]} - (\mathrm{k1_{r19}} \cdot \mathrm{[eEF1A\_GDP]} \cdot \mathrm{[eEF1B]} - \mathrm{k2_{r19}} \cdot \mathrm{[eEF1A\_GDP\_eEF1B]})$$

$$\frac{\mathrm{d[eEF1A\_GDP\_eEF1B]}}{\mathrm{d}t} = \mathrm{k1_{r19}} \cdot \mathrm{[eEF1A\_GDP]} \cdot \mathrm{[eEF1B]} - \mathrm{k2_{r19}} \cdot \mathrm{[eEF1A\_GDP\_eEF1B]} - (\mathrm{k1_{r20}} \cdot \mathrm{[eEF1A\_GDP\_eEF1B]} - \mathrm{k2_{r20}} \cdot \mathrm{[eEF1A\_GTP]} \cdot \mathrm{[eEF1B]})$$

$$\frac{\mathrm{d[eEF1A\_GTP]}}{\mathrm{d}t} = \mathrm{k1_{r20}} \cdot \mathrm{[eEF1A\_GDP\_eEF1B]} - \mathrm{k2_{r20}} \cdot \mathrm{[eEF1A\_GTP]} \cdot \mathrm{[eEF1B]} - (\mathrm{k1_{r21}} \cdot \mathrm{[eEF1A\_GTP]} \cdot \mathrm{[aa\text{-}tRNA]} - \mathrm{k2_{r21}} \cdot \mathrm{[aa\text{-}tRNA\_eEF1A\_GTP]})$$

$$
\begin{aligned}
\frac{\mathrm{d[aa\text{-}tRNA\_eEF1A\_GTP]}}{\mathrm{d}t} = {} & \mathrm{k1_{r21}} \cdot \mathrm{[eEF1A\_GTP]} \cdot \mathrm{[aa\text{-}tRNA]} - \mathrm{k2_{r21}} \cdot \mathrm{[aa\text{-}tRNA\_eEF1A\_GTP]} \\
& - (\mathrm{k22f} \cdot \mathrm{[aa\text{-}tRNA\_eEF1A\_GTP]} \cdot \mathrm{[80S\_1]} - \mathrm{k22b} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_1]}) \\
& - (\mathrm{k22f} \cdot \mathrm{[aa\text{-}tRNA\_eEF1A\_GTP]} \cdot \mathrm{[80S\_2]} - \mathrm{k22b} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_2]}) \\
& - (\mathrm{k22f} \cdot \mathrm{[aa\text{-}tRNA\_eEF1A\_GTP]} \cdot \mathrm{[80S\_3]} - \mathrm{k22b} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_3]}) \\
& - (\mathrm{k22f} \cdot \mathrm{[aa\text{-}tRNA\_eEF1A\_GTP]} \cdot \mathrm{[80S\_4]} - \mathrm{k22b} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_4]}) \\
& - (\mathrm{k22f} \cdot \mathrm{[aa\text{-}tRNA\_eEF1A\_GTP]} \cdot \mathrm{[80S\_5]} - \mathrm{k22b} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_5]}) \\
& - (\mathrm{k22f} \cdot \mathrm{[aa\text{-}tRNA\_eEF1A\_GTP]} \cdot \mathrm{[80S\_6]} - \mathrm{k22b} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_6]}) \\
& - (\mathrm{k22f} \cdot \mathrm{[aa\text{-}tRNA\_eEF1A\_GTP]} \cdot \mathrm{[80S\_7]} - \mathrm{k22b} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_7]}) \\
& - (\mathrm{k22f} \cdot \mathrm{[aa\text{-}tRNA\_eEF1A\_GTP]} \cdot \mathrm{[80S\_8]} - \mathrm{k22b} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_8]}) \\
& - (\mathrm{k22f} \cdot \mathrm{[aa\text{-}tRNA\_eEF1A\_GTP]} \cdot \mathrm{[80S\_9]} - \mathrm{k22b} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_9]}) \\
& - (\mathrm{k22f} \cdot \mathrm{[aa\text{-}tRNA\_eEF1A\_GTP]} \cdot \mathrm{[80S\_10]} - \mathrm{k22b} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_10]}) \\
& - (\mathrm{k22f} \cdot \mathrm{[aa\text{-}tRNA\_eEF1A\_GTP]} \cdot \mathrm{[80S\_11]} - \mathrm{k22b} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_11]}) \\
& - (\mathrm{k22f} \cdot \mathrm{[aa\text{-}tRNA\_eEF1A\_GTP]} \cdot \mathrm{[80S\_12]} - \mathrm{k22b} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_12]}) \\
& - (\mathrm{k22f} \cdot \mathrm{[aa\text{-}tRNA\_eEF1A\_GTP]} \cdot \mathrm{[80S\_13]} - \mathrm{k22b} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_13]}) \\
& - (\mathrm{k22f} \cdot \mathrm{[aa\text{-}tRNA\_eEF1A\_GTP]} \cdot \mathrm{[80S\_14]} - \mathrm{k22b} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_14]}) \\
& - (\mathrm{k22f} \cdot \mathrm{[aa\text{-}tRNA\_eEF1A\_GTP]} \cdot \mathrm{[80S\_15]} - \mathrm{k22b} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_15]}) \\
& - (\mathrm{k22f} \cdot \mathrm{[aa\text{-}tRNA\_eEF1A\_GTP]} \cdot \mathrm{[80S\_16]} - \mathrm{k22b} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_16]}) \\
& - (\mathrm{k22f} \cdot \mathrm{[aa\text{-}tRNA\_eEF1A\_GTP]} \cdot \mathrm{[80S\_17]} - \mathrm{k22b} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_17]}) \\
& - (\mathrm{k22f} \cdot \mathrm{[aa\text{-}tRNA\_eEF1A\_GTP]} \cdot \mathrm{[80S\_18]} - \mathrm{k22b} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_18]}) \\
& - (\mathrm{k22f} \cdot \mathrm{[aa\text{-}tRNA\_eEF1A\_GTP]} \cdot \mathrm{[80S\_19]} - \mathrm{k22b} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_19]})
\end{aligned}
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$$
\begin{aligned}
\frac{\mathrm{d[eEF2\_GDP]}}{\mathrm{d}t} = {} & \mathrm{k26f} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF2\_GTP\_1]} \cdot \frac{\mathrm{mRNA\_num1}}{\mathrm{mRNA\_den1}} \\
& + \mathrm{k26f} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF2\_GTP\_2]} \cdot \frac{\mathrm{mRNA\_num2}}{\mathrm{mRNA\_den2}} \\
& + \mathrm{k26f} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF2\_GTP\_3]} \cdot \frac{\mathrm{mRNA\_num3}}{\mathrm{mRNA\_den3}} \\
& + \mathrm{k26f} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF2\_GTP\_4]} \cdot \frac{\mathrm{mRNA\_num4}}{\mathrm{mRNA\_den4}} \\
& + \mathrm{k26f} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF2\_GTP\_5]} \cdot \frac{\mathrm{mRNA\_num5}}{\mathrm{mRNA\_den5}} \\
& + \mathrm{k26f} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF2\_GTP\_6]} \\
& + \mathrm{k26f} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF2\_GTP\_7]} \\
& + \mathrm{k26f} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF2\_GTP\_8]} \\
& + \mathrm{k26f} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF2\_GTP\_9]} \\
& + \mathrm{k26f} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF2\_GTP\_10]} \\
& + \mathrm{k26f} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF2\_GTP\_11]} \\
& + \mathrm{k26f} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF2\_GTP\_12]} \\
& + \mathrm{k26f} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF2\_GTP\_13]} \\
& + \mathrm{k26f} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF2\_GTP\_14]} \\
& + \mathrm{k26f} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF2\_GTP\_15]} \\
& + \mathrm{k26f} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF2\_GTP\_16]} \\
& + \mathrm{k26f} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF2\_GTP\_17]} \\
& + \mathrm{k26f} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF2\_GTP\_18]} \\
& + \mathrm{k26f} \cdot \mathrm{[80S\_aa\text{-}tRNA\_eEF2\_GTP\_19]} \\
& - (\mathrm{k1_{r24}} \cdot \mathrm{[eEF2\_GDP]} - \mathrm{k2_{r24}} \cdot \mathrm{[eEF2\_GTP]})
\end{aligned}
$$

$$
\begin{aligned}
\frac{d[\mathrm{eEF2\_GTP}]}{dt} = {} & \mathrm{k1_{r24}} \cdot [\mathrm{eEF2\_GDP}] - \mathrm{k2_{r24}} \cdot [\mathrm{eEF2\_GTP}] \\
& - (\mathrm{k25f} \cdot [\mathrm{eEF2\_GTP}] \cdot [\mathrm{80S\_aa\text{-}tRNA\_14}] - \mathrm{k25b} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF2\_GTP\_14}]) \\
& - (\mathrm{k25f} \cdot [\mathrm{eEF2\_GTP}] \cdot [\mathrm{80S\_aa\text{-}tRNA\_15}] - \mathrm{k25b} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF2\_GTP\_15}]) \\
& - (\mathrm{k25f} \cdot [\mathrm{eEF2\_GTP}] \cdot [\mathrm{80S\_aa\text{-}tRNA\_16}] - \mathrm{k25b} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF2\_GTP\_16}]) \\
& - (\mathrm{k25f} \cdot [\mathrm{eEF2\_GTP}] \cdot [\mathrm{80S\_aa\text{-}tRNA\_17}] - \mathrm{k25b} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF2\_GTP\_17}]) \\
& - (\mathrm{k25f} \cdot [\mathrm{eEF2\_GTP}] \cdot [\mathrm{80S\_aa\text{-}tRNA\_18}] - \mathrm{k25b} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF2\_GTP\_18}]) \\
& - (\mathrm{k25f} \cdot [\mathrm{eEF2\_GTP}] \cdot [\mathrm{80S\_aa\text{-}tRNA\_19}] - \mathrm{k25b} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF2\_GTP\_19}]) \\
& - (\mathrm{k25f} \cdot [\mathrm{eEF2\_GTP}] \cdot [\mathrm{80S\_aa\text{-}tRNA\_1}] - \mathrm{k25b} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF2\_GTP\_1}]) \\
& - (\mathrm{k25f} \cdot [\mathrm{eEF2\_GTP}] \cdot [\mathrm{80S\_aa\text{-}tRNA\_2}] - \mathrm{k25b} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF2\_GTP\_2}]) \\
& - (\mathrm{k25f} \cdot [\mathrm{eEF2\_GTP}] \cdot [\mathrm{80S\_aa\text{-}tRNA\_3}] - \mathrm{k25b} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF2\_GTP\_3}]) \\
& - (\mathrm{k25f} \cdot [\mathrm{eEF2\_GTP}] \cdot [\mathrm{80S\_aa\text{-}tRNA\_4}] - \mathrm{k25b} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF2\_GTP\_4}]) \\
& - (\mathrm{k25f} \cdot [\mathrm{eEF2\_GTP}] \cdot [\mathrm{80S\_aa\text{-}tRNA\_5}] - \mathrm{k25b} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF2\_GTP\_5}]) \\
& - (\mathrm{k25f} \cdot [\mathrm{eEF2\_GTP}] \cdot [\mathrm{80S\_aa\text{-}tRNA\_6}] - \mathrm{k25b} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF2\_GTP\_6}]) \\
& - (\mathrm{k25f} \cdot [\mathrm{eEF2\_GTP}] \cdot [\mathrm{80S\_aa\text{-}tRNA\_7}] - \mathrm{k25b} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF2\_GTP\_7}]) \\
& - (\mathrm{k25f} \cdot [\mathrm{eEF2\_GTP}] \cdot [\mathrm{80S\_aa\text{-}tRNA\_8}] - \mathrm{k25b} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF2\_GTP\_8}]) \\
& - (\mathrm{k25f} \cdot [\mathrm{eEF2\_GTP}] \cdot [\mathrm{80S\_aa\text{-}tRNA\_9}] - \mathrm{k25b} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF2\_GTP\_9}]) \\
& - (\mathrm{k25f} \cdot [\mathrm{eEF2\_GTP}] \cdot [\mathrm{80S\_aa\text{-}tRNA\_10}] - \mathrm{k25b} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF2\_GTP\_10}]) \\
& - (\mathrm{k25f} \cdot [\mathrm{eEF2\_GTP}] \cdot [\mathrm{80S\_aa\text{-}tRNA\_11}] - \mathrm{k25b} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF2\_GTP\_11}]) \\
& - (\mathrm{k25f} \cdot [\mathrm{eEF2\_GTP}] \cdot [\mathrm{80S\_aa\text{-}tRNA\_12}] - \mathrm{k25b} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF2\_GTP\_12}]) \\
& - (\mathrm{k25f} \cdot [\mathrm{eEF2\_GTP}] \cdot [\mathrm{80S\_aa\text{-}tRNA\_13}] - \mathrm{k25b} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF2\_GTP\_13}])
\end{aligned}
$$

$$
\begin{aligned}
\frac{d[\mathrm{eEF3\_GDP}]}{dt} = {} & \mathrm{k29f} \cdot [\mathrm{80S\_tRNA\_eEF3\_GTP\_2}] \\
& + \mathrm{k29f} \cdot [\mathrm{80S\_tRNA\_eEF3\_GTP\_3}] \\
& + \mathrm{k29f} \cdot [\mathrm{80S\_tRNA\_eEF3\_GTP\_4}] \\
& + \mathrm{k29f} \cdot [\mathrm{80S\_tRNA\_eEF3\_GTP\_5}] \\
& + \mathrm{k29f} \cdot [\mathrm{80S\_tRNA\_eEF3\_GTP\_6}] \\
& + \mathrm{k29f} \cdot [\mathrm{80S\_tRNA\_eEF3\_GTP\_7}] \\
& + \mathrm{k29f} \cdot [\mathrm{80S\_tRNA\_eEF3\_GTP\_8}] \\
& + \mathrm{k29f} \cdot [\mathrm{80S\_tRNA\_eEF3\_GTP\_9}] \\
& + \mathrm{k29f} \cdot [\mathrm{80S\_tRNA\_eEF3\_GTP\_10}] \\
& + \mathrm{k29f} \cdot [\mathrm{80S\_tRNA\_eEF3\_GTP\_11}] \\
& + \mathrm{k29f} \cdot [\mathrm{80S\_tRNA\_eEF3\_GTP\_12}] \\
& + \mathrm{k29f} \cdot [\mathrm{80S\_tRNA\_eEF3\_GTP\_13}] \\
& + \mathrm{k29f} \cdot [\mathrm{80S\_tRNA\_eEF3\_GTP\_14}] \\
& + \mathrm{k29f} \cdot [\mathrm{80S\_tRNA\_eEF3\_GTP\_15}] \\
& + \mathrm{k29f} \cdot [\mathrm{80S\_tRNA\_eEF3\_GTP\_16}] \\
& + \mathrm{k29f} \cdot [\mathrm{80S\_tRNA\_eEF3\_GTP\_17}] \\
& + \mathrm{k29f} \cdot [\mathrm{80S\_tRNA\_eEF3\_GTP\_18}] \\
& + \mathrm{k29f} \cdot [\mathrm{80S\_tRNA\_eEF3\_GTP\_19}] \\
& + \mathrm{k29f} \cdot [\mathrm{80S\_tRNA\_eEF3\_GTP\_20}] \\
& - (\mathrm{k1_{r27}} \cdot [\mathrm{eEF3\_GDP}] - \mathrm{k2_{r27}} \cdot [\mathrm{eEF3\_GTP}])
\end{aligned}
$$

$$\frac{d[eEF3\_GTP]}{dt} = k1_{r27} \cdot [eEF3\_GDP] - k2_{r27} \cdot [eEF3\_GTP]$$
$$- k28f \cdot [80S\_tRNA\_2] \cdot [eEF3\_GTP]$$
$$- k28f \cdot [80S\_tRNA\_3] \cdot [eEF3\_GTP]$$
$$- k28f \cdot [80S\_tRNA\_4] \cdot [eEF3\_GTP]$$
$$- k28f \cdot [80S\_tRNA\_5] \cdot [eEF3\_GTP]$$
$$- k28f \cdot [80S\_tRNA\_6] \cdot [eEF3\_GTP]$$
$$- k28f \cdot [80S\_tRNA\_7] \cdot [eEF3\_GTP]$$
$$- k28f \cdot [80S\_tRNA\_8] \cdot [eEF3\_GTP]$$
$$- k28f \cdot [80S\_tRNA\_9] \cdot [eEF3\_GTP]$$
$$- k28f \cdot [80S\_tRNA\_10] \cdot [eEF3\_GTP]$$
$$- k28f \cdot [80S\_tRNA\_11] \cdot [eEF3\_GTP]$$
$$- k28f \cdot [80S\_tRNA\_12] \cdot [eEF3\_GTP]$$
$$- k28f \cdot [80S\_tRNA\_13] \cdot [eEF3\_GTP]$$
$$- k28f \cdot [80S\_tRNA\_14] \cdot [eEF3\_GTP]$$
$$- k28f \cdot [80S\_tRNA\_15] \cdot [eEF3\_GTP]$$
$$- k28f \cdot [80S\_tRNA\_16] \cdot [eEF3\_GTP]$$
$$- k28f \cdot [80S\_tRNA\_17] \cdot [eEF3\_GTP]$$
$$- k28f \cdot [80S\_tRNA\_18] \cdot [eEF3\_GTP]$$
$$- k28f \cdot [80S\_tRNA\_19] \cdot [eEF3\_GTP]$$
$$- k28f \cdot [80S\_tRNA\_20] \cdot [eEF3\_GTP]$$

$$\frac{d[80S\_1]}{dt} = k_{r18} \cdot [60S] \cdot [48S\_Ded1\_eIF5B\_GTP] \cdot mRNA\_init\_free$$
$$- (k22f \cdot [aa\text{-}tRNA\_eEF1A\_GTP] \cdot [80S\_1] - k22b \cdot [80S\_aa\text{-}tRNA\_eEF1A\_GTP\_1])$$

$$\frac{d[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_1]}{dt} = k22f \cdot [aa\text{-}tRNA\_eEF1A\_GTP] \cdot [80S\_1] - k22b \cdot [80S\_aa\text{-}tRNA\_eEF1A\_GTP\_1]$$
$$- k23f \cdot [80S\_aa\text{-}tRNA\_eEF1A\_GTP\_1]$$

$$\frac{d[80S\_aa\text{-}tRNA\_1]}{dt} = k23f \cdot [80S\_aa\text{-}tRNA\_eEF1A\_GTP\_1]$$
$$- (k25f \cdot [eEF2\_GTP] \cdot [80S\_aa\text{-}tRNA\_1] - k25b \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_1])$$

$$\frac{d[80S\_aa\text{-}tRNA\_eEF2\_GTP\_1]}{dt} = k25f \cdot [eEF2\_GTP] \cdot [80S\_aa\text{-}tRNA\_1] - k25b \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_1]$$
$$- k26f \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_1] \cdot \frac{mRNA\_num1}{mRNA\_den1}$$

$$\frac{d[80S\_2]}{dt} = k29f \cdot [80S\_tRNA\_eEF3\_GTP\_2]$$
$$- (k22f \cdot [aa\text{-}tRNA\_eEF1A\_GTP] \cdot [80S\_2] - k22b \cdot [80S\_aa\text{-}tRNA\_eEF1A\_GTP\_2])$$

$$\frac{d[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_2]}{dt} = k22f \cdot [aa\text{-}tRNA\_eEF1A\_GTP] \cdot [80S\_2] - k22b \cdot [80S\_aa\text{-}tRNA\_eEF1A\_GTP\_2]$$
$$- k23f \cdot [80S\_aa\text{-}tRNA\_eEF1A\_GTP\_2]$$

$$\frac{d[80S\_aa\text{-}tRNA\_2]}{dt} = k23f \cdot [80S\_aa\text{-}tRNA\_eEF1A\_GTP\_2]$$
$$- (k25f \cdot [eEF2\_GTP] \cdot [80S\_aa\text{-}tRNA\_2] - k25b \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_2])$$

$$\frac{d[80S\_aa\text{-}tRNA\_eEF2\_GTP\_2]}{dt} = k25f \cdot [eEF2\_GTP] \cdot [80S\_aa\text{-}tRNA\_2] - k25b \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_2]$$
$$- k26f \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_2] \cdot \frac{mRNA\_num2}{mRNA\_den2}$$

$$\frac{d[80S\_tRNA\_2]}{dt} = k26f \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_1] \cdot \frac{mRNA\_num1}{mRNA\_den1}$$
$$- k28f \cdot [80S\_tRNA\_2] \cdot [eEF3\_GTP]$$

$$\frac{\mathrm{d}[\mathrm{80S\_tRNA\_eEF3\_GTP\_2}]}{\mathrm{d}t} = \mathrm{k28f} \cdot [\mathrm{80S\_tRNA\_2}] \cdot [\mathrm{eEF3\_GTP}] - \mathrm{k29f} \cdot [\mathrm{80S\_tRNA\_eEF3\_GTP\_2}]$$

$$\begin{aligned}\frac{\mathrm{d}[\mathrm{80S\_3}]}{\mathrm{d}t} &= \mathrm{k29f} \cdot [\mathrm{80S\_tRNA\_eEF3\_GTP\_3}] \\ &\quad - (\mathrm{k22f} \cdot [\mathrm{aa\text{-}tRNA\_eEF1A\_GTP}] \cdot [\mathrm{80S\_3}] - \mathrm{k22b} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF1A\_GTP\_3}])\end{aligned}$$

$$\begin{aligned}\frac{\mathrm{d}[\mathrm{80S\_aa\text{-}tRNA\_eEF1A\_GTP\_3}]}{\mathrm{d}t} &= \mathrm{k22f} \cdot [\mathrm{aa\text{-}tRNA\_eEF1A\_GTP}] \cdot [\mathrm{80S\_3}] - \mathrm{k22b} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF1A\_GTP\_3}] \\ &\quad - \mathrm{k23f} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF1A\_GTP\_3}]\end{aligned}$$

$$\begin{aligned}\frac{\mathrm{d}[\mathrm{80S\_aa\text{-}tRNA\_3}]}{\mathrm{d}t} &= \mathrm{k23f} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF1A\_GTP\_3}] \\ &\quad - (\mathrm{k25f} \cdot [\mathrm{eEF2\_GTP}] \cdot [\mathrm{80S\_aa\text{-}tRNA\_3}] - \mathrm{k25b} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF2\_GTP\_3}])\end{aligned}$$

$$\begin{aligned}\frac{\mathrm{d}[\mathrm{80S\_aa\text{-}tRNA\_eEF2\_GTP\_3}]}{\mathrm{d}t} &= \mathrm{k25f} \cdot [\mathrm{eEF2\_GTP}] \cdot [\mathrm{80S\_aa\text{-}tRNA\_3}] - \mathrm{k25b} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF2\_GTP\_3}] \\ &\quad \mathrm{k26f} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF2\_GTP\_3}] \cdot \frac{\mathrm{mRNA\_num3}}{\mathrm{mRNA\_den3}}\end{aligned}$$

$$\begin{aligned}\frac{\mathrm{d}[\mathrm{80S\_tRNA\_3}]}{\mathrm{d}t} &= \mathrm{k26f} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF2\_GTP\_2}] \cdot \frac{\mathrm{mRNA\_num2}}{\mathrm{mRNA\_den2}} \\ &\quad - \mathrm{k28f} \cdot [\mathrm{80S\_tRNA\_3}] \cdot [\mathrm{eEF3\_GTP}]\end{aligned}$$

$$\frac{\mathrm{d}[\mathrm{80S\_tRNA\_eEF3\_GTP\_3}]}{\mathrm{d}t} = \mathrm{k28f} \cdot [\mathrm{80S\_tRNA\_3}] \cdot [\mathrm{eEF3\_GTP}] - \mathrm{k29f} \cdot [\mathrm{80S\_tRNA\_eEF3\_GTP\_3}]$$

$$\begin{aligned}\frac{\mathrm{d}[\mathrm{80S\_4}]}{\mathrm{d}t} &= \mathrm{k29f} \cdot [\mathrm{80S\_tRNA\_eEF3\_GTP\_4}] \\ &\quad - (\mathrm{k22f} \cdot [\mathrm{aa\text{-}tRNA\_eEF1A\_GTP}] \cdot [\mathrm{80S\_4}] - \mathrm{k22b} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF1A\_GTP\_4}])\end{aligned}$$

$$\begin{aligned}\frac{\mathrm{d}[\mathrm{80S\_aa\text{-}tRNA\_eEF1A\_GTP\_4}]}{\mathrm{d}t} &= \mathrm{k22f} \cdot [\mathrm{aa\text{-}tRNA\_eEF1A\_GTP}] \cdot [\mathrm{80S\_4}] - \mathrm{k22b} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF1A\_GTP\_4}] \\ &\quad - (\mathrm{k23f} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF1A\_GTP\_4}])\end{aligned}$$

$$\begin{aligned}\frac{\mathrm{d}[\mathrm{80S\_aa\text{-}tRNA\_4}]}{\mathrm{d}t} &= \mathrm{k23f} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF1A\_GTP\_4}] \\ &\quad - (\mathrm{k25f} \cdot [\mathrm{eEF2\_GTP}] \cdot [\mathrm{80S\_aa\text{-}tRNA\_4}] - \mathrm{k25b} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF2\_GTP\_4}])\end{aligned}$$

$$\begin{aligned}\frac{\mathrm{d}[\mathrm{80S\_aa\text{-}tRNA\_eEF2\_GTP\_4}]}{\mathrm{d}t} &= \mathrm{k25f} \cdot [\mathrm{eEF2\_GTP}] \cdot [\mathrm{80S\_aa\text{-}tRNA\_4}] - \mathrm{k25b} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF2\_GTP\_4}] \\ &\quad - \mathrm{k26f} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF2\_GTP\_4}] \cdot \frac{\mathrm{mRNA\_num4}}{\mathrm{mRNA\_den4}}\end{aligned}$$

$$\begin{aligned}\frac{\mathrm{d}[\mathrm{80S\_tRNA\_4}]}{\mathrm{d}t} &= \mathrm{k26f} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF2\_GTP\_3}] \cdot \frac{\mathrm{mRNA\_num3}}{\mathrm{mRNA\_den3}} \\ &\quad - \mathrm{k28f} \cdot [\mathrm{80S\_tRNA\_4}] \cdot [\mathrm{eEF3\_GTP}]\end{aligned}$$

$$\frac{\mathrm{d}[\mathrm{80S\_tRNA\_eEF3\_GTP\_4}]}{\mathrm{d}t} = \mathrm{k28f} \cdot [\mathrm{80S\_tRNA\_4}] \cdot [\mathrm{eEF3\_GTP}] - \mathrm{k29f} \cdot [\mathrm{80S\_tRNA\_eEF3\_GTP\_4}]$$

$$\begin{aligned}\frac{\mathrm{d}[\mathrm{80S\_5}]}{\mathrm{d}t} &= \mathrm{k29f} \cdot [\mathrm{80S\_tRNA\_eEF3\_GTP\_5}] \\ &\quad - (\mathrm{k22f} \cdot [\mathrm{aa\text{-}tRNA\_eEF1A\_GTP}] \cdot [\mathrm{80S\_5}] - \mathrm{k22b} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF1A\_GTP\_5}])\end{aligned}$$

$$\begin{aligned}\frac{\mathrm{d}[\mathrm{80S\_aa\text{-}tRNA\_eEF1A\_GTP\_5}]}{\mathrm{d}t} &= \mathrm{k22f} \cdot [\mathrm{aa\text{-}tRNA\_eEF1A\_GTP}] \cdot [\mathrm{80S\_5}] - \mathrm{k22b} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF1A\_GTP\_5}] \\ &\quad - \mathrm{k23f} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF1A\_GTP\_5}]\end{aligned}$$

$$\begin{aligned}\frac{\mathrm{d}[\mathrm{80S\_aa\text{-}tRNA\_5}]}{\mathrm{d}t} &= \mathrm{k23f} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF1A\_GTP\_5}] \\ &\quad - (\mathrm{k25f} \cdot [\mathrm{eEF2\_GTP}] \cdot [\mathrm{80S\_aa\text{-}tRNA\_5}] - \mathrm{k25b} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF2\_GTP\_5}])\end{aligned}$$

$$\begin{aligned}\frac{\mathrm{d}[\mathrm{80S\_aa\text{-}tRNA\_eEF2\_GTP\_5}]}{\mathrm{d}t} &= \mathrm{k25f} \cdot [\mathrm{eEF2\_GTP}] \cdot [\mathrm{80S\_aa\text{-}tRNA\_5}] - \mathrm{k25b} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF2\_GTP\_5}] \\ &\quad - \mathrm{k26f} \cdot [\mathrm{80S\_aa\text{-}tRNA\_eEF2\_GTP\_5}] \cdot \frac{\mathrm{mRNA\_num5}}{\mathrm{mRNA\_den5}}\end{aligned}$$

$$\frac{d[\text{80S\_tRNA\_5}]}{dt} = \text{k26f} \cdot [\text{80S\_aa-tRNA\_eEF2\_GTP\_4}] \cdot \frac{\text{mRNA\_num4}}{\text{mRNA\_den4}} - \text{k28f} \cdot [\text{80S\_tRNA\_5}] \cdot [\text{eEF3\_GTP}]$$

$$\frac{d[\text{80S\_tRNA\_eEF3\_GTP\_5}]}{dt} = \text{k28f} \cdot [\text{80S\_tRNA\_5}] \cdot [\text{eEF3\_GTP}] - \text{k29f} \cdot [\text{80S\_tRNA\_eEF3\_GTP\_5}]$$

$$\frac{d[\text{80S\_6}]}{dt} = \text{k29f} \cdot [\text{80S\_tRNA\_eEF3\_GTP\_6}] - (\text{k22f} \cdot [\text{aa-tRNA\_eEF1A\_GTP}] \cdot [\text{80S\_6}] - \text{k22b} \cdot [\text{80S\_aa-tRNA\_eEF1A\_GTP\_6}])$$

$$\frac{d[\text{80S\_aa-tRNA\_eEF1A\_GTP\_6}]}{dt} = \text{k22f} \cdot [\text{aa-tRNA\_eEF1A\_GTP}] \cdot [\text{80S\_6}] - \text{k22b} \cdot [\text{80S\_aa-tRNA\_eEF1A\_GTP\_6}] - \text{k23f} \cdot [\text{80S\_aa-tRNA\_eEF1A\_GTP\_6}]$$

$$\frac{d[\text{80S\_aa-tRNA\_6}]}{dt} = \text{k23f} \cdot [\text{80S\_aa-tRNA\_eEF1A\_GTP\_6}] - (\text{k25f} \cdot [\text{eEF2\_GTP}] \cdot [\text{80S\_aa-tRNA\_6}] - \text{k25b} \cdot [\text{80S\_aa-tRNA\_eEF2\_GTP\_6}])$$

$$\frac{d[\text{80S\_aa-tRNA\_eEF2\_GTP\_6}]}{dt} = \text{k25f} \cdot [\text{eEF2\_GTP}] \cdot [\text{80S\_aa-tRNA\_6}] - \text{k25b} \cdot [\text{80S\_aa-tRNA\_eEF2\_GTP\_6}] - \text{k26f} \cdot [\text{80S\_aa-tRNA\_eEF2\_GTP\_6}]$$

$$\frac{d[\text{80S\_tRNA\_6}]}{dt} = \text{k26f} \cdot [\text{80S\_aa-tRNA\_eEF2\_GTP\_5}] \cdot \frac{\text{mRNA\_num5}}{\text{mRNA\_den5}} - \text{k28f} \cdot [\text{80S\_tRNA\_6}] \cdot [\text{eEF3\_GTP}]$$

$$\frac{d[\text{80S\_tRNA\_eEF3\_GTP\_6}]}{dt} = \text{k28f} \cdot [\text{80S\_tRNA\_6}] \cdot [\text{eEF3\_GTP}] - (\text{k29f} \cdot [\text{80S\_tRNA\_eEF3\_GTP\_6}])$$

$$\frac{d[\text{80S\_7}]}{dt} = \text{k29f} \cdot [\text{80S\_tRNA\_eEF3\_GTP\_7}] - (\text{k22f} \cdot [\text{aa-tRNA\_eEF1A\_GTP}] \cdot [\text{80S\_7}] - \text{k22b} \cdot [\text{80S\_aa-tRNA\_eEF1A\_GTP\_7}])$$

$$\frac{d[\text{80S\_aa-tRNA\_eEF1A\_GTP\_7}]}{dt} = \text{k22f} \cdot [\text{aa-tRNA\_eEF1A\_GTP}] \cdot [\text{80S\_7}] - \text{k22b} \cdot [\text{80S\_aa-tRNA\_eEF1A\_GTP\_7}] - \text{k23f} \cdot [\text{80S\_aa-tRNA\_eEF1A\_GTP\_7}]$$

$$\frac{d[\text{80S\_aa-tRNA\_7}]}{dt} = \text{k23f} \cdot [\text{80S\_aa-tRNA\_eEF1A\_GTP\_7}] - (\text{k25f} \cdot [\text{eEF2\_GTP}] \cdot [\text{80S\_aa-tRNA\_7}] - \text{k25b} \cdot [\text{80S\_aa-tRNA\_eEF2\_GTP\_7}])$$

$$\frac{d[\text{80S\_aa-tRNA\_eEF2\_GTP\_7}]}{dt} = \text{k25f} \cdot [\text{eEF2\_GTP}] \cdot [\text{80S\_aa-tRNA\_7}] - \text{k25b} \cdot [\text{80S\_aa-tRNA\_eEF2\_GTP\_7}] - \text{k26f} \cdot [\text{80S\_aa-tRNA\_eEF2\_GTP\_7}]$$

$$\frac{d[\text{80S\_tRNA\_7}]}{dt} = \text{k26f} \cdot [\text{80S\_aa-tRNA\_eEF2\_GTP\_6}] - \text{k28f} \cdot [\text{80S\_tRNA\_7}] \cdot [\text{eEF3\_GTP}]$$

$$\frac{d[\text{80S\_tRNA\_eEF3\_GTP\_7}]}{dt} = \text{k28f} \cdot [\text{80S\_tRNA\_7}] \cdot [\text{eEF3\_GTP}] - \text{k29f} \cdot [\text{80S\_tRNA\_eEF3\_GTP\_7}]$$

$$\frac{d[\text{80S\_8}]}{dt} = \text{k29f} \cdot [\text{80S\_tRNA\_eEF3\_GTP\_8}] - (\text{k22f} \cdot [\text{aa-tRNA\_eEF1A\_GTP}] \cdot [\text{80S\_8}] - \text{k22b} \cdot [\text{80S\_aa-tRNA\_eEF1A\_GTP\_8}])$$

$$\frac{d[\text{80S\_aa-tRNA\_eEF1A\_GTP\_8}]}{dt} = \text{k22f} \cdot [\text{aa-tRNA\_eEF1A\_GTP}] \cdot [\text{80S\_8}] - \text{k22b} \cdot [\text{80S\_aa-tRNA\_eEF1A\_GTP\_8}] - \text{k23f} \cdot [\text{80S\_aa-tRNA\_eEF1A\_GTP\_8}]$$

$$\frac{d[\text{80S\_aa-tRNA\_8}]}{dt} = \text{k23f} \cdot [\text{80S\_aa-tRNA\_eEF1A\_GTP\_8}] - (\text{k25f} \cdot [\text{eEF2\_GTP}] \cdot [\text{80S\_aa-tRNA\_8}] - \text{k25b} \cdot [\text{80S\_aa-tRNA\_eEF2\_GTP\_8}])$$

$$\frac{d[\text{80S\_aa-tRNA\_eEF2\_GTP\_8}]}{dt} = \text{k25f} \cdot [\text{eEF2\_GTP}] \cdot [\text{80S\_aa-tRNA\_8}] - \text{k25b} \cdot [\text{80S\_aa-tRNA\_eEF2\_GTP\_8}] - \text{k26f} \cdot [\text{80S\_aa-tRNA\_eEF2\_GTP\_8}]$$

$$\frac{d[80S\_tRNA\_8]}{dt} = k26f \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_7] - k28f \cdot [80S\_tRNA\_8] \cdot [eEF3\_GTP]$$

$$\frac{d[80S\_tRNA\_eEF3\_GTP\_8]}{dt} = k28f \cdot [80S\_tRNA\_8] \cdot [eEF3\_GTP] - k29f \cdot [80S\_tRNA\_eEF3\_GTP\_8]$$

$$\frac{d[80S\_9]}{dt} = k29f \cdot [80S\_tRNA\_eEF3\_GTP\_9] - (k22f \cdot [aa\text{-}tRNA\_eEF1A\_GTP] \cdot [80S\_9] - k22b \cdot [80S\_aa\text{-}tRNA\_eEF1A\_GTP\_9])$$

$$\frac{d[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_9]}{dt} = k22f \cdot [aa\text{-}tRNA\_eEF1A\_GTP] \cdot [80S\_9] - k22b \cdot [80S\_aa\text{-}tRNA\_eEF1A\_GTP\_9] - k23f \cdot [80S\_aa\text{-}tRNA\_eEF1A\_GTP\_9]$$

$$\frac{d[80S\_aa\text{-}tRNA\_9]}{dt} = k23f \cdot [80S\_aa\text{-}tRNA\_eEF1A\_GTP\_9] - (k25f \cdot [eEF2\_GTP] \cdot [80S\_aa\text{-}tRNA\_9] - k25b \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_9])$$

$$\frac{d[80S\_aa\text{-}tRNA\_eEF2\_GTP\_9]}{dt} = k25f \cdot [eEF2\_GTP] \cdot [80S\_aa\text{-}tRNA\_9] - k25b \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_9] - k26f \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_9]$$

$$\frac{d[80S\_tRNA\_9]}{dt} = k26f \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_8] - k28f \cdot [80S\_tRNA\_9] \cdot [eEF3\_GTP]$$

$$\frac{d[80S\_tRNA\_eEF3\_GTP\_9]}{dt} = k28f \cdot [80S\_tRNA\_9] \cdot [eEF3\_GTP] - k29f \cdot [80S\_tRNA\_eEF3\_GTP\_9]$$

$$\frac{d[80S\_10]}{dt} = k29f \cdot [80S\_tRNA\_eEF3\_GTP\_10] - (k22f \cdot [aa\text{-}tRNA\_eEF1A\_GTP] \cdot [80S\_10] - k22b \cdot [80S\_aa\text{-}tRNA\_eEF1A\_GTP\_10])$$

$$\frac{d[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_10]}{dt} = k22f \cdot [aa\text{-}tRNA\_eEF1A\_GTP] \cdot [80S\_10] - k22b \cdot [80S\_aa\text{-}tRNA\_eEF1A\_GTP\_10] - k23f \cdot [80S\_aa\text{-}tRNA\_eEF1A\_GTP\_10]$$

$$\frac{d[80S\_aa\text{-}tRNA\_10]}{dt} = k23f \cdot [80S\_aa\text{-}tRNA\_eEF1A\_GTP\_10] - (k25f \cdot [eEF2\_GTP] \cdot [80S\_aa\text{-}tRNA\_10] - k25b \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_10])$$

$$\frac{d[80S\_aa\text{-}tRNA\_eEF2\_GTP\_10]}{dt} = k25f \cdot [eEF2\_GTP] \cdot [80S\_aa\text{-}tRNA\_10] - k25b \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_10] - k26f \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_10]$$

$$\frac{d[80S\_tRNA\_10]}{dt} = k26f \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_9] - k28f \cdot [80S\_tRNA\_10] \cdot [eEF3\_GTP]$$

$$\frac{d[80S\_tRNA\_eEF3\_GTP\_10]}{dt} = k28f \cdot [80S\_tRNA\_10] \cdot [eEF3\_GTP] - k29f \cdot [80S\_tRNA\_eEF3\_GTP\_10]$$

$$\frac{d[80S\_11]}{dt} = k29f \cdot [80S\_tRNA\_eEF3\_GTP\_11] - (k22f \cdot [aa\text{-}tRNA\_eEF1A\_GTP] \cdot [80S\_11] - k22b \cdot [80S\_aa\text{-}tRNA\_eEF1A\_GTP\_11])$$

$$\frac{d[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_11]}{dt} = k22f \cdot [aa\text{-}tRNA\_eEF1A\_GTP] \cdot [80S\_11] - k22b \cdot [80S\_aa\text{-}tRNA\_eEF1A\_GTP\_11] - k23f \cdot [80S\_aa\text{-}tRNA\_eEF1A\_GTP\_11]$$

$$\frac{d[80S\_aa\text{-}tRNA\_11]}{dt} = k23f \cdot [80S\_aa\text{-}tRNA\_eEF1A\_GTP\_11] - (k25f \cdot [eEF2\_GTP] \cdot [80S\_aa\text{-}tRNA\_11] - k25b \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_11])$$

$$\frac{d[80S\_aa\text{-}tRNA\_eEF2\_GTP\_11]}{dt} = k25f \cdot [eEF2\_GTP] \cdot [80S\_aa\text{-}tRNA\_11] - k25b \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_11] - k26f \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_11]$$

$$\frac{d[80S\_tRNA\_11]}{dt} = k26f \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_10] - k28f \cdot [80S\_tRNA\_11] \cdot [eEF3\_GTP]$$

$$\frac{d[80S\_tRNA\_eEF3\_GTP\_11]}{dt} = k28f \cdot [80S\_tRNA\_11] \cdot [eEF3\_GTP] - k29f \cdot [80S\_tRNA\_eEF3\_GTP\_11]$$

$$\frac{d[80S\_12]}{dt} = k29f \cdot [80S\_tRNA\_eEF3\_GTP\_12] - (k22f \cdot [aa\text{-}tRNA\_eEF1A\_GTP] \cdot [80S\_12] - k22b \cdot [80S\_aa\text{-}tRNA\_eEF1A\_GTP\_12])$$

$$\frac{d[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_12]}{dt} = k22f \cdot [aa\text{-}tRNA\_eEF1A\_GTP] \cdot [80S\_12] - k22b \cdot [80S\_aa\text{-}tRNA\_eEF1A\_GTP\_12] - k23f \cdot [80S\_aa\text{-}tRNA\_eEF1A\_GTP\_12]$$

$$\frac{d[80S\_aa\text{-}tRNA\_12]}{dt} = k23f \cdot [80S\_aa\text{-}tRNA\_eEF1A\_GTP\_12] - (k25f \cdot [eEF2\_GTP] \cdot [80S\_aa\text{-}tRNA\_12] - k25b \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_12])$$

$$\frac{d[80S\_aa\text{-}tRNA\_eEF2\_GTP\_12]}{dt} = k25f \cdot [eEF2\_GTP] \cdot [80S\_aa\text{-}tRNA\_12] - k25b \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_12] - k26f \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_12]$$

$$\frac{d[80S\_tRNA\_12]}{dt} = k26f \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_11] - k28f \cdot [80S\_tRNA\_12] \cdot [eEF3\_GTP]$$

$$\frac{d[80S\_tRNA\_eEF3\_GTP\_12]}{dt} = k28f \cdot [80S\_tRNA\_12] \cdot [eEF3\_GTP] - k29f \cdot [80S\_tRNA\_eEF3\_GTP\_12]$$

$$\frac{d[80S\_13]}{dt} = k29f \cdot [80S\_tRNA\_eEF3\_GTP\_13] - (k22f \cdot [aa\text{-}tRNA\_eEF1A\_GTP] \cdot [80S\_13] - k22b \cdot [80S\_aa\text{-}tRNA\_eEF1A\_GTP\_13])$$

$$\frac{d[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_13]}{dt} = k22f \cdot [aa\text{-}tRNA\_eEF1A\_GTP] \cdot [80S\_13] - k22b \cdot [80S\_aa\text{-}tRNA\_eEF1A\_GTP\_13] - k23f \cdot [80S\_aa\text{-}tRNA\_eEF1A\_GTP\_13]$$

$$\frac{d[80S\_aa\text{-}tRNA\_13]}{dt} = k23f \cdot [80S\_aa\text{-}tRNA\_eEF1A\_GTP\_13] - (k25f \cdot [eEF2\_GTP] \cdot [80S\_aa\text{-}tRNA\_13] - k25b \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_13])$$

$$\frac{d[80S\_aa\text{-}tRNA\_eEF2\_GTP\_13]}{dt} = k25f \cdot [eEF2\_GTP] \cdot [80S\_aa\text{-}tRNA\_13] - k25b \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_13] - k26f \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_13]$$

$$\frac{d[80S\_tRNA\_13]}{dt} = k26f \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_12] - k28f \cdot [80S\_tRNA\_13] \cdot [eEF3\_GTP]$$

$$\frac{d[80S\_tRNA\_eEF3\_GTP\_13]}{dt} = k28f \cdot [80S\_tRNA\_13] \cdot [eEF3\_GTP] - k29f \cdot [80S\_tRNA\_eEF3\_GTP\_13]$$

$$\frac{d[80S\_14]}{dt} = k29f \cdot [80S\_tRNA\_eEF3\_GTP\_14] - (k22f \cdot [aa\text{-}tRNA\_eEF1A\_GTP] \cdot [80S\_14] - k22b \cdot [80S\_aa\text{-}tRNA\_eEF1A\_GTP\_14])$$

$$\frac{d[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_14]}{dt} = k22f \cdot [aa\text{-}tRNA\_eEF1A\_GTP] \cdot [80S\_14] - k22b \cdot [80S\_aa\text{-}tRNA\_eEF1A\_GTP\_14] - k23f \cdot [80S\_aa\text{-}tRNA\_eEF1A\_GTP\_14]$$

$$\frac{d[80S\_aa\text{-}tRNA\_14]}{dt} = k23f \cdot [80S\_aa\text{-}tRNA\_eEF1A\_GTP\_14] - (k25f \cdot [eEF2\_GTP] \cdot [80S\_aa\text{-}tRNA\_14] - k25b \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_14])$$

$$\frac{d[80S\_aa\text{-}tRNA\_eEF2\_GTP\_14]}{dt} = k25f \cdot [eEF2\_GTP] \cdot [80S\_aa\text{-}tRNA\_14] - k25b \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_14] - k26f \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_14]$$

$$\frac{d[80S\_tRNA\_14]}{dt} = k26f \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_13] - k28f \cdot [80S\_tRNA\_14] \cdot [eEF3\_GTP]$$

$$\frac{d[80S\_tRNA\_eEF3\_GTP\_14]}{dt} = k28f \cdot [80S\_tRNA\_14] \cdot [eEF3\_GTP] - k29f \cdot [80S\_tRNA\_eEF3\_GTP\_14]$$

$$\frac{\mathrm{d}[\text{80S\_15}]}{\mathrm{d}t} = \text{k29f} \cdot [\text{80S\_tRNA\_eEF3\_GTP\_15}] - (\text{k22f} \cdot [\text{aa-tRNA\_eEF1A\_GTP}] \cdot [\text{80S\_15}] - \text{k22b} \cdot [\text{80S\_aa-tRNA\_eEF1A\_GTP\_15}])$$

$$\frac{\mathrm{d}[\text{80S\_aa-tRNA\_eEF1A\_GTP\_15}]}{\mathrm{d}t} = \text{k22f} \cdot [\text{aa-tRNA\_eEF1A\_GTP}] \cdot [\text{80S\_15}] - \text{k22b} \cdot [\text{80S\_aa-tRNA\_eEF1A\_GTP\_15}] - \text{k23f} \cdot [\text{80S\_aa-tRNA\_eEF1A\_GTP\_15}]$$

$$\frac{\mathrm{d}[\text{80S\_aa-tRNA\_15}]}{\mathrm{d}t} = \text{k23f} \cdot [\text{80S\_aa-tRNA\_eEF1A\_GTP\_15}] - (\text{k25f} \cdot [\text{eEF2\_GTP}] \cdot [\text{80S\_aa-tRNA\_15}] - \text{k25b} \cdot [\text{80S\_aa-tRNA\_eEF2\_GTP\_15}])$$

$$\frac{\mathrm{d}[\text{80S\_aa-tRNA\_eEF2\_GTP\_15}]}{\mathrm{d}t} = \text{k25f} \cdot [\text{eEF2\_GTP}] \cdot [\text{80S\_aa-tRNA\_15}] - \text{k25b} \cdot [\text{80S\_aa-tRNA\_eEF2\_GTP\_15}] - \text{k26f} \cdot [\text{80S\_aa-tRNA\_eEF2\_GTP\_15}]$$

$$\frac{\mathrm{d}[\text{80S\_tRNA\_15}]}{\mathrm{d}t} = \text{k26f} \cdot [\text{80S\_aa-tRNA\_eEF2\_GTP\_14}] - \text{k28f} \cdot [\text{80S\_tRNA\_15}] \cdot [\text{eEF3\_GTP}]$$

$$\frac{\mathrm{d}[\text{80S\_tRNA\_eEF3\_GTP\_15}]}{\mathrm{d}t} = \text{k28f} \cdot [\text{80S\_tRNA\_15}] \cdot [\text{eEF3\_GTP}] - \text{k29f} \cdot [\text{80S\_tRNA\_eEF3\_GTP\_15}]$$

$$\frac{\mathrm{d}[\text{80S\_16}]}{\mathrm{d}t} = \text{k29f} \cdot [\text{80S\_tRNA\_eEF3\_GTP\_16}] - (\text{k22f} \cdot [\text{aa-tRNA\_eEF1A\_GTP}] \cdot [\text{80S\_16}] - \text{k22b} \cdot [\text{80S\_aa-tRNA\_eEF1A\_GTP\_16}])$$

$$\frac{\mathrm{d}[\text{80S\_aa-tRNA\_eEF1A\_GTP\_16}]}{\mathrm{d}t} = \text{k22f} \cdot [\text{aa-tRNA\_eEF1A\_GTP}] \cdot [\text{80S\_16}] - \text{k22b} \cdot [\text{80S\_aa-tRNA\_eEF1A\_GTP\_16}] - \text{k23f} \cdot [\text{80S\_aa-tRNA\_eEF1A\_GTP\_16}]$$

$$\frac{\mathrm{d}[\text{80S\_aa-tRNA\_16}]}{\mathrm{d}t} = \text{k23f} \cdot [\text{80S\_aa-tRNA\_eEF1A\_GTP\_16}] - (\text{k25f} \cdot [\text{eEF2\_GTP}] \cdot [\text{80S\_aa-tRNA\_16}] - \text{k25b} \cdot [\text{80S\_aa-tRNA\_eEF2\_GTP\_16}])$$

$$\frac{\mathrm{d}[\text{80S\_aa-tRNA\_eEF2\_GTP\_16}]}{\mathrm{d}t} = \text{k25f} \cdot [\text{eEF2\_GTP}] \cdot [\text{80S\_aa-tRNA\_16}] - \text{k25b} \cdot [\text{80S\_aa-tRNA\_eEF2\_GTP\_16}] - \text{k26f} \cdot [\text{80S\_aa-tRNA\_eEF2\_GTP\_16}]$$

$$\frac{\mathrm{d}[\text{80S\_tRNA\_16}]}{\mathrm{d}t} = \text{k26f} \cdot [\text{80S\_aa-tRNA\_eEF2\_GTP\_15}] - \text{k28f} \cdot [\text{80S\_tRNA\_16}] \cdot [\text{eEF3\_GTP}]$$

$$\frac{\mathrm{d}[\text{80S\_tRNA\_eEF3\_GTP\_16}]}{\mathrm{d}t} = \text{k28f} \cdot [\text{80S\_tRNA\_16}] \cdot [\text{eEF3\_GTP}] - \text{k29f} \cdot [\text{80S\_tRNA\_eEF3\_GTP\_16}]$$

$$\frac{\mathrm{d}[\text{80S\_17}]}{\mathrm{d}t} = \text{k29f} \cdot [\text{80S\_tRNA\_eEF3\_GTP\_17}] - (\text{k22f} \cdot [\text{aa-tRNA\_eEF1A\_GTP}] \cdot [\text{80S\_17}] - \text{k22b} \cdot [\text{80S\_aa-tRNA\_eEF1A\_GTP\_17}])$$

$$\frac{\mathrm{d}[\text{80S\_aa-tRNA\_eEF1A\_GTP\_17}]}{\mathrm{d}t} = \text{k22f} \cdot [\text{aa-tRNA\_eEF1A\_GTP}] \cdot [\text{80S\_17}] - \text{k22b} \cdot [\text{80S\_aa-tRNA\_eEF1A\_GTP\_17}] - \text{k23f} \cdot [\text{80S\_aa-tRNA\_eEF1A\_GTP\_17}]$$

$$\frac{\mathrm{d}[\text{80S\_aa-tRNA\_17}]}{\mathrm{d}t} = \text{k23f} \cdot [\text{80S\_aa-tRNA\_eEF1A\_GTP\_17}] - (\text{k25f} \cdot [\text{eEF2\_GTP}] \cdot [\text{80S\_aa-tRNA\_17}] - \text{k25b} \cdot [\text{80S\_aa-tRNA\_eEF2\_GTP\_17}])$$

$$\frac{\mathrm{d}[\text{80S\_aa-tRNA\_eEF2\_GTP\_17}]}{\mathrm{d}t} = \text{k25f} \cdot [\text{eEF2\_GTP}] \cdot [\text{80S\_aa-tRNA\_17}] - \text{k25b} \cdot [\text{80S\_aa-tRNA\_eEF2\_GTP\_17}] - \text{k26f} \cdot [\text{80S\_aa-tRNA\_eEF2\_GTP\_17}]$$

$$\frac{\mathrm{d}[\text{80S\_tRNA\_17}]}{\mathrm{d}t} = \text{k26f} \cdot [\text{80S\_aa-tRNA\_eEF2\_GTP\_16}] - \text{k28f} \cdot [\text{80S\_tRNA\_17}] \cdot [\text{eEF3\_GTP}]$$

$$\frac{\mathrm{d}[\text{80S\_tRNA\_eEF3\_GTP\_17}]}{\mathrm{d}t} = \text{k28f} \cdot [\text{80S\_tRNA\_17}] \cdot [\text{eEF3\_GTP}] - \text{k29f} \cdot [\text{80S\_tRNA\_eEF3\_GTP\_17}]$$

$$\frac{\mathrm{d}[\text{80S\_18}]}{\mathrm{d}t} = \text{k29f} \cdot [\text{80S\_tRNA\_eEF3\_GTP\_18}] - (\text{k22f} \cdot [\text{aa-tRNA\_eEF1A\_GTP}] \cdot [\text{80S\_18}] - \text{k22b} \cdot [\text{80S\_aa-tRNA\_eEF1A\_GTP\_18}])$$

$$\frac{d[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_18]}{dt} = k22f \cdot [aa\text{-}tRNA\_eEF1A\_GTP] \cdot [80S\_18] - k22b \cdot [80S\_aa\text{-}tRNA\_eEF1A\_GTP\_18] - k23f \cdot [80S\_aa\text{-}tRNA\_eEF1A\_GTP\_18]$$

$$\frac{d[80S\_aa\text{-}tRNA\_18]}{dt} = k23f \cdot [80S\_aa\text{-}tRNA\_eEF1A\_GTP\_18] - (k25f \cdot [eEF2\_GTP] \cdot [80S\_aa\text{-}tRNA\_18] - k25b \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_18])$$

$$\frac{d[80S\_aa\text{-}tRNA\_eEF2\_GTP\_18]}{dt} = k25f \cdot [eEF2\_GTP] \cdot [80S\_aa\text{-}tRNA\_18] - k25b \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_18] - k26f \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_18]$$

$$\frac{d[80S\_tRNA\_18]}{dt} = k26f \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_17] - k28f \cdot [80S\_tRNA\_18] \cdot [eEF3\_GTP]$$

$$\frac{d[80S\_tRNA\_eEF3\_GTP\_18]}{dt} = k28f \cdot [80S\_tRNA\_18] \cdot [eEF3\_GTP] - k29f \cdot [80S\_tRNA\_eEF3\_GTP\_18]$$

$$\frac{d[80S\_19]}{dt} = k29f \cdot [80S\_tRNA\_eEF3\_GTP\_19] - (k22f \cdot [aa\text{-}tRNA\_eEF1A\_GTP] \cdot [80S\_19] - k22b \cdot [80S\_aa\text{-}tRNA\_eEF1A\_GTP\_19])$$

$$\frac{d[80S\_aa\text{-}tRNA\_eEF1A\_GTP\_19]}{dt} = k22f \cdot [aa\text{-}tRNA\_eEF1A\_GTP] \cdot [80S\_19] - k22b \cdot [80S\_aa\text{-}tRNA\_eEF1A\_GTP\_19] - k23f \cdot [80S\_aa\text{-}tRNA\_eEF1A\_GTP\_19]$$

$$\frac{d[80S\_aa\text{-}tRNA\_19]}{dt} = k23f \cdot [80S\_aa\text{-}tRNA\_eEF1A\_GTP\_19] - (k25f \cdot [eEF2\_GTP] \cdot [80S\_aa\text{-}tRNA\_19] - k25b \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_19])$$

$$\frac{d[80S\_aa\text{-}tRNA\_eEF2\_GTP\_19]}{dt} = k25f \cdot [eEF2\_GTP] \cdot [80S\_aa\text{-}tRNA\_19] - k25b \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_19] - k26f \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_19]$$

$$\frac{d[80S\_tRNA\_19]}{dt} = k26f \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_18] - k28f \cdot [80S\_tRNA\_19] \cdot [eEF3\_GTP]$$

$$\frac{d[80S\_tRNA\_eEF3\_GTP\_19]}{dt} = k28f \cdot [80S\_tRNA\_19] \cdot [eEF3\_GTP] - k29f \cdot [80S\_tRNA\_eEF3\_GTP\_19]$$

$$\frac{d[80S\_20]}{dt} = k29f \cdot [80S\_tRNA\_eEF3\_GTP\_20] - k1_{r32} \cdot [eRF1\_eRF3\_GTP] \cdot [80S\_20]$$

$$\frac{d[80S\_tRNA\_20]}{dt} = k26f \cdot [80S\_aa\text{-}tRNA\_eEF2\_GTP\_19] - k28f \cdot [80S\_tRNA\_20] \cdot [eEF3\_GTP]$$

$$\frac{d[80S\_tRNA\_eEF3\_GTP\_20]}{dt} = k28f \cdot [80S\_tRNA\_20] \cdot [eEF3\_GTP] - k29f \cdot [80S\_tRNA\_eEF3\_GTP\_20]$$

$$\frac{d[eRF3\_GDP]}{dt} = k1_{r33} \cdot [80S\_eRF1\_eRF3\_GTP] - (k1_{r30} \cdot [eRF3\_GDP] - k2_{r30} \cdot [eRF3\_GTP])$$

$$\frac{d[eRF3\_GTP]}{dt} = k1_{r30} \cdot [eRF3\_GDP] - k2_{r30} \cdot [eRF3\_GTP] - (k1_{r31} \cdot [eRF1] \cdot [eRF3\_GTP] - k2_{r31} \cdot [eRF1\_eRF3\_GTP])$$

$$\frac{d[eRF1]}{dt} = k1_{r33} \cdot [80S\_eRF1\_eRF3\_GTP] - (k1_{r31} \cdot [eRF1] \cdot [eRF3\_GTP] - k2_{r31} \cdot [eRF1\_eRF3\_GTP])$$

$$\frac{d[eRF1\_eRF3\_GTP]}{dt} = k1_{r31} \cdot [eRF1] \cdot [eRF3\_GTP] - k2_{r31} \cdot [eRF1\_eRF3\_GTP] - k1_{r32} \cdot [eRF1\_eRF3\_GTP] \cdot [80S\_20]$$

$$\frac{d[80S\_eRF1\_eRF3\_GTP]}{dt} = k1_{r32} \cdot [eRF1\_eRF3\_GTP] \cdot [80S\_20] - k1_{r33} \cdot [80S\_eRF1\_eRF3\_GTP]$$

$$
\begin{aligned}
\text{mRNA\_init\_free} = \text{mRNA\_tot} - (&[\text{80S\_1}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_1}] \\
&+[\text{80S\_aa-tRNA\_1}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_1}] + [\text{80S\_2}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_2}] \\
&+[\text{80S\_aa-tRNA\_2}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_2}] + [\text{80S\_tRNA\_2}] + [\text{80S\_tRNA\_eEF3\_GTP\_2}] \\
&+[\text{80S\_3}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_3}] + [\text{80S\_aa-tRNA\_3}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_3}] \\
&+[\text{80S\_tRNA\_3}] + [\text{80S\_tRNA\_eEF3\_GTP\_3}] + [\text{80S\_4}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_4}] \\
&+[\text{80S\_aa-tRNA\_4}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_4}] + [\text{80S\_tRNA\_4}] + [\text{80S\_tRNA\_eEF3\_GTP\_4}] \\
&+[\text{80S\_5}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_5}] + [\text{80S\_aa-tRNA\_5}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_5}] \\
&+[\text{80S\_tRNA\_5}] + [\text{80S\_tRNA\_eEF3\_GTP\_5}] + [\text{80S\_6}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_6}] \\
&+[\text{80S\_aa-tRNA\_6}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_6}] + [\text{80S\_tRNA\_6}] + [\text{80S\_tRNA\_eEF3\_GTP\_6}] \\
&+[\text{80S\_7}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_7}] + [\text{80S\_aa-tRNA\_7}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_7}] \\
&+[\text{80S\_tRNA\_7}] + [\text{80S\_tRNA\_eEF3\_GTP\_7}] + [\text{80S\_8}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_8}] \\
&+[\text{80S\_aa-tRNA\_8}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_8}] + [\text{80S\_tRNA\_8}] + [\text{80S\_tRNA\_eEF3\_GTP\_8}] \\
&+[\text{80S\_tRNA\_9}] + [\text{80S\_tRNA\_eEF3\_GTP\_9}] + [\text{80S\_10}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_10}] \\
&+[\text{80S\_aa-tRNA\_10}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_10}] + [\text{80S\_tRNA\_10}] + [\text{80S\_tRNA\_eEF3\_GTP\_10}] \\
&+[\text{80S\_11}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_11}] + [\text{80S\_aa-tRNA\_11}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_11}] \\
&+[\text{80S\_tRNA\_11}] + [\text{80S\_tRNA\_eEF3\_GTP\_11}] + [\text{80S\_12}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_12}] \\
&+[\text{80S\_aa-tRNA\_12}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_12}] + [\text{80S\_tRNA\_12}] + [\text{80S\_tRNA\_eEF3\_GTP\_12}] \\
&+[\text{80S\_13}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_13}] + [\text{80S\_aa-tRNA\_13}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_13}] \\
&+[\text{80S\_tRNA\_13}] + [\text{80S\_tRNA\_eEF3\_GTP\_13}] + [\text{80S\_14}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_14}] \\
&+[\text{80S\_aa-tRNA\_14}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_14}] + [\text{80S\_tRNA\_14}] + [\text{80S\_tRNA\_eEF3\_GTP\_14}] \\
&+[\text{80S\_15}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_15}] + [\text{80S\_aa-tRNA\_15}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_15}] \\
&+[\text{80S\_tRNA\_15}] + [\text{80S\_tRNA\_eEF3\_GTP\_15}])
\end{aligned}
$$

$$
\begin{aligned}
\text{mRNA\_num1} = {} & \text{mRNA\_tot} - ([\text{80S\_2}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_2}] + [\text{80S\_aa-tRNA\_2}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_2}] + [\text{80S\_tRNA\_2}] + [\text{80S\_tRNA\_eEF3\_GTP\_2}] + [\text{80S\_3}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_3}] + [\text{80S\_aa-tRNA\_3}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_3}] + [\text{80S\_tRNA\_3}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_3}] + [\text{80S\_4}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_4}] + [\text{80S\_aa-tRNA\_4}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_4}] + [\text{80S\_tRNA\_4}] + [\text{80S\_tRNA\_eEF3\_GTP\_4}] + [\text{80S\_5}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_5}] + [\text{80S\_aa-tRNA\_5}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_5}] + [\text{80S\_tRNA\_5}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_5}] + [\text{80S\_6}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_6}] + [\text{80S\_aa-tRNA\_6}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_6}] + [\text{80S\_tRNA\_6}] + [\text{80S\_tRNA\_eEF3\_GTP\_6}] + [\text{80S\_7}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_7}] + [\text{80S\_aa-tRNA\_7}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_7}] + [\text{80S\_tRNA\_7}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_7}] + [\text{80S\_8}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_8}] + [\text{80S\_aa-tRNA\_8}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_8}] + [\text{80S\_tRNA\_8}] + [\text{80S\_tRNA\_eEF3\_GTP\_8}] + [\text{80S\_9}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_9}] + [\text{80S\_aa-tRNA\_9}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_9}] + [\text{80S\_tRNA\_9}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_9}] + [\text{80S\_10}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_10}] + [\text{80S\_aa-tRNA\_10}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_10}] + [\text{80S\_tRNA\_10}] + [\text{80S\_tRNA\_eEF3\_GTP\_10}] + [\text{80S\_11}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_11}] + [\text{80S\_aa-tRNA\_11}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_11}] + [\text{80S\_tRNA\_11}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_11}] + [\text{80S\_12}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_12}] + [\text{80S\_aa-tRNA\_12}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_12}] + [\text{80S\_tRNA\_12}] + [\text{80S\_tRNA\_eEF3\_GTP\_12}] + [\text{80S\_13}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_13}] + [\text{80S\_aa-tRNA\_13}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_13}] + [\text{80S\_tRNA\_13}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_13}] + [\text{80S\_14}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_14}] + [\text{80S\_aa-tRNA\_14}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_14}] + [\text{80S\_tRNA\_14}] + [\text{80S\_tRNA\_eEF3\_GTP\_14}] + [\text{80S\_15}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_15}] + [\text{80S\_aa-tRNA\_15}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_15}] + [\text{80S\_tRNA\_15}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_15}] + [\text{80S\_16}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_16}] + [\text{80S\_aa-tRNA\_16}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_16}] + [\text{80S\_tRNA\_16}] + [\text{80S\_tRNA\_eEF3\_GTP\_16}]) \\
\text{mRNA\_den1} = {} & \text{mRNA\_tot} - ([\text{80S\_2}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_2}] + [\text{80S\_aa-tRNA\_2}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_2}] + [\text{80S\_tRNA\_2}] + [\text{80S\_tRNA\_eEF3\_GTP\_2}] + [\text{80S\_3}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_3}] + [\text{80S\_aa-tRNA\_3}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_3}] + [\text{80S\_tRNA\_3}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_3}] + [\text{80S\_4}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_4}] + [\text{80S\_aa-tRNA\_4}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_4}] + [\text{80S\_tRNA\_4}] + [\text{80S\_tRNA\_eEF3\_GTP\_4}] + [\text{80S\_5}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_5}] + [\text{80S\_aa-tRNA\_5}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_5}] + [\text{80S\_tRNA\_5}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_5}] + [\text{80S\_6}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_6}] + [\text{80S\_aa-tRNA\_6}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_6}] + [\text{80S\_tRNA\_6}] + [\text{80S\_tRNA\_eEF3\_GTP\_6}] + [\text{80S\_7}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_7}] + [\text{80S\_aa-tRNA\_7}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_7}] + [\text{80S\_tRNA\_7}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_7}] + [\text{80S\_8}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_8}] + [\text{80S\_aa-tRNA\_8}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_8}] + [\text{80S\_tRNA\_8}] + [\text{80S\_tRNA\_eEF3\_GTP\_8}] + [\text{80S\_9}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_9}] + [\text{80S\_aa-tRNA\_9}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_9}] + [\text{80S\_tRNA\_9}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_9}] + [\text{80S\_10}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_10}] + [\text{80S\_aa-tRNA\_10}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_10}] + [\text{80S\_tRNA\_10}] + [\text{80S\_tRNA\_eEF3\_GTP\_10}] + [\text{80S\_11}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_11}] + [\text{80S\_aa-tRNA\_11}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_11}] + [\text{80S\_tRNA\_11}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_11}] + [\text{80S\_12}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_12}] + [\text{80S\_aa-tRNA\_12}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_12}] + [\text{80S\_tRNA\_12}] + [\text{80S\_tRNA\_eEF3\_GTP\_12}] + [\text{80S\_13}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_13}] + [\text{80S\_aa-tRNA\_13}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_13}] + [\text{80S\_tRNA\_13}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_13}] + [\text{80S\_14}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_14}] + [\text{80S\_aa-tRNA\_14}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_14}] + [\text{80S\_tRNA\_14}] + [\text{80S\_tRNA\_eEF3\_GTP\_14}] + [\text{80S\_15}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_15}] + [\text{80S\_aa-tRNA\_15}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_15}] + [\text{80S\_tRNA\_15}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_15}])
\end{aligned}
$$

$$
\begin{aligned}
\text{mRNA\_num2} = \text{mRNA\_tot} - (& [\text{80S\_3}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_3}] + [\text{80S\_aa-tRNA\_3}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_3}] + [\text{80S\_tRNA\_3}] + [\text{80S\_tRNA\_eEF3\_GTP\_3}] + [\text{80S\_4}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_4}] + [\text{80S\_aa-tRNA\_4}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_4}] + [\text{80S\_tRNA\_4}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_4}] + [\text{80S\_5}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_5}] + [\text{80S\_aa-tRNA\_5}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_5}] + [\text{80S\_tRNA\_5}] + [\text{80S\_tRNA\_eEF3\_GTP\_5}] + [\text{80S\_6}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_6}] + [\text{80S\_aa-tRNA\_6}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_6}] + [\text{80S\_tRNA\_6}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_6}] + [\text{80S\_7}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_7}] + [\text{80S\_aa-tRNA\_7}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_7}] + [\text{80S\_tRNA\_7}] + [\text{80S\_tRNA\_eEF3\_GTP\_7}] + [\text{80S\_8}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_8}] + [\text{80S\_aa-tRNA\_8}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_8}] + [\text{80S\_tRNA\_8}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_8}] + [\text{80S\_9}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_9}] + [\text{80S\_aa-tRNA\_9}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_9}] + [\text{80S\_tRNA\_9}] + [\text{80S\_tRNA\_eEF3\_GTP\_9}] + [\text{80S\_10}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_10}] + [\text{80S\_aa-tRNA\_10}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_10}] + [\text{80S\_tRNA\_10}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_10}] + [\text{80S\_11}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_11}] + [\text{80S\_aa-tRNA\_11}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_11}] + [\text{80S\_tRNA\_11}] + [\text{80S\_tRNA\_eEF3\_GTP\_11}] + [\text{80S\_12}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_12}] + [\text{80S\_aa-tRNA\_12}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_12}] + [\text{80S\_tRNA\_12}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_12}] + [\text{80S\_13}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_13}] + [\text{80S\_aa-tRNA\_13}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_13}] + [\text{80S\_tRNA\_13}] + [\text{80S\_tRNA\_eEF3\_GTP\_13}] + [\text{80S\_14}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_14}] + [\text{80S\_aa-tRNA\_14}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_14}] + [\text{80S\_tRNA\_14}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_14}] + [\text{80S\_15}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_15}] + [\text{80S\_aa-tRNA\_15}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_15}] + [\text{80S\_tRNA\_15}] + [\text{80S\_tRNA\_eEF3\_GTP\_15}] + [\text{80S\_16}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_16}] + [\text{80S\_aa-tRNA\_16}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_16}] + [\text{80S\_tRNA\_16}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_16}] + [\text{80S\_17}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_17}] + [\text{80S\_aa-tRNA\_17}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_17}] + [\text{80S\_tRNA\_17}] + [\text{80S\_tRNA\_eEF3\_GTP\_17}])
\end{aligned}
$$

$$
\begin{aligned}
\text{mRNA\_den2} = \text{mRNA\_tot} - (& [\text{80S\_3}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_3}] + [\text{80S\_aa-tRNA\_3}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_3}] + [\text{80S\_tRNA\_3}] + [\text{80S\_tRNA\_eEF3\_GTP\_3}] + [\text{80S\_4}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_4}] + [\text{80S\_aa-tRNA\_4}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_4}] + [\text{80S\_tRNA\_4}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_4}] + [\text{80S\_5}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_5}] + [\text{80S\_aa-tRNA\_5}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_5}] + [\text{80S\_tRNA\_5}] + [\text{80S\_tRNA\_eEF3\_GTP\_5}] + [\text{80S\_6}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_6}] + [\text{80S\_aa-tRNA\_6}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_6}] + [\text{80S\_tRNA\_6}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_6}] + [\text{80S\_7}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_7}] + [\text{80S\_aa-tRNA\_7}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_7}] + [\text{80S\_tRNA\_7}] + [\text{80S\_tRNA\_eEF3\_GTP\_7}] + [\text{80S\_8}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_8}] + [\text{80S\_aa-tRNA\_8}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_8}] + [\text{80S\_tRNA\_8}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_8}] + [\text{80S\_9}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_9}] + [\text{80S\_aa-tRNA\_9}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_9}] + [\text{80S\_tRNA\_9}] + [\text{80S\_tRNA\_eEF3\_GTP\_9}] + [\text{80S\_10}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_10}] + [\text{80S\_aa-tRNA\_10}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_10}] + [\text{80S\_tRNA\_10}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_10}] + [\text{80S\_11}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_11}] + [\text{80S\_aa-tRNA\_11}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_11}] + [\text{80S\_tRNA\_11}] + [\text{80S\_tRNA\_eEF3\_GTP\_11}] + [\text{80S\_12}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_12}] + [\text{80S\_aa-tRNA\_12}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_12}] + [\text{80S\_tRNA\_12}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_12}] + [\text{80S\_13}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_13}] + [\text{80S\_aa-tRNA\_13}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_13}] + [\text{80S\_tRNA\_13}] + [\text{80S\_tRNA\_eEF3\_GTP\_13}] + [\text{80S\_14}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_14}] + [\text{80S\_aa-tRNA\_14}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_14}] + [\text{80S\_tRNA\_14}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_14}] + [\text{80S\_15}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_15}] + [\text{80S\_aa-tRNA\_15}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_15}] + [\text{80S\_tRNA\_15}] + [\text{80S\_tRNA\_eEF3\_GTP\_15}] + [\text{80S\_16}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_16}] + [\text{80S\_aa-tRNA\_16}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_16}] + [\text{80S\_tRNA\_16}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_16}])
\end{aligned}
$$

$$
\begin{aligned}
\text{mRNA\_num3} = {} & \text{mRNA\_tot} - ([\text{80S\_4}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_4}] + [\text{80S\_aa-tRNA\_4}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_4}] + [\text{80S\_tRNA\_4}] + [\text{80S\_tRNA\_eEF3\_GTP\_4}] + [\text{80S\_5}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_5}] + [\text{80S\_aa-tRNA\_5}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_5}] + [\text{80S\_tRNA\_5}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_5}] + [\text{80S\_6}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_6}] + [\text{80S\_aa-tRNA\_6}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_6}] + [\text{80S\_tRNA\_6}] + [\text{80S\_tRNA\_eEF3\_GTP\_6}] + [\text{80S\_7}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_7}] + [\text{80S\_aa-tRNA\_7}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_7}] + [\text{80S\_tRNA\_7}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_7}] + [\text{80S\_8}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_8}] + [\text{80S\_aa-tRNA\_8}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_8}] + [\text{80S\_tRNA\_8}] + [\text{80S\_tRNA\_eEF3\_GTP\_8}] + [\text{80S\_9}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_9}] + [\text{80S\_aa-tRNA\_9}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_9}] + [\text{80S\_tRNA\_9}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_9}] + [\text{80S\_10}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_10}] + [\text{80S\_aa-tRNA\_10}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_10}] + [\text{80S\_tRNA\_10}] + [\text{80S\_tRNA\_eEF3\_GTP\_10}] + [\text{80S\_11}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_11}] + [\text{80S\_aa-tRNA\_11}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_11}] + [\text{80S\_tRNA\_11}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_11}] + [\text{80S\_12}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_12}] + [\text{80S\_aa-tRNA\_12}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_12}] + [\text{80S\_tRNA\_12}] + [\text{80S\_tRNA\_eEF3\_GTP\_12}] + [\text{80S\_13}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_13}] + [\text{80S\_aa-tRNA\_13}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_13}] + [\text{80S\_tRNA\_13}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_13}] + [\text{80S\_14}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_14}] + [\text{80S\_aa-tRNA\_14}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_14}] + [\text{80S\_tRNA\_14}] + [\text{80S\_tRNA\_eEF3\_GTP\_14}] + [\text{80S\_15}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_15}] + [\text{80S\_aa-tRNA\_15}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_15}] + [\text{80S\_tRNA\_15}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_15}] + [\text{80S\_16}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_16}] + [\text{80S\_aa-tRNA\_16}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_16}] + [\text{80S\_tRNA\_16}] + [\text{80S\_tRNA\_eEF3\_GTP\_16}] + [\text{80S\_17}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_17}] + [\text{80S\_aa-tRNA\_17}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_17}] + [\text{80S\_tRNA\_17}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_17}] + [\text{80S\_18}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_18}] + [\text{80S\_aa-tRNA\_18}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_18}] + [\text{80S\_tRNA\_18}] + [\text{80S\_tRNA\_eEF3\_GTP\_18}]) \\
\text{mRNA\_den3} = {} & \text{mRNA\_tot} - ([\text{80S\_4}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_4}] + [\text{80S\_aa-tRNA\_4}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_4}] + [\text{80S\_tRNA\_4}] + [\text{80S\_tRNA\_eEF3\_GTP\_4}] + [\text{80S\_5}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_5}] + [\text{80S\_aa-tRNA\_5}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_5}] + [\text{80S\_tRNA\_5}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_5}] + [\text{80S\_6}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_6}] + [\text{80S\_aa-tRNA\_6}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_6}] + [\text{80S\_tRNA\_6}] + [\text{80S\_tRNA\_eEF3\_GTP\_6}] + [\text{80S\_7}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_7}] + [\text{80S\_aa-tRNA\_7}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_7}] + [\text{80S\_tRNA\_7}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_7}] + [\text{80S\_8}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_8}] + [\text{80S\_aa-tRNA\_8}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_8}] + [\text{80S\_tRNA\_8}] + [\text{80S\_tRNA\_eEF3\_GTP\_8}] + [\text{80S\_9}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_9}] + [\text{80S\_aa-tRNA\_9}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_9}] + [\text{80S\_tRNA\_9}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_9}] + [\text{80S\_10}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_10}] + [\text{80S\_aa-tRNA\_10}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_10}] + [\text{80S\_tRNA\_10}] + [\text{80S\_tRNA\_eEF3\_GTP\_10}] + [\text{80S\_11}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_11}] + [\text{80S\_aa-tRNA\_11}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_11}] + [\text{80S\_tRNA\_11}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_11}] + [\text{80S\_12}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_12}] + [\text{80S\_aa-tRNA\_12}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_12}] + [\text{80S\_tRNA\_12}] + [\text{80S\_tRNA\_eEF3\_GTP\_12}] + [\text{80S\_13}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_13}] + [\text{80S\_aa-tRNA\_13}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_13}] + [\text{80S\_tRNA\_13}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_13}] + [\text{80S\_14}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_14}] + [\text{80S\_aa-tRNA\_14}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_14}] + [\text{80S\_tRNA\_14}] + [\text{80S\_tRNA\_eEF3\_GTP\_14}] + [\text{80S\_15}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_15}] + [\text{80S\_aa-tRNA\_15}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_15}] + [\text{80S\_tRNA\_15}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_15}] + [\text{80S\_16}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_16}] + [\text{80S\_aa-tRNA\_16}] \\
& +[\text{80S\_aa-tRNA\_eEF2\_GTP\_16}] + [\text{80S\_tRNA\_16}] + [\text{80S\_tRNA\_eEF3\_GTP\_16}] + [\text{80S\_17}] \\
& +[\text{80S\_aa-tRNA\_eEF1A\_GTP\_17}] + [\text{80S\_aa-tRNA\_17}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_17}] + [\text{80S\_tRNA\_17}] \\
& +[\text{80S\_tRNA\_eEF3\_GTP\_17}])
\end{aligned}
$$

$$
\begin{aligned}
\text{mRNA\_num4} = \text{mRNA\_tot} - (& [\text{80S\_5}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_5}] + [\text{80S\_aa-tRNA\_5}] \\
& + [\text{80S\_aa-tRNA\_eEF2\_GTP\_5}] + [\text{80S\_tRNA\_5}] + [\text{80S\_tRNA\_eEF3\_GTP\_5}] + [\text{80S\_6}] \\
& + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_6}] + [\text{80S\_aa-tRNA\_6}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_6}] + [\text{80S\_tRNA\_6}] \\
& + [\text{80S\_tRNA\_eEF3\_GTP\_6}] + [\text{80S\_7}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_7}] + [\text{80S\_aa-tRNA\_7}] \\
& + [\text{80S\_aa-tRNA\_eEF2\_GTP\_7}] + [\text{80S\_tRNA\_7}] + [\text{80S\_tRNA\_eEF3\_GTP\_7}] + [\text{80S\_8}] \\
& + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_8}] + [\text{80S\_aa-tRNA\_8}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_8}] + [\text{80S\_tRNA\_8}] \\
& + [\text{80S\_tRNA\_eEF3\_GTP\_8}] + [\text{80S\_9}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_9}] + [\text{80S\_aa-tRNA\_9}] \\
& + [\text{80S\_aa-tRNA\_eEF2\_GTP\_9}] + [\text{80S\_tRNA\_9}] + [\text{80S\_tRNA\_eEF3\_GTP\_9}] + [\text{80S\_10}] \\
& + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_10}] + [\text{80S\_aa-tRNA\_10}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_10}] + [\text{80S\_tRNA\_10}] \\
& + [\text{80S\_tRNA\_eEF3\_GTP\_10}] + [\text{80S\_11}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_11}] + [\text{80S\_aa-tRNA\_11}] \\
& + [\text{80S\_aa-tRNA\_eEF2\_GTP\_11}] + [\text{80S\_tRNA\_11}] + [\text{80S\_tRNA\_eEF3\_GTP\_11}] + [\text{80S\_12}] \\
& + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_12}] + [\text{80S\_aa-tRNA\_12}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_12}] + [\text{80S\_tRNA\_12}] \\
& + [\text{80S\_tRNA\_eEF3\_GTP\_12}] + [\text{80S\_13}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_13}] + [\text{80S\_aa-tRNA\_13}] \\
& + [\text{80S\_aa-tRNA\_eEF2\_GTP\_13}] + [\text{80S\_tRNA\_13}] + [\text{80S\_tRNA\_eEF3\_GTP\_13}] + [\text{80S\_14}] \\
& + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_14}] + [\text{80S\_aa-tRNA\_14}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_14}] + [\text{80S\_tRNA\_14}] \\
& + [\text{80S\_tRNA\_eEF3\_GTP\_14}] + [\text{80S\_15}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_15}] + [\text{80S\_aa-tRNA\_15}] \\
& + [\text{80S\_aa-tRNA\_eEF2\_GTP\_15}] + [\text{80S\_tRNA\_15}] + [\text{80S\_tRNA\_eEF3\_GTP\_15}] + [\text{80S\_16}] \\
& + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_16}] + [\text{80S\_aa-tRNA\_16}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_16}] + [\text{80S\_tRNA\_16}] \\
& + [\text{80S\_tRNA\_eEF3\_GTP\_16}] + [\text{80S\_17}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_17}] + [\text{80S\_aa-tRNA\_17}] \\
& + [\text{80S\_aa-tRNA\_eEF2\_GTP\_17}] + [\text{80S\_tRNA\_17}] + [\text{80S\_tRNA\_eEF3\_GTP\_17}] + [\text{80S\_18}] \\
& + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_18}] + [\text{80S\_aa-tRNA\_18}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_18}] + [\text{80S\_tRNA\_18}] \\
& + [\text{80S\_tRNA\_eEF3\_GTP\_18}] + [\text{80S\_19}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_19}] + [\text{80S\_aa-tRNA\_19}] \\
& + [\text{80S\_aa-tRNA\_eEF2\_GTP\_19}] + [\text{80S\_tRNA\_19}] + [\text{80S\_tRNA\_eEF3\_GTP\_19}])
\end{aligned}
$$

$$
\begin{aligned}
\text{mRNA\_den4} = \text{mRNA\_tot} - (& [\text{80S\_5}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_5}] + [\text{80S\_aa-tRNA\_5}] \\
& + [\text{80S\_aa-tRNA\_eEF2\_GTP\_5}] + [\text{80S\_tRNA\_5}] + [\text{80S\_tRNA\_eEF3\_GTP\_5}] + [\text{80S\_6}] \\
& + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_6}] + [\text{80S\_aa-tRNA\_6}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_6}] + [\text{80S\_tRNA\_6}] \\
& + [\text{80S\_tRNA\_eEF3\_GTP\_6}] + [\text{80S\_7}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_7}] + [\text{80S\_aa-tRNA\_7}] \\
& + [\text{80S\_aa-tRNA\_eEF2\_GTP\_7}] + [\text{80S\_tRNA\_7}] + [\text{80S\_tRNA\_eEF3\_GTP\_7}] + [\text{80S\_8}] \\
& + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_8}] + [\text{80S\_aa-tRNA\_8}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_8}] + [\text{80S\_tRNA\_8}] \\
& + [\text{80S\_tRNA\_eEF3\_GTP\_8}] + [\text{80S\_9}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_9}] + [\text{80S\_aa-tRNA\_9}] \\
& + [\text{80S\_aa-tRNA\_eEF2\_GTP\_9}] + [\text{80S\_tRNA\_9}] + [\text{80S\_tRNA\_eEF3\_GTP\_9}] + [\text{80S\_10}] \\
& + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_10}] + [\text{80S\_aa-tRNA\_10}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_10}] + [\text{80S\_tRNA\_10}] \\
& + [\text{80S\_tRNA\_eEF3\_GTP\_10}] + [\text{80S\_11}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_11}] + [\text{80S\_aa-tRNA\_11}] \\
& + [\text{80S\_aa-tRNA\_eEF2\_GTP\_11}] + [\text{80S\_tRNA\_11}] + [\text{80S\_tRNA\_eEF3\_GTP\_11}] + [\text{80S\_12}] \\
& + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_12}] + [\text{80S\_aa-tRNA\_12}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_12}] + [\text{80S\_tRNA\_12}] \\
& + [\text{80S\_tRNA\_eEF3\_GTP\_12}] + [\text{80S\_13}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_13}] + [\text{80S\_aa-tRNA\_13}] \\
& + [\text{80S\_aa-tRNA\_eEF2\_GTP\_13}] + [\text{80S\_tRNA\_13}] + [\text{80S\_tRNA\_eEF3\_GTP\_13}] + [\text{80S\_14}] \\
& + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_14}] + [\text{80S\_aa-tRNA\_14}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_14}] + [\text{80S\_tRNA\_14}] \\
& + [\text{80S\_tRNA\_eEF3\_GTP\_14}] + [\text{80S\_15}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_15}] + [\text{80S\_aa-tRNA\_15}] \\
& + [\text{80S\_aa-tRNA\_eEF2\_GTP\_15}] + [\text{80S\_tRNA\_15}] + [\text{80S\_tRNA\_eEF3\_GTP\_15}] + [\text{80S\_16}] \\
& + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_16}] + [\text{80S\_aa-tRNA\_16}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_16}] + [\text{80S\_tRNA\_16}] \\
& + [\text{80S\_tRNA\_eEF3\_GTP\_16}] + [\text{80S\_17}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_17}] + [\text{80S\_aa-tRNA\_17}] \\
& + [\text{80S\_aa-tRNA\_eEF2\_GTP\_17}] + [\text{80S\_tRNA\_17}] + [\text{80S\_tRNA\_eEF3\_GTP\_17}] + [\text{80S\_18}] \\
& + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_18}] + [\text{80S\_aa-tRNA\_18}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_18}] + [\text{80S\_tRNA\_18}] \\
& + [\text{80S\_tRNA\_eEF3\_GTP\_18}])
\end{aligned}
$$

$$
\begin{aligned}
\text{mRNA\_num5} = \text{mRNA\_tot} - (&[\text{80S\_6}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_6}] + [\text{80S\_aa-tRNA\_6}] \\
&+[\text{80S\_aa-tRNA\_eEF2\_GTP\_6}] + [\text{80S\_tRNA\_6}] + [\text{80S\_tRNA\_eEF3\_GTP\_6}] + [\text{80S\_7}] \\
&+[\text{80S\_aa-tRNA\_eEF1A\_GTP\_7}] + [\text{80S\_aa-tRNA\_7}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_7}] + [\text{80S\_tRNA\_7}] \\
&+[\text{80S\_tRNA\_eEF3\_GTP\_7}] + [\text{80S\_8}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_8}] + [\text{80S\_aa-tRNA\_8}] \\
&+[\text{80S\_aa-tRNA\_eEF2\_GTP\_8}] + [\text{80S\_tRNA\_8}] + [\text{80S\_tRNA\_eEF3\_GTP\_8}] + [\text{80S\_9}] \\
&+[\text{80S\_aa-tRNA\_eEF1A\_GTP\_9}] + [\text{80S\_aa-tRNA\_9}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_9}] + [\text{80S\_tRNA\_9}] \\
&+[\text{80S\_tRNA\_eEF3\_GTP\_9}] + [\text{80S\_10}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_10}] + [\text{80S\_aa-tRNA\_10}] \\
&+[\text{80S\_aa-tRNA\_eEF2\_GTP\_10}] + [\text{80S\_tRNA\_10}] + [\text{80S\_tRNA\_eEF3\_GTP\_10}] + [\text{80S\_11}] \\
&+[\text{80S\_aa-tRNA\_eEF1A\_GTP\_11}] + [\text{80S\_aa-tRNA\_11}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_11}] + [\text{80S\_tRNA\_11}] \\
&+[\text{80S\_tRNA\_eEF3\_GTP\_11}] + [\text{80S\_12}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_12}] + [\text{80S\_aa-tRNA\_12}] \\
&+[\text{80S\_aa-tRNA\_eEF2\_GTP\_12}] + [\text{80S\_tRNA\_12}] + [\text{80S\_tRNA\_eEF3\_GTP\_12}] + [\text{80S\_13}] \\
&+[\text{80S\_aa-tRNA\_eEF1A\_GTP\_13}] + [\text{80S\_aa-tRNA\_13}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_13}] + [\text{80S\_tRNA\_13}] \\
&+[\text{80S\_tRNA\_eEF3\_GTP\_13}] + [\text{80S\_14}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_14}] + [\text{80S\_aa-tRNA\_14}] \\
&+[\text{80S\_aa-tRNA\_eEF2\_GTP\_14}] + [\text{80S\_tRNA\_14}] + [\text{80S\_tRNA\_eEF3\_GTP\_14}] + [\text{80S\_15}] \\
&+[\text{80S\_aa-tRNA\_eEF1A\_GTP\_15}] + [\text{80S\_aa-tRNA\_15}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_15}] + [\text{80S\_tRNA\_15}] \\
&+[\text{80S\_tRNA\_eEF3\_GTP\_15}] + [\text{80S\_16}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_16}] + [\text{80S\_aa-tRNA\_16}] \\
&+[\text{80S\_aa-tRNA\_eEF2\_GTP\_16}] + [\text{80S\_tRNA\_16}] + [\text{80S\_tRNA\_eEF3\_GTP\_16}] + [\text{80S\_17}] \\
&+[\text{80S\_aa-tRNA\_eEF1A\_GTP\_17}] + [\text{80S\_aa-tRNA\_17}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_17}] + [\text{80S\_tRNA\_17}] \\
&+[\text{80S\_tRNA\_eEF3\_GTP\_17}] + [\text{80S\_18}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_18}] + [\text{80S\_aa-tRNA\_18}] \\
&+[\text{80S\_aa-tRNA\_eEF2\_GTP\_18}] + [\text{80S\_tRNA\_18}] + [\text{80S\_tRNA\_eEF3\_GTP\_18}] + [\text{80S\_19}] \\
&+[\text{80S\_aa-tRNA\_eEF1A\_GTP\_19}] + [\text{80S\_aa-tRNA\_19}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_19}] + [\text{80S\_tRNA\_19}] \\
&+[\text{80S\_tRNA\_eEF3\_GTP\_19}] + [\text{80S\_20}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_20}] + [\text{80S\_aa-tRNA\_20}] \\
&+[\text{80S\_aa-tRNA\_eEF2\_GTP\_20}] + [\text{80S\_tRNA\_20}] + [\text{80S\_tRNA\_eEF3\_GTP\_20}])
\end{aligned}
$$

$$
\begin{aligned}
\text{mRNA\_den5} = \text{mRNA\_tot} - (&[\text{80S\_6}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_6}] + [\text{80S\_aa-tRNA\_6}] \\
&+[\text{80S\_aa-tRNA\_eEF2\_GTP\_6}] + [\text{80S\_tRNA\_6}] + [\text{80S\_tRNA\_eEF3\_GTP\_6}] + [\text{80S\_7}] \\
&+[\text{80S\_aa-tRNA\_eEF1A\_GTP\_7}] + [\text{80S\_aa-tRNA\_7}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_7}] + [\text{80S\_tRNA\_7}] \\
&+[\text{80S\_tRNA\_eEF3\_GTP\_7}] + [\text{80S\_8}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_8}] + [\text{80S\_aa-tRNA\_8}] \\
&+[\text{80S\_aa-tRNA\_eEF2\_GTP\_8}] + [\text{80S\_tRNA\_8}] + [\text{80S\_tRNA\_eEF3\_GTP\_8}] + [\text{80S\_9}] \\
&+[\text{80S\_aa-tRNA\_eEF1A\_GTP\_9}] + [\text{80S\_aa-tRNA\_9}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_9}] + [\text{80S\_tRNA\_9}] \\
&+[\text{80S\_tRNA\_eEF3\_GTP\_9}] + [\text{80S\_10}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_10}] + [\text{80S\_aa-tRNA\_10}] \\
&+[\text{80S\_aa-tRNA\_eEF2\_GTP\_10}] + [\text{80S\_tRNA\_10}] + [\text{80S\_tRNA\_eEF3\_GTP\_10}] + [\text{80S\_11}] \\
&+[\text{80S\_aa-tRNA\_eEF1A\_GTP\_11}] + [\text{80S\_aa-tRNA\_11}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_11}] + [\text{80S\_tRNA\_11}] \\
&+[\text{80S\_tRNA\_eEF3\_GTP\_11}] + [\text{80S\_12}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_12}] + [\text{80S\_aa-tRNA\_12}] \\
&+[\text{80S\_aa-tRNA\_eEF2\_GTP\_12}] + [\text{80S\_tRNA\_12}] + [\text{80S\_tRNA\_eEF3\_GTP\_12}] + [\text{80S\_13}] \\
&+[\text{80S\_aa-tRNA\_eEF1A\_GTP\_13}] + [\text{80S\_aa-tRNA\_13}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_13}] + [\text{80S\_tRNA\_13}] \\
&+[\text{80S\_tRNA\_eEF3\_GTP\_13}] + [\text{80S\_14}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_14}] + [\text{80S\_aa-tRNA\_14}] \\
&+[\text{80S\_aa-tRNA\_eEF2\_GTP\_14}] + [\text{80S\_tRNA\_14}] + [\text{80S\_tRNA\_eEF3\_GTP\_14}] + [\text{80S\_15}] \\
&+[\text{80S\_aa-tRNA\_eEF1A\_GTP\_15}] + [\text{80S\_aa-tRNA\_15}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_15}] + [\text{80S\_tRNA\_15}] \\
&+[\text{80S\_tRNA\_eEF3\_GTP\_15}] + [\text{80S\_16}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_16}] + [\text{80S\_aa-tRNA\_16}] \\
&+[\text{80S\_aa-tRNA\_eEF2\_GTP\_16}] + [\text{80S\_tRNA\_16}] + [\text{80S\_tRNA\_eEF3\_GTP\_16}] + [\text{80S\_17}] \\
&+[\text{80S\_aa-tRNA\_eEF1A\_GTP\_17}] + [\text{80S\_aa-tRNA\_17}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_17}] + [\text{80S\_tRNA\_17}] \\
&+[\text{80S\_tRNA\_eEF3\_GTP\_17}] + [\text{80S\_18}] + [\text{80S\_aa-tRNA\_eEF1A\_GTP\_18}] + [\text{80S\_aa-tRNA\_18}] \\
&+[\text{80S\_aa-tRNA\_eEF2\_GTP\_18}] + [\text{80S\_tRNA\_18}] + [\text{80S\_tRNA\_eEF3\_GTP\_18}] + [\text{80S\_19}] \\
&+[\text{80S\_aa-tRNA\_eEF1A\_GTP\_19}] + [\text{80S\_aa-tRNA\_19}] + [\text{80S\_aa-tRNA\_eEF2\_GTP\_19}] + [\text{80S\_tRNA\_19}] \\
&+[\text{80S\_tRNA\_eEF3\_GTP\_19}])
\end{aligned}
$$

Supplementary Table I. Strains used in this study

Strain Name	Strain collection number	Derived from:	Genotype (difference from a parental strain)	Source
WT	PTC41	W303	MATα *ade2*-1 *ura3*-1 *leu2*-3, 112 *his3*-11,15 *can1*-100	M. Tuite, University of Kent
tetO7RPS5	PTC389	PTC41	*RPS5-PtetO7:KanMX*	This study
tetO7SUI1	PTC277	PTC41	*SUI1-PtetO7:KanMX*	This study
tetO7TIF11	PTC269	PTC41	*TIF11-PtetO7:KanMX*	This study
tetO7SUI2	PTC390	PTC41	*SUI2-PtetO7:KanMX*	This study
tetO7CGD11	PTC273	PTC41	*GCD11-PtetO7:KanMX*	This study
tetO7GCD6	PTC272	PTC41	*GCD6-PtetO7:KanMX*	This study
tetO7GCD1	PTC400	PTC41	*GCD1-PtetO7:KanMX*	This study
tetO7RPG1-60	PTC391	PTC41	*RPG1-60bp-PtetO7:KanMX*	This study
tetO7NIP1-60	PTC401	PTC41	*NIP1-60bp-PtetO7:KanMX*	This study
tetO7HCR1	PTC270	PTC41	*HCR1-PtetO7:KanMX*	This study
TIF1Δ	PTC392	PTC41	*TIF1Δ*	This study
TIF2Δ	PTC267	PTC41	*TIF2Δ*	This study
tetO7TIF2 TIF1Δ	PTC393	PTC392	*TIF2-PtetO7:KanMX*	This study
tetO7TIF3	PTC394	PTC41	*TIF3-PtetO7:KanMX*	This study
tetO7CDC33	PTC278	PTC41	*CDC33-PtetO7:KanMX*	This study
TIF4632Δ	PTC274	PTC41	*TIF4632Δ*	This study
tetO7TIF4631 TIF4632Δ	PTC276	PTC274	*TIF4631-PtetO7:KanMX*	This study
tetO7TIF5	PTC268	PTC41	*TIF5-PtetO7:KanMX*	This study
tetO7FUN12	PTC265	PTC41	*FUN12-PtetO7:KanMX*	This study
TEF1Δ	PTC402	PTC41	*TEF1Δ*	This study
TEF2Δ	PTC354	PTC41	*TEF2Δ*	This study
tetO7TEF1 TEF2Δ	PTC362	PTC354	*TEF1-PtetO7:KanMX*	This study
tetO7TEF5	PTC363	PTC41	*TEF5-PtetO7:KanMX*	This study
EFT1Δ	PTC403	PTC41	*EFT1Δ*	This study
EFT2Δ	PTC355	PTC41	*EFT2Δ*	This study
tetO7EFT1 EFT2Δ	PTC364	PTC355	*EFT1-PtetO7:KanMX*	This study
tetO7YEF3	PTC365	PTC41	*YEF3-PtetO7:KanMX*	This study
tetO7SUP35	PTC367	PTC41	*SUP35-PtetO7:KanMX*	This study
tetO7SUP45	PTC366	PTC41	*SUP45-PtetO7:KanMX*	This study
tetO7DBP5	PTC398	PTC41	*DBP5-PtetO7:KanMX*	This study
tetO7DED1-30	PTC397	PTC41	*DED1-30bp-PtetO7:KanMX*	This study
tetO7HYP2	PTC395	PTC41	*HYP2-PtetO7:KanMX*	This study
tetO7PAB1	PTC271	PTC41	*PAB1-PtetO7:KanMX*	This study
competitor	PTC404	PTC41	*lys2Δ:KanMX*	This study

Supplementary Table II. Plasmids constructed in this study

Plasmid Name	Plasmid collection number	Description:
pTRPEX	pJM798	*GPF* promoter in *YCp33-Supex2* substituted with *TEF1* promoter
pTEFEX	pJM815	*GPF* promoter in *YCp33-Supex2* substituted with *TRP1* promoter
pTRPEX SUI1	pJM790	*SUI1* gene under control of *TRP1* promoter
pLEUEX SUI1	pJM860	*SUI1* gene under control of truncated *LEU4* promoter
pPGKEX SUI1	pJM866	*SUI1* gene under control of truncated *PGK1* promoter
pTEFEX SUI1	pJM832	*SUI1* gene under control of *TEF1* promoter
pTEFEX TIF11	pJM822	*TIF11* gene under control of *TEF1* promoter
pTRPEX TIF11	pJM810	*TIF11* gene under control of *TRP1* promoter
pTRPEX SUI2	pJM804	*SUI2* gene under control of *TRP1* promoter
pLEUEX SUI2	pJM862	*SUI2* gene under control of truncated *LEU4* promoter
pPGKEX SUI2	pJM867	*SUI2* gene under control of truncated *PGK1* promoter
pTEFEX GCD1	pJM901	*GCD1* gene under control of *TEF1* promoter
pTRPEX GCD1	pJM902	*GCD1* gene under control of *TRP1* promoter
pTEFEX GCD6	pJM826	*GCD6* gene under control of *TEF1* promoter
pTRPEX GCD6	pJM808	*GCD6* gene under control of *TRP1* promoter
pTEFEX RPG1	pJM827	*RPG1* gene under control of *TEF1* promoter
pPGKEX RPG1	pJM869	*RPG1* gene under control of truncated *PGK1* promoter
pTRPEX RPG1	pJM809	*RPG1* gene under control of *TRP1* promoter
pTEFEX NIP1	pJM880	*NIP1* gene under control of *TEF1* promoter
pTRPEX NIP1	pJM881	*NIP1* gene under control of *TRP1* promoter
pTEFEX HCR1	pJM824	*HCR1* gene under control of *TEF1* promoter
pTEFEX TIF1	pJM817	*TIF1* gene under control of *TEF1* promoter
pTRPEX TIF1	pJM813	*TIF1* gene under control of *TRP1* promoter
pTEFEX TIF3	pJM825	*TIF3* gene under control of *TEF1* promoter
pTRPEX TIF3	pJM806	*TIF3* gene under control of *TRP1* promoter
pTEFEX CDC33	pJM882	*CDC33* gene under control of *TEF1* promoter
pTRPEX CDC33	pJM883	*CDC33* gene under control of *TRP1* promoter
pTEFEX TIF4631	pJM884	*TIF4631* gene under control of *TEF1* promoter
pTRPEX TIF4631	pJM885	*TIF4631* gene under control of *TRP1* promoter
pTEFEX TIF5	pJM820	*TIF5* gene under control of *TEF1* promoter
pTRPEX TIF5	pJM807	*TIF5* gene under control of *TRP1* promoter
pTEFEX FUN12	pJM821	*FUN12* gene under control of *TEF1* promoter
pTRPEX FUN12	pJM886	*FUN12* gene under control of *TRP1* promoter
pTEFEX DED1	pJM816	*DED1* gene under control of *TEF1* promoter
pTRPEX DED1	pJM799	*DED1* gene under control of *TRP1* promoter
pLEUEX DED1	pJM887	*DED1* gene under control of truncated *LEU4* promoter
pPGKEX DED1	pJM888	*DED1* gene under control of truncated *PGK1* promoter
pTEFEX PAB1	pJM823	*PAB1* gene under control of *TEF1* promoter
pTRPEX PAB1	pJM889	*PAB1* gene under control of *TRP1* promoter
pTEFEX TEF1	pJM890	*TEF1* gene under control of *TEF1* promoter
pTEF5EX TEF1	pJM913	*TEF1* gene under control of *TEF5* promoter
pTEFEX TEF5	pJM891	*TEF5* gene under control of *TEF1* promoter
pTEFEX YEF3	pJM892	*YEF3* gene under control of *TEF1* promoter

pTRPEX SUP45	pJM805	*SUP45* gene under control of *TRP1* promoter
pTEFEX SUP35	pJM893	*SUP35* gene under control of *TEF1* promoter
pTEFEX HYP2	pJM894	*HYP2* gene under control of *TEF1* promoter
pTRPEX HYP2	pJM895	*HYP2* gene under control of *TRP1* promoter
pTEFEX DBP5	pJM896	*DBP5* gene under control of *TEF1* promoter
pTRPEX DBP5	pJM897	*DBP5* gene under control of *TRP1* promoter
pTRPEX RPS5	pJM802	*RPS5* gene under control of *TRP1* promoter
pTRPEX-HIS3L2-LucF	pJM898	*Firefly* luciferase gene with L2 mRNA leader sequence under control of *TRP1* promoter
pDCDEX L0-LucR	pJM899	*Renilla* luciferase gene with L0 mRNA leader sequence under control of *DCD1* promoter
pDLV L2-LucF L0-LucR	pJM900	Scanning competence assay vector containing two luciferase genes – Renilla and Firefly – proceeded by leader sequences (L0 and L2, respectively)

Supplementary Table III. Interactions of translation machinery components

Translation Factor	Reported direct interactions	Source
eIF1	eIF2, eIF3, eIF4G, eIF5, R,	Asano *et al.,* 2000; He *et al.,* 2003; Singh *et al.,* 2004; Passmore *et al.,* 2007; Reibarkh *et al.,* 2008 ;
eIF1A	eIF2, eIF3, eIF5B, R,	Fekete *et al.,* 2007; Fringer *et al.,* 2007; Olsen *et al.,* 2003; Passmore *et al.,* 2007; Zheng *et al.,* 2011;
eIF2	eIF1, eIF1A, eIF2B, eIF3, eIF5, R, mRNA, Met-tRNA$_i^{Met}$	Assano *et al.,* 1999; Bushman *et al.,* 1993; Kimball 1999; Laurino *et al.,* 1999; Mohammad-Qureshi *et al.,* 2007; Olsen *et al.,* 2003; Singh *et al.,* 2004; Valasek *et al.,* 2002;
eIF2B	eIF2,	Bushman *et al.,* 1993; Mohammad-Qureshi *et al.,* 2007;
eIF3	eIF1, eIF1A, eIF2, eIF4B, eIF5, R,	Asano *et al.,* 2000; Valasek *et al.,* 2002; Valasek *et al.,* 2003; Vornloche *et al.,* 1999; Olsen *et al.,* 2003;
eIF4A	eIF4G, mRNA,	Dominguez *et al.,* 1999; Marsden *et al.,* 2006; Neff and Sachs 1999; Rogers *et al.,* 1999; Schütz *et al.,* 2008;
eIF4B	eIF3, mRNA,	Altmann *et al.,* 1995; Marsden *et al.,* 2006; Vornloche *et al.,* 1999;
eIF4E	eIF4G, mRNA,	Altmann *et al.,* 1997; Mader *et al.,* 1995; Kiraga-Motoszko *et al.,* 2011;
eIF4G	eIF1, eIF4A, eIF4E, eIF5, Ded1, Pab1, mRNA,	Altmann *et al.,* 1997; Berset *et al.,* 2003; Dominguez *et al.,* 1999; Goyer *et al.,* 1993; He *et al.,* 2003; Hilliker *et al.,* 2011; Mader *et al.,* 1995; Neff and Sachs 1999; Schütz *et al.,* 2008; Tarun and Sachs 1996; Wells *et al.,* 1998;
eIF5	eIF1, eIF2, eIF3, eIF4G, R,	Assano *et al.,* 1999; Asano *et al.,* 2000; He *et al.,* 2003; Phan *et al.,* 1998; Reibarkh *et al.,* 2008; Singh *et al.,* 2004; Valasek *et al.,* 2003;
eIF5B	eIF1A, R,	Fringer *et al.,* 2007; Olsen *et al.,* 2003; Zheng *et al.,* 2011;
eEF1A	eEF1B, eEF3, R,	Anand *et al.,* 2006; Chakraburtty and Triana-Alonso 1998; Kovalchuke *et al.,* 1998; Pedersen *et al.,* 2001; Pittman *et al.,* 2009;
eEF1B	eEF1A,	Pedersen *et al.,* 2001; Pittman *et al.,* 2009;
eEF2	Hyp2, R,	Nilsson *et al.,* 2007; Spahn *et al.,* 2004; Zanelli *et al.,* 2006;
eEF3	eEF1A, R,	Anand *et al.,* 2006; Andersen *et al.,* 2006; Chakraburtty and Triana-Alonso 1998; Dasmahapatra and Chakraburtty 1981; Kovalchuke *et al.,* 1998; Skogerson and Wakatama 1976; Triana-Alonso *et al.,* 1995;
eRF1	Dbp5, eRF3, R,	Eurwilaichitr *et al.,* 1999; Frolova *et al.,* 2000; Gross *et al.,* 2007; Kobayashi *et al.,* 2004;
eRF3	eRF1, Pab1,	Eurwilaichitr *et al.,* 1999; Hosoda *et al.,* 2003; Kobayashi *et al.,* 2004;
Dbp5	eRF1, mRNA,	Estruch and Cole 2003; Gross *et al.,* 2007;
Ded1	eIF4G, mRNA,	Chuang *et al.,* 1997; Iost *et al.,* 1999; Hilliker *et al.,* 2011; Marsden *et al.,* 2006;
Hyp2	eEF2, R,	Jao *et al.,* 2006; Zanelli *et al.,* 2006;
Pab1	eIF4G, eRF3, mRNA,	Hosoda *et al.,* 2003; Kobayashi *et al.,* 2004; Tarun and Sachs 1996; Wells *et al.,* 1998;

R – ribosome

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Quantified protein	Ribo3 Q-peptides
P40512|	ISHEVVQDDSFSLLR
CSN11_YEAST	YFDCCTK
P02994|	IGGIGTVPVGR
EF1A_YEAST	SHINVVVIGHVDSGK
P16521|	IVVEYIAAIGADLIDER
EF3A_YEAST	LVLAAGTWQRPHLIVLDEPTNYLDR
P14741|	IAEIGVDFIADDDIILVHGYSR
eI2BA_YEAST	NLHLYGDWENCK
P32502|	LSPLYPFDVEK
eI2BB_YEAST	TFTVLVTEGFPNNTK
P09032|	GSNLAPFTQPDFPFQTQNK
eI2BG_YEAST	LSNCYIEGHYVVEPK
P53235|	TSQDIELFQSYPTFEQSNTNSK
eIF2A_YEAST	WNPLGNAILCLAITDFDSSNK
P06103|	DFSFAPEGVK
eIF3B_YEAST	YLVTFSTEPIIVEEDNEFSPFTK
P32497|	DQLDSADYVDNLIDGLSTILSK
eIF3C_YEAST	VVEVLQSVIAELEIPAK
Q04067|	GLAFVTFSSEEVAEQALR
eIF3G_YEAST	GSPAGPSAVTAR
P40217|	EFIILGGGQEAK
eIF3I_YEAST	YETDCPLNTAVITPLK
P05453|	FVAQIAIVELK
ERF3_YEAST	VIAVLETEAPVCVETYQDYPQLGR
Q12099|	GIYSYGFEAPSSIQSR
FAL1_YEAST	HGCQAVSGTPGR
P34167|	EDAPDLDWGAAR
IF4B_YEAST	GGGADVDWSSAR
P39936|	AQPISDIYEFAYPENVERPDIK
IF4F2_YEAST	WEDDGETLK
P38431|	GGGLSISDIAQGK
IF5_YEAST	NPETEIIITK
P25637|	HINSTAR
YIH1_YEAST	WFGGAHIGPDR

Quantified protein	Ribo4 Q-peptides
P32324|	AEQLYEGPADDANCIAIK
EF2_YEAST	FSVSPVVQVAVEVK
P12754|	DASNEEDSNSK
eI2BD_YEAST	VITEFGALPPSSVPVILR
P32501|	CLLPLANVPLIEYTLEFLAK
eI2BE_YEAST	TIEPAAFVLDK
P38249|	LATLPAPLDLSAWDIEK
eIF3A_YEAST	SGNNLVDLSDADTLQR
P12385|	GLILAGSADFK
ERF1_YEAST	VAEVAVQNFITNDK
P38912|	DFQDDQCDVVHK
IF1A_YEAST	VEASCFDGNK
P20459|	AVTATEDAELQALLESK
IF2A_YEAST	LSIIDETVWEGIEPPSK
P09064|	EGTPSANSSIQQEVGLPYSELLSR
IF2B_YEAST	TIFSNIQDIAEK
P32481|	FAVPGGLIGVGTK
IF2G_YEAST	GTIADGAPIVPISAQLK
P39730|	GVVVQASTLGSLEALLDFLK
IF2P_YEAST	IQLELAEQGLNSELYFQNK
P10081|	GIDVQQVSLVINYDLPANK
IF4A_YEAST	GVFGYGFEEPSAIQQR
P07260|	GADIDELWLR
IF4E_YEAST	NDVRPEWEDEANAK
P39935|	DATPIEDVFSFNYPEGIEGPDIK
IF4F1_YEAST	SDEAEAEVEAEAGDAGTK
P19211|	LEDLSPSTHNLEVPFVK
IF5A1_YEAST	VHLVTLDIFTGK
P23301|	APEGELGDSLQTAFDEGK
IF5A2_YEAST	VHLVAIDIFTGK
Q12522|	GLLVPTQTTDQELQHLR
IF6_YEAST	TQFENSNEIGVFSK
P32911|	SFDPFADTGDDETATSNYIHIR
SUI1_YEAST	TLTTVQGVPEEYDLK
Q03690|	GGDEAAIAASNQDLK
TIF31_YEAST	SVDELLTFIEGDSSNSK

Quantified protein	Ribo1 Q-peptides
P02994|	IGGIGTVPVGR
EF1A_YEAST	SHINVVVIGHVDSGK
P14741|	GIPVTLIVDSAVGAVIDK
eI2BA_YEAST	VFVGAEGVAESGGIINLVGTYSVGVLAHNAR
P32502|	QVAIQGIK
eI2BB_YEAST	TPVFAVAGLYK
P06103|	NINDNNDVSASLK
eIF3B_YEAST	IFDVQPEDASDDFTTIEEIVEEVLEETK
P40217|	NPGSINIYEIER
eIF3I_YEAST	VQGHFGPLNTVAISPQGTSYASGGEDGFIR
P05453|	ISESTHNTNNANVTSADALIK
ERF3_YEAST	DQGTTIAIGK
Q12099|	GIYSYGFEAPSSIQSR
FAL1_YEAST	DLQALILSPTR
P39936|	YTYGPTFLLQFK
IF4F2_YEAST	EAPKPTGEANEVVIDGK
P38431|	GGGLSISDIAQGK
IF5_YEAST	LQDVLDGFINK
P32324|	TDGNSFLINLIDSPGHVDFSSEVTAALR
EF2_YEAST	AYLPVNESFGFTGELR
P32501|	LQAVVLTDSYETR
eI2BE_YEAST	HIYAYLTDEYAVR
P12385|	LSVLSAITSTQQK
ERF1_YEAST	NFGATLEFITDK
P38912|	NQGELPENAK
IF1A_YEAST	EEGQEYAQITK
P39730|	VISLEINHQPVQEVK
IF2P_YEAST	IFNADVIYHLFDSFTAYQEK
P07260|	GADIDELWLR
IF4E_YEAST	TVLSDSAHFDVK
P39935|	DATPIEDVFSFNYPEGIEGPDIK
IF4F1_YEAST	ADAEWVQSTASK
P19211|	LEDLSPSTHNLEVPFVK
IF5A1_YEAST	VHLVTLDIFTGK
P23301|	APEGELGDSLQTAFDEGK
IF5A2_YEAST	VHLVAIDIFTGK

Quantified protein	Ribo2 Q-peptides
P40512|	IGHLLSINYGEK
CSN11_YEAST	LQFSYLSSTLGIDLEDIK
P16521|	VGNVGEDDAIPEVSHAGDVSTTLQVVNELLK
EF3A_YEAST	TVYVEHDIDGTHSDTSVLDFVFESGVGTK
P09032|	GSNLAPFTQPDFPFQTQNK
eI2BG_YEAST	EISVVAPVDEIELIESGLTSFLSLR
P53235|	VSLTTGPVHDFTWSPTSR
eIF2A_YEAST	LSDVYDLHFSPAGNYLSTWER
P32497|	DQLDSADYVDNLIDGLSTILSK
eIF3C_YEAST	ISLNSSNNASADER
Q04067|	LGEEVELR
eIF3G_YEAST	GSPAGPSAVTAR
P34167|	SGGFGGSFGGR
IF4B_YEAST	GAQFGKPQQTK
P25637|	QEDGSIIVVK
YIH1_YEAST	QDGSAATYQDSDDDGETAAGSR
P12754|	VLTELLLHNAISLK
eI2BD_YEAST	VITEFGALPPSSVPVILR
P38249|	LATLPAPLDLSAWDIEK
eIF3A_YEAST	TAGGSSPATPATPATPATPTPSSGPK
P20459|	GIEQLESAIEK
IF2A_YEAST	LVAAPLYVLTTQALDK
P09064|	EGTPSANSSIQQEVGLPYSELLSR
IF2B_YEAST	TIFSNIQDIAEK
P32481|	YNIDAVNEFIVK
IF2G_YEAST	EFEEGGGLPEQPLNPDFSK
P10081|	TGTFSIAALQR
IF4A_YEAST	GVFGYGFEEPSAIQQR
Q12522|	GLLVPTQTTDQELQHLR
IF6_YEAST	LQDAQPESISGNLR
P32911|	SFDPFADTGDDETATSNYIHIR
SUI1_YEAST	TLTTVQGVPEEYDLK
Q03690|	ELDSQIVHYEQNLK
TIF31_YEAST	FVEPPTTFSLSDLTIIPR

Supplementary Table IV
QconCAT peptides

The proteins to be quantitated were distributed over four QconCATs (Ribo1 - Ribo4), with two peptides per protein. A stringent set of rules were followed to select the most ‘quantotypic’ peptides from each protein. The Ribo1/Ribo2 peptides were generated first, with the Ribo3/Ribo4 peptides synthesised later using a modified set of rules with the aim of increasing the number of successful Q-peptides per protein. Note that some of the peptide sequences did not correspond to proteins studied in this work.

Supplementary Table Va - Transition list for QconCAT 'Ribo 3'. Using data independent acquisition on a Waters Synapt G2 mass spectrometer, transition lists were created. These provide information on the precursor retention time ('prec retT') as well as the product ion fragment number ('frag str') and mass/charge ('product m_z'). Acquistions to optimise the collision energy ('ColE') and cone voltage ('ConeV') for each peptide were performed prior to quantification runs. For each peptide, in both heavy (QconCAT) and light (yeast analyte), two transitions were acquired. Peptide modification carbamidomethyl cysteine displayed as CAM+C.

List	Prot Acc	peptide modification	peptide seq	prec retT	prec z	precursor mz	frag str	product m_z	product inten	prod z	num KR	ColE	Cone V
Ribo3_1	Q12099	CAM+C(3);13C+KR(12)	HGCQAVSGTPGR_heavy	15.66	2	616.798	y3	335.213	406	1	1	29	40
Ribo3_1	Q12099	CAM+C(3);13C+KR(12)	HGCQAVSGTPGR_heavy	15.66	2	616.798	y7	679.381	398	1	1	26	30
Ribo3_1	Q12099	CAM+C(3);13C+KR(12)	HGCQAVSGTPGR_light	15.66	2	613.798	y3	329.213	406	1	1	29	40
Ribo3_1	Q12099	CAM+C(3);13C+KR(12)	HGCQAVSGTPGR_light	15.66	2	613.798	y7	673.381	398	1	1	26	30
Ribo3_1	Q04067	13C+KR(12)	GSPAGPSAVTAR_heavy	17.69	2	538.793	y10	466.766	13838	2	1	19	25
Ribo3_1	Q04067	13C+KR(12)	GSPAGPSAVTAR_heavy	17.69	2	538.793	y9	835.473	4419	1	1	23	30
Ribo3_1	Q04067	13C+KR(12)	GSPAGPSAVTAR_light	17.69	2	535.793	y10	463.766	13838	2	1	19	25
Ribo3_1	Q04067	13C+KR(12)	GSPAGPSAVTAR_light	17.69	2	535.793	y9	829.473	4419	1	1	23	30
Ribo3_1	P34167	13C+KR(12)	GGGADVDWSSAR_heavy	20.81	2	592.276	y7	826.417	3266	1	1	23	35
Ribo3_1	P34167	13C+KR(12)	GGGADVDWSSAR_heavy	20.81	2	592.276	y5	612.321	2502	1	1	28	35
Ribo3_1	P34167	13C+KR(12)	GGGADVDWSSAR_light	20.81	2	589.276	y7	820.417	3266	1	1	23	35
Ribo3_1	P34167	13C+KR(12)	GGGADVDWSSAR_light	20.81	2	589.276	y5	606.321	2502	1	1	28	35
Ribo3_1	P38431	13C+KR(10)	NPETEIIITK_heavy	22.96	2	582.334	y7	823.523	2892	1	1	22	35
Ribo3_1	P38431	13C+KR(10)	NPETEIIITK_heavy	22.96	2	582.334	y8	952.566	1858	1	1	22	35
Ribo3_1	P38431	13C+KR(10)	NPETEIIITK_light	22.96	2	579.334	y7	817.523	2892	1	1	22	35
Ribo3_1	P38431	13C+KR(10)	NPETEIIITK_light	22.96	2	579.334	y8	946.566	1858	1	1	22	35
Ribo3_1	P38431	13C+KR(13)	GGGLSISDIAQGK_heavy	24.96	2	604.834	y7	724.395	6565	1	1	21	35
Ribo3_1	P38431	13C+KR(13)	GGGLSISDIAQGK_heavy	24.96	2	604.834	y8	837.479	2392	1	1	23	35
Ribo3_1	P38431	13C+KR(13)	GGGLSISDIAQGK_light	24.96	2	601.834	y7	718.395	6565	1	1	21	35
Ribo3_1	P38431	13C+KR(13)	GGGLSISDIAQGK_light	24.96	2	601.834	y8	831.479	2392	1	1	23	35
Ribo3_1	P34167	13C+KR(12)	EDAPDLDWGAAR_heavy	25.07	2	661.310	y5	566.315	5898	1	1	30	35
Ribo3_1	P34167	13C+KR(12)	EDAPDLDWGAAR_heavy	25.07	2	661.310	y6	681.342	5301	1	1	25	35
Ribo3_1	P34167	13C+KR(12)	EDAPDLDWGAAR_light	25.07	2	658.310	y5	560.315	5898	1	1	30	35
Ribo3_1	P34167	13C+KR(12)	EDAPDLDWGAAR_light	25.07	2	658.310	y6	675.342	5301	1	1	25	35
Ribo3_1	Q12099	13C+KR(16)	GIYSYGFEAPSSIQSR_heavy	26.27	2	884.437	y7	780.432	7047	1	1	28	40
Ribo3_1	Q12099	13C+KR(16)	GIYSYGFEAPSSIQSR_heavy	26.27	2	884.437	y11	1184.607	6201	1	1	33	35
Ribo3_1	Q12099	13C+KR(16)	GIYSYGFEAPSSIQSR_light	26.27	2	881.437	y7	774.432	7047	1	1	28	40
Ribo3_1	Q12099	13C+KR(16)	GIYSYGFEAPSSIQSR_light	26.27	2	881.437	y11	1178.607	6201	1	1	33	35
Ribo3_1	P40217	13C+KR(12)	EFIILGGGQEAK_heavy	26.82	2	634.353	y7	652.335	8436	1	1	22	35
Ribo3_1	P40217	13C+KR(12)	EFIILGGGQEAK_heavy	26.82	2	634.353	y8	765.419	7155	1	1	22	35
Ribo3_1	P40217	13C+KR(12)	EFIILGGGQEAK_light	26.82	2	631.353	y7	646.335	8436	1	1	22	35
Ribo3_1	P40217	13C+KR(12)	EFIILGGGQEAK_light	26.82	2	631.353	y8	759.419	7155	1	1	22	35
Ribo3_1	P40217	CAM+C(5);13C+KR(16)	YETDCPLNTAVITPLK_heavy	27.31	2	920.979	y11	1172.737	4986	1	1	34	35
Ribo3_1	P40217	CAM+C(5);13C+KR(16)	YETDCPLNTAVITPLK_heavy	27.31	2	920.979	y4	464.318	1333	1	1	29	35
Ribo3_1	P40217	CAM+C(5);13C+KR(16)	YETDCPLNTAVITPLK_light	27.31	2	917.979	y11	1166.737	4986	1	1	34	35
Ribo3_1	P40217	CAM+C(5);13C+KR(16)	YETDCPLNTAVITPLK_light	27.31	2	917.979	y4	458.318	1333	1	1	29	35
Ribo3_1	P32502	13C+KR(15)	TFTVLVTEGFPNNTK_heavy	28.41	2	837.446	y9	1013.494	5685	1	1	26	35
Ribo3_1	P32502	13C+KR(15)	TFTVLVTEGFPNNTK_heavy	28.41	2	837.446	y5	579.318	4306	1	1	26	35
Ribo3_1	P32502	13C+KR(15)	TFTVLVTEGFPNNTK_light	28.41	2	834.446	y9	1007.494	5685	1	1	26	35
Ribo3_1	P32502	13C+KR(15)	TFTVLVTEGFPNNTK_light	28.41	2	834.446	y5	573.318	4306	1	1	26	35
Ribo3_1	P32502	13C+KR(11)	LSPLYPFDVEK_heavy	29.33	2	657.357	y9	557.299	33142	2	1	20	30
Ribo3_1	P32502	13C+KR(11)	LSPLYPFDVEK_heavy	29.33	2	657.357	y6	740.391	13123	1	1	23	30
Ribo3_1	P32502	13C+KR(11)	LSPLYPFDVEK_light	29.33	2	654.357	y9	554.299	33142	2	1	20	30
Ribo3_1	P32502	13C+KR(11)	LSPLYPFDVEK_light	29.33	2	654.357	y6	734.391	13123	1	1	23	30
Ribo3_1	Q04067	13C+KR(18)	GLAFVTFSSEEVAEQALR_heavy	31.83	2	980.512	y11	1224.624	1006	1	1	34	40
Ribo3_1	Q04067	13C+KR(18)	GLAFVTFSSEEVAEQALR_heavy	31.83	2	980.512	y13	1472.729	951	1	1	34	40
Ribo3_1	Q04067	13C+KR(18)	GLAFVTFSSEEVAEQALR_light	31.83	2	977.512	y11	1218.624	1006	1	1	34	40
Ribo3_1	Q04067	13C+KR(18)	GLAFVTFSSEEVAEQALR_light	31.83	2	977.512	y13	1466.729	951	1	1	34	40
Ribo3_1	P06103	13C+KR(23)	YLVTFSTEPIIVEEDNEFSPFTK_heavy	33.66	2	1356.176	y4	498.305	459	1	1	54	35
Ribo3_1	P06103	13C+KR(23)	YLVTFSTEPIIVEEDNEFSPFTK_heavy	33.66	2	1356.176	y5	585.329	436	1	1	54	35
Ribo3_1	P06103	13C+KR(23)	YLVTFSTEPIIVEEDNEFSPFTK_light	33.66	2	1353.176	y4	492.305	459	1	1	54	35
Ribo3_1	P06103	13C+KR(23)	YLVTFSTEPIIVEEDNEFSPFTK_light	33.66	2	1353.176	y5	579.329	436	1	1	54	35
Ribo3_1	P16521	13C+KR(17)	IVVEYIAAIGADLIDER_heavy	36.49	3	622.684	y10	1078.589	313	1	1	22	25
Ribo3_1	P16521	13C+KR(17)	IVVEYIAAIGADLIDER_heavy	36.49	3	622.684	y2	310.181	66	1	1	29	25
Ribo3_1	P16521	13C+KR(17)	IVVEYIAAIGADLIDER_light	36.49	3	620.684	y10	1072.589	313	1	1	22	25
Ribo3_1	P16521	13C+KR(17)	IVVEYIAAIGADLIDER_light	36.49	3	620.684	y2	304.181	66	1	1	29	25
Ribo3_2	P25637	13C+KR(15)	HINSTAR_1_heavy	15.42	2	402.725	b5	553.273		1	1	17	30
Ribo3_2	P25637	13C+KR(15)	HINSTAR_1_light	15.42	2	399.725	b5	547.273		1	1	17	30
Ribo3_2	P40512	CAM+C(4),(5);13C+KR(7)	YFDCCTK_heavy	18.69	2	500.204	y5	689.269	985	1	1	18	30
Ribo3_2	P40512	CAM+C(4),(5);13C+KR(7)	YFDCCTK_heavy	18.69	2	500.204	y6	836.338	599	1	1	20	25
Ribo3_2	P40512	CAM+C(4),(5);13C+KR(7)	YFDCCTK_light	18.69	2	497.204	y5	683.269	985	1	1	18	30
Ribo3_2	P40512	CAM+C(4),(5);13C+KR(7)	YFDCCTK_light	18.69	2	497.204	y6	830.338	599	1	1	20	25
Ribo3_2	P39936	13C+KR(9)	WEDDGETLK_heavy	20.67	2	549.756	y7	783.383	3365	1	1	19	35
Ribo3_2	P39936	13C+KR(9)	WEDDGETLK_heavy	20.67	2	549.756	y5	553.333	702	1	1	21	35
Ribo3_2	P39936	13C+KR(9)	WEDDGETLK_light	20.67	2	546.756	y7	777.383	3365	1	1	19	35
Ribo3_2	P39936	13C+KR(9)	WEDDGETLK_light	20.67	2	546.756	y5	547.333	702	1	1	21	35
Ribo3_2	P09032	CAM+C(4);13C+KR(15)	LSNCYIEGHYVVEPK_heavy	22.93	3	605.302	y13	807.390	5051	2	1	18	35
Ribo3_2	P09032	CAM+C(4);13C+KR(15)	LSNCYIEGHYVVEPK_heavy	22.93	3	605.302	y14	850.906	4769	2	1	21	35
Ribo3_2	P09032	CAM+C(4);13C+KR(15)	LSNCYIEGHYVVEPK_light	22.93	3	603.302	y13	804.390	5051	2	1	18	35
Ribo3_2	P09032	CAM+C(4);13C+KR(15)	LSNCYIEGHYVVEPK_light	22.93	3	603.302	y14	847.906	4769	2	1	21	35
Ribo3_2	P53235	13C+KR(27)	WNPLGNAILCLAITDFDSSNK_heavy	23.16	3	785.730	y8	919.410		1	1	24	35
Ribo3_2	P53235	13C+KR(27)	WNPLGNAILCLAITDFDSSNK_heavy	23.16	3	785.730	b15	818.410		2	1	27	30
Ribo3_2	P53235	13C+KR(27)	WNPLGNAILCLAITDFDSSNK_light	23.16	3	783.730	y8	913.410		1	1	24	35
Ribo3_2	P53235	13C+KR(27)	WNPLGNAILCLAITDFDSSNK_light	23.16	3	783.730	b15	815.410		2	1	27	30
Ribo3_2	P25637	13C+KR(16)	WFGGAHIGPDR_heavy	24.12	2	609.800	y5	563.300		1	1	28	40

Ribo3_2	P25637	13C+KR(16)	WFGGAHIGPDR_heavy	24.12	2	609.800	y10	516.760		2	1	25	40
Ribo3_2	P25637	13C+KR(16)	WFGGAHIGPDR_light	24.12	2	606.800	y5	557.300		1	1	28	40
Ribo3_2	P25637	13C+KR(16)	WFGGAHIGPDR_light	24.12	2	606.800	y10	513.760		2	1	25	40
Ribo3_2	P14741	CAM+C(11);13C+KR(12)	NLHLYGDWENCK_heavy	24.79	3	518.909	y4	556.250	900	1	1	15	25
Ribo3_2	P14741	CAM+C(11);13C+KR(12)	NLHLYGDWENCK_heavy	24.79	3	518.909	y8	1077.442	693	1	1	18	25
Ribo3_2	P14741	CAM+C(11);13C+KR(12)	NLHLYGDWENCK_light	24.79	3	516.909	y4	550.250	900	1	1	15	25
Ribo3_2	P14741	CAM+C(11);13C+KR(12)	NLHLYGDWENCK_light	24.79	3	516.909	y8	1071.442	693	1	1	18	25
Ribo3_2	P06103	13C+KR(10)	DFSFAPEGVK_heavy	26.08	2	551.780	y8	840.454	9125	1	1	19	25
Ribo3_2	P06103	13C+KR(10)	DFSFAPEGVK_heavy	26.08	2	551.780	y7	753.427	3379	1	1	19	25
Ribo3_2	P06103	13C+KR(10)	DFSFAPEGVK_light	26.08	2	548.780	y8	834.454	9125	1	1	19	25
Ribo3_2	P06103	13C+KR(10)	DFSFAPEGVK_light	26.08	2	548.780	y7	747.427	3379	1	1	19	25
Ribo3_2	P40512	13C+KR(15)	ISHEVVQDDSFSLLR_heavy	26.33	3	584.308	y6	728.440	3832	1	1	21	25
Ribo3_2	P40512	13C+KR(15)	ISHEVVQDDSFSLLR_heavy	26.33	3	584.308	y5	641.408	2090	1	1	21	25
Ribo3_2	P40512	13C+KR(15)	ISHEVVQDDSFSLLR_light	26.33	3	582.308	y6	722.440	3832	1	1	21	25
Ribo3_2	P40512	13C+KR(15)	ISHEVVQDDSFSLLR_light	26.33	3	582.308	y5	635.408	2090	1	1	21	25
Ribo3_2	P53235	13C+KR(22)	TSQDIELFQSYPTFEQSNTNSK_heavy	28.16	2	1285.604	y11	1258.601	2309	1	1	41	35
Ribo3_2	P53235	13C+KR(22)	TSQDIELFQSYPTFEQSNTNSK_heavy	28.16	2	1285.604	y13	1508.692	193	1	1	41	35
Ribo3_2	P53235	13C+KR(22)	TSQDIELFQSYPTFEQSNTNSK_light	28.16	2	1282.604	y11	1252.601	2309	1	1	41	35
Ribo3_2	P53235	13C+KR(22)	TSQDIELFQSYPTFEQSNTNSK_light	28.16	2	1282.604	y13	1502.692	193	1	1	41	35
Ribo3_2	P39936	13C+KR(18);13C+KR(22)	AQPISDIYEFAYPENVERPDIK_heavy	28.75	3	869.444	y20	1204.114	55402	2	2	27	35
Ribo3_2	P39936	13C+KR(18);13C+KR(22)	AQPISDIYEFAYPENVERPDIK_heavy	28.75	3	869.444	y10	1208.670	4316	1	2	34	35
Ribo3_2	P39936	13C+KR(18);13C+KR(22)	AQPISDIYEFAYPENVERPDIK_light	28.75	3	865.444	y20	1198.114	55402	2	2	27	35
Ribo3_2	P39936	13C+KR(18);13C+KR(22)	AQPISDIYEFAYPENVERPDIK_light	28.75	3	865.444	y10	1196.670	4316	1	2	34	35
Ribo3_2	P09032	13C+KR(19)	GSNLAPFTQPDFPFQTQNK_heavy	29.30	2	1072.031	y14	850.918	5223	2	1	34	35
Ribo3_2	P09032	13C+KR(19)	GSNLAPFTQPDFPFQTQNK_heavy	29.30	2	1072.031	y11	1355.667	464	1	1	34	35
Ribo3_2	P09032	13C+KR(19)	GSNLAPFTQPDFPFQTQNK_light	29.30	2	1069.031	y14	847.918	5223	2	1	34	35
Ribo3_2	P09032	13C+KR(19)	GSNLAPFTQPDFPFQTQNK_light	29.30	2	1069.031	y11	1349.667	464	1	1	34	35
Ribo3_2	P05453	13C+KR(11)	FVAQIAIVELK_heavy	29.55	2	618.886	y6	678.447	1062	1	1	22	25
Ribo3_2	P05453	13C+KR(11)	FVAQIAIVELK_heavy	29.55	2	618.886	y7	791.533	964	1	1	22	35
Ribo3_2	P05453	13C+KR(11)	FVAQIAIVELK_light	29.55	2	615.886	y6	672.447	1062	1	1	22	25
Ribo3_2	P05453	13C+KR(11)	FVAQIAIVELK_light	29.55	2	615.886	y7	785.533	964	1	1	22	35
Ribo3_2	P05453	CAM+C(12);13C+KR(24)	VIAVLETEAPVCVETYQDYPQLGR_heavy	29.75	3	919.468	y5	576.355	2143	1	1	32	35
Ribo3_2	P05453	CAM+C(12);13C+KR(24)	VIAVLETEAPVCVETYQDYPQLGR_heavy	29.75	3	919.468	y6	739.420	1000	1	1	34	35
Ribo3_2	P05453	CAM+C(12);13C+KR(24)	VIAVLETEAPVCVETYQDYPQLGR_light	29.75	3	917.468	y5	570.355	2143	1	1	32	35
Ribo3_2	P05453	CAM+C(12);13C+KR(24)	VIAVLETEAPVCVETYQDYPQLGR_light	29.75	3	917.468	y6	733.420	1000	1	1	34	35
Ribo3_2	P32497	13C+KR(17)	VVEVLQSVIAELEIPAK_heavy	35.94	3	615.034	y3	321.223	1733	1	1	26	25
Ribo3_2	P32497	13C+KR(17)	VVEVLQSVIAELEIPAK_heavy	35.94	3	615.034	y8	876.516	1396	1	1	19	25
Ribo3_2	P32497	13C+KR(17)	VVEVLQSVIAELEIPAK_light	35.94	3	613.034	y3	315.223	1733	1	1	26	25
Ribo3_2	P32497	13C+KR(17)	VVEVLQSVIAELEIPAK_light	35.94	3	613.034	y8	870.516	1396	1	1	19	25
Ribo3_2	P32497	13C+KR(22)	DQLDSADYVDNLIDGLSTILSK_heavy	39.15	2	1201.107	y10	1052.629	1298	1	1	41	40
Ribo3_2	P32497	13C+KR(22)	DQLDSADYVDNLIDGLSTILSK_heavy	39.15	2	1201.107	y6	654.411	942	1	1	43	35
Ribo3_2	P32497	13C+KR(22)	DQLDSADYVDNLIDGLSTILSK_light	39.15	2	1198.107	y10	1046.629	1298	1	1	41	40
Ribo3_2	P32497	13C+KR(22)	DQLDSADYVDNLIDGLSTILSK_light	39.15	2	1198.107	y6	648.411	942	1	1	43	35

Supplementary Table Vb - Transition list for QconCAT 'Ribo 4'. Using data independent acquisition on a Waters Synapt G2 mass spectrometer, transition lists were created. These provide information on the precursor retention time ('precursor retT') as well as the product ion fragment number ('fragment str') and mass/charge ('product m_'z). Acquistions to optimise the collision energy ('ColE') and cone voltage ('ConeV') for each peptide were performed prior to quantification runs. For each peptide, in both heavy (QconCAT) and light (yeast analyte), two transitions were acquired.

List	Prot Acc	peptide modification	peptide seq	prec retT	prec z	precursor mz	frag str	product m_z	product inten	prod z	num KR	ColE	Cone V
Ribo4_1	P38912	CAM+C(5);13C+KR(10)	VEASCFDGNK_heavy	18.11	2	566.756	y7	833.362	1252	1	1	20	25
Ribo4_1	P38912	CAM+C(5);13C+KR(10)	VEASCFDGNK_heavy	18.11	2	566.756	y6	746.325	397	1	1	20	25
Ribo4_1	P38912	CAM+C(5);13C+KR(10)	VEASCFDGNK_light	18.11	2	563.756	y7	827.362	1252	1	1	20	25
Ribo4_1	P38912	CAM+C(5);13C+KR(10)	VEASCFDGNK_light	18.11	2	563.756	y6	740.325	397	1	1	20	25
Ribo4_1	P38912	CAM+C(7);13C+KR(12)	DFQDDQCDVVHK_heavy	18.93	3	504.555	y10	625.280	1456	2	1	15	25
Ribo4_1	P38912	CAM+C(7);13C+KR(12)	DFQDDQCDVVHK_heavy	18.93	3	504.555	y9	561.254	1180	2	1	15	25
Ribo4_1	P38912	CAM+C(7);13C+KR(12)	DFQDDQCDVVHK_light	18.93	3	502.555	y10	622.280	1456	2	1	15	25
Ribo4_1	P38912	CAM+C(7);13C+KR(12)	DFQDDQCDVVHK_light	18.93	3	502.555	y9	558.254	1180	2	1	15	25
Ribo4_1	P38249	13C+KR(16)	SGNNLVDLSDADTLQR_heavy	25.25	2	862.432	y10	1139.565	3040	1	1	30	40
Ribo4_1	P38249	13C+KR(16)	SGNNLVDLSDADTLQR_heavy	25.25	2	862.432	y11	1238.632	2415	1	1	30	35
Ribo4_1	P38249	13C+KR(16)	SGNNLVDLSDADTLQR_light	25.25	2	859.432	y10	1133.565	3040	1	1	30	40
Ribo4_1	P38249	13C+KR(16)	SGNNLVDLSDADTLQR_light	25.25	2	859.432	y11	1232.632	2415	1	1	30	35
Ribo4_1	P23301	13C+KR(18)	APEGELGDSLQTAFDEGK_heavy	26.75	2	935.430	y7	767.350		1	1	39	35
Ribo4_1	P23301	13C+KR(18)	APEGELGDSLQTAFDEGK_heavy	26.75	2	935.430	y6	666.310		1	1	39	40
Ribo4_1	P23301	13C+KR(18)	APEGELGDSLQTAFDEGK_light	26.75	2	932.430	y7	761.350		1	1	39	35
Ribo4_1	P23301	13C+KR(18)	APEGELGDSLQTAFDEGK_light	26.75	2	932.430	y6	660.310		1	1	39	40
Ribo4_1	P19211	13C+KR(17)	LEDLSPSTHNLEVPFVK_heavy	27.08	3	644.346	y12	687.379	5627	2	1	20	30
Ribo4_1	P19211	13C+KR(17)	LEDLSPSTHNLEVPFVK_heavy	27.08	3	644.346	y13	730.895	3919	2	1	20	30
Ribo4_1	P19211	13C+KR(17)	LEDLSPSTHNLEVPFVK_light	27.08	3	642.346	y12	684.379	5627	2	1	20	30
Ribo4_1	P19211	13C+KR(17)	LEDLSPSTHNLEVPFVK_light	27.08	3	642.346	y13	727.895	3919	2	1	20	30
Ribo4_1	P32481	13C+KR(17)	GTIADGAPIVPISAQLK_heavy	27.41	2	828.985	y10	1071.688	5684	1	1	29	35
Ribo4_1	P32481	13C+KR(17)	GTIADGAPIVPISAQLK_heavy	27.41	2	828.985	y13	1314.775	422	1	1	26	40
Ribo4_1	P32481	13C+KR(17)	GTIADGAPIVPISAQLK_light	27.41	2	825.985	y10	1065.688	5684	1	1	29	35
Ribo4_1	P32481	13C+KR(17)	GTIADGAPIVPISAQLK_light	27.41	2	825.985	y13	1308.775	422	1	1	26	40
Ribo4_1	P32481	13C+KR(13)	FAVPGGLIGVGTK_heavy	28.00	2	611.369	y11	502.314	1916	2	1	18	25
Ribo4_1	P32481	13C+KR(13)	FAVPGGLIGVGTK_heavy	28.00	2	611.369	y10	904.557	15499	1	1	21	25
Ribo4_1	P32481	13C+KR(13)	FAVPGGLIGVGTK_light	28.00	2	608.369	y11	499.314	1916	2	1	18	25
Ribo4_1	P32481	13C+KR(13)	FAVPGGLIGVGTK_light	28.00	2	608.369	y10	898.557	15499	1	1	21	25
Ribo4_1	P09064	13C+KR(12)	TIFSNIQDIAEK_heavy	28.46	2	692.874	y10	1170.598	1189	1	1	24	25
Ribo4_1	P09064	13C+KR(12)	TIFSNIQDIAEK_heavy	28.46	2	692.874	y3	353.214	183	1	1	24	30
Ribo4_1	P09064	13C+KR(12)	TIFSNIQDIAEK_light	28.46	2	689.874	y10	1164.598	1189	1	1	24	25
Ribo4_1	P09064	13C+KR(12)	TIFSNIQDIAEK_light	28.46	2	689.874	y3	347.214	183	1	1	24	30
Ribo4_1	P20459	13C+KR(17)	AVTATEDAELQALLESK_heavy	28.73	2	897.960	y9	1030.580		2	1	35	25
Ribo4_1	P20459	13C+KR(17)	AVTATEDAELQALLESK_heavy	28.73	2	897.960	y6	660.390		2	1	31	30
Ribo4_1	P20459	13C+KR(17)	AVTATEDAELQALLESK_light	28.73	2	894.960	y9	1027.580		2	1	35	25
Ribo4_1	P20459	13C+KR(17)	AVTATEDAELQALLESK_light	28.73	2	894.960	y6	657.390		2	1	31	30
Ribo4_1	P09064	13C+KR(24)	EGTPSANSSIQQEVGLPYSELLSR_heavy	29.69	2	1284.649	y8	970.533	4377	1	1	48	30
Ribo4_1	P09064	13C+KR(24)	EGTPSANSSIQQEVGLPYSELLSR_heavy	29.69	2	1284.649	y10	1140.633	1764	1	1	48	30
Ribo4_1	P09064	13C+KR(24)	EGTPSANSSIQQEVGLPYSELLSR_light	29.69	2	1281.649	y8	964.533	4377	1	1	48	30
Ribo4_1	P09064	13C+KR(24)	EGTPSANSSIQQEVGLPYSELLSR_light	29.69	2	1281.649	y10	1134.633	1764	1	1	48	30
Ribo4_1	P20459	13C+KR(17)	LSIIDETVWEGIEPPSK_heavy	31.07	2	960.009	y9	1048.536	7120	1	1	33	35
Ribo4_1	P20459	13C+KR(17)	LSIIDETVWEGIEPPSK_heavy	31.07	2	960.009	y4	434.271	3848	1	1	40	35
Ribo4_1	P20459	13C+KR(17)	LSIIDETVWEGIEPPSK_light	31.07	2	957.009	y9	1042.536	7120	1	1	33	35
Ribo4_1	P20459	13C+KR(17)	LSIIDETVWEGIEPPSK_light	31.07	2	957.009	y4	428.271	3848	1	1	40	35
Ribo4_1	P12754	13C+KR(18)	VITEFGALPPSSVPVILR_heavy	31.73	2	951.066	y10	1070.670	23527	1	1	35	40
Ribo4_1	P12754	13C+KR(18)	VITEFGALPPSSVPVILR_heavy	31.73	2	951.066	y13	1311.818	607	1	1	40	40
Ribo4_1	P12754	13C+KR(18)	VITEFGALPPSSVPVILR_light	31.73	2	948.066	y10	1064.670	23527	1	1	35	40
Ribo4_1	P12754	13C+KR(18)	VITEFGALPPSSVPVILR_light	31.73	2	948.066	y13	1305.818	607	1	1	40	40
Ribo4_1	P38249	13C+KR(17)	LATLPAPLDLSAWDIEK_heavy	33.57	2	930.018	y13	1460.773	13005	1	1	32	35
Ribo4_1	P38249	13C+KR(17)	LATLPAPLDLSAWDIEK_heavy	33.57	2	930.018	y11	1292.684	3999	1	1	32	30
Ribo4_1	P38249	13C+KR(17)	LATLPAPLDLSAWDIEK_light	33.57	2	927.018	y13	1454.773	13005	1	1	32	35
Ribo4_1	P38249	13C+KR(17)	LATLPAPLDLSAWDIEK_light	33.57	2	927.018	y11	1286.684	3999	1	1	32	30
Ribo4_2	P32501	13C+KR(20)	CLLPLANVPLIEYTLEFLAK_heavy	16.97	3	775.107	y9	1119.600		1	1	31	40
Ribo4_2	P32501	13C+KR(20)	CLLPLANVPLIEYTLEFLAK_light	16.97	3	773.107	y9	1113.600		1	1	31	40
Ribo4_2	Q03690	13C+KR(15)	GGDEAAIAASNQDLK_heavy	20.05	2	733.365	y8	852.453	3876	1	1	23	35
Ribo4_2	Q03690	13C+KR(15)	GGDEAAIAASNQDLK_heavy	20.05	2	733.365	y7	781.414	1944	1	1	23	30
Ribo4_2	Q03690	13C+KR(15)	GGDEAAIAASNQDLK_light	20.05	2	730.365	y8	846.453	3876	1	1	23	35
Ribo4_2	Q03690	13C+KR(15)	GGDEAAIAASNQDLK_light	20.05	2	730.365	y7	775.414	1944	1	1	23	30
Ribo4_2	P39935	13C+KR(18)	SDEAEAEVEAEAGDAGTK_heavy	21.09	2	892.894	y13	1253.602	960	1	1	35	60
Ribo4_2	P39935	13C+KR(18)	SDEAEAEVEAEAGDAGTK_heavy	21.09	2	892.894	y11	1053.520	794	1	1	35	30
Ribo4_2	P39935	13C+KR(18)	SDEAEAEVEAEAGDAGTK_light	21.09	2	889.894	y13	1247.602	960	1	1	35	60
Ribo4_2	P39935	13C+KR(18)	SDEAEAEVEAEAGDAGTK_light	21.09	2	889.894	y11	1047.520	794	1	1	35	30
Ribo4_2	Q12522	13C+KR(17)	GLLVPTQTTDQELQHLR_heavy	25.92	3	652.360	y13	786.907	28790	2	1	20	25
Ribo4_2	Q12522	13C+KR(17)	GLLVPTQTTDQELQHLR_heavy	25.92	3	652.360	y14	836.442	6121	2	1	20	30
Ribo4_2	Q12522	13C+KR(17)	GLLVPTQTTDQELQHLR_light	25.92	3	650.360	y13	783.907	28790	2	1	20	25
Ribo4_2	Q12522	13C+KR(17)	GLLVPTQTTDQELQHLR_light	25.92	3	650.360	y14	833.442	6121	2	1	20	30
Ribo4_2	Q12522	13C+KR(14)	TQFENSNEIGVFSK_heavy	25.99	2	803.390	y9	980.510		1	1	30	35
Ribo4_2	Q12522	13C+KR(14)	TQFENSNEIGVFSK_light	25.99	2	800.390	y9	974.510		1	1	30	35
Ribo4_2	P12385	13C+KR(14)	VAEVAVQNFITNDK_heavy	26.14	2	777.418	y4	483.252	632	1	1	27	30
Ribo4_2	P12385	13C+KR(14)	VAEVAVQNFITNDK_heavy	26.14	2	777.418	y10	1155.614	405	1	1	27	30
Ribo4_2	P12385	13C+KR(14)	VAEVAVQNFITNDK_light	26.14	2	774.418	y4	477.252	632	1	1	27	30
Ribo4_2	P12385	13C+KR(14)	VAEVAVQNFITNDK_light	26.14	2	774.418	y10	1149.614	405	1	1	27	30
Ribo4_2	P12385	13C+KR(11)	GLILAGSADFK_heavy	26.55	2	549.319	y8	814.437	3478	1	1	19	25
Ribo4_2	P12385	13C+KR(11)	GLILAGSADFK_heavy	26.55	2	549.319	y7	701.355	1929	1	1	19	25
Ribo4_2	P12385	13C+KR(11)	GLILAGSADFK_light	26.55	2	546.319	y8	808.437	3478	1	1	19	25

Ribo4_2	P12385	13C+KR(11)	GLILAGSADFK_light	26.55	2	546.319	y7	695.355	1929	1	1	19	25
Ribo4_2	P32501	13C+KR(11)	TIEPAAFVLDK_heavy	27.76	2	605.344	y8	866.509	5544	1	1	21	30
Ribo4_2	P32501	13C+KR(11)	TIEPAAFVLDK_heavy	27.76	2	605.344	y9	995.552	4501	1	1	18	30
Ribo4_2	P32501	13C+KR(11)	TIEPAAFVLDK_light	27.76	2	602.344	y8	860.509	5544	1	1	21	30
Ribo4_2	P32501	13C+KR(11)	TIEPAAFVLDK_light	27.76	2	602.344	y9	989.552	4501	1	1	18	30
Ribo4_2	P07260	13C+KR(10)	GADIDELWLR_heavy	29.58	2	597.318	y6	837.459	8700	1	1	21	25
Ribo4_2	P07260	13C+KR(10)	GADIDELWLR_heavy	29.58	2	597.318	y5	722.430	2217	1	1	25	25
Ribo4_2	P07260	13C+KR(10)	GADIDELWLR_light	29.58	2	594.318	y6	831.459	8700	1	1	21	25
Ribo4_2	P07260	13C+KR(10)	GADIDELWLR_light	29.58	2	594.318	y5	716.430	2217	1	1	25	25
Ribo4_2	P39730	13C+KR(19)	IQLELAEQGLNSELYFQNK_heavy	29.70	2	1122.085	y11	1318.670		1	1	36	35
Ribo4_2	P39730	13C+KR(19)	IQLELAEQGLNSELYFQNK_heavy	29.70	2	1122.085	y12	1446.730		1	1	39	35
Ribo4_2	P39730	13C+KR(19)	IQLELAEQGLNSELYFQNK_light	29.70	2	1119.085	y11	1312.670		1	1	36	35
Ribo4_2	P39730	13C+KR(19)	IQLELAEQGLNSELYFQNK_light	29.70	2	1119.085	y12	1440.730		1	1	39	35
Ribo4_2	P10081	13C+KR(19)	GIDVQQVSLVINYDLPANK_heavy	30.14	2	1046.574	y4	435.267	440	1	1	43	30
Ribo4_2	P10081	13C+KR(19)	GIDVQQVSLVINYDLPANK_heavy	30.14	2	1046.574	y5	548.348	61	1	1	43	40
Ribo4_2	P10081	13C+KR(19)	GIDVQQVSLVINYDLPANK_light	30.14	2	1043.574	y4	429.267	440	1	1	43	30
Ribo4_2	P10081	13C+KR(19)	GIDVQQVSLVINYDLPANK_light	30.14	2	1043.574	y5	542.348	61	1	1	43	40
Ribo4_2	Q03690	13C+KR(17)	SVDELLTFIEGDSSNSK_heavy	32.54	2	923.956	y10	1089.520	1823	1	1	32	30
Ribo4_2	Q03690	13C+KR(17)	SVDELLTFIEGDSSNSK_heavy	32.54	2	923.956	y7	700.322	1778	1	1	32	40
Ribo4_2	Q03690	13C+KR(17)	SVDELLTFIEGDSSNSK_light	32.54	2	920.956	y10	1083.520	1823	1	1	32	30
Ribo4_2	Q03690	13C+KR(17)	SVDELLTFIEGDSSNSK_light	32.54	2	920.956	y7	694.322	1778	1	1	32	40
Ribo4_2	P39935	13C+KR(23)	DATPIEDVFSFNYPEGIEGPDIK_heavy	33.35	2	1280.117	y10	1060.567	1369	1	1	44	40
Ribo4_2	P39935	13C+KR(23)	DATPIEDVFSFNYPEGIEGPDIK_heavy	33.35	2	1280.117	y12	1337.639	949	1	1	41	40
Ribo4_2	P39935	13C+KR(23)	DATPIEDVFSFNYPEGIEGPDIK_light	33.35	2	1277.117	y10	1054.567	1369	1	1	44	40
Ribo4_2	P39935	13C+KR(23)	DATPIEDVFSFNYPEGIEGPDIK_light	33.35	2	1277.117	y12	1331.639	949	1	1	41	40
Ribo4_2	P39730	13C+KR(20)	GVVVQASTLGSLEALLDFLK_heavy	39.13	2	1033.597	y13	1425.830		1	1	38	35
Ribo4_2	P39730	13C+KR(20)	GVVVQASTLGSLEALLDFLK_heavy	39.13	2	1033.597	y14	1512.860		1	1	36	35
Ribo4_2	P39730	13C+KR(20)	GVVVQASTLGSLEALLDFLK_light	39.13	2	1030.597	y13	1419.830		1	1	38	35
Ribo4_2	P39730	13C+KR(20)	GVVVQASTLGSLEALLDFLK_light	39.13	2	1030.597	y14	1506.860		1	1	36	35

Translation Factor	Entry name	Acc	Biological replicates	Average (cpc)	unique peptides	Abundance (cpc)	SEM
Initiation factor eIF1	SUI1_YEAST	P32911	Log_1	32,520	2	eEF2 average: 34,000	2,000
			Log_2	37,345	2		
			Log_3	30,792	2		
Initiation factor eIF1A	IF1A_YEAST	P38912	Log_1	48,266	1	eIF1A average: 57,000	5,500
			Log_2	67,203	1		
			Log_3	56,132	1		
Initiation factor eIF2α	IF2A_YEAST	P20459	Log_1	6,133	1	eIF2 complex average of β and γ: 29,000	2,100
			Log_2	8,215	1		
			Log_3	8,306	1		
Initiation factor eIF2β	IF2B_YEAST	P09064	Log_1	20,690	1		
			Log_2	32,910	1		
			Log_3	27,986	1		
Initiation factor eIF2γ	IF2G_YEAST	P32481	Log_1	32,844	3		
			Log_2	27,657	3		
			Log_3	31,588	3		
Initiation factor eIF2Bα	eI2BA_YEAST	P14741	Q-peptides not suitable for quantification			eIF2B complex average of β to ε: 5,600	150
Initiation factor eIF2Bβ	eI2BB_YEAST	P32502	Log_1	5,394	2		
			Log_2	6,199	2		
			Log_3	5,521	2		
Initiation factor eIF2Bδ	eI2BD_YEAST	P12754	Log_1	4,079	1		
			Log_2	5,267	1		
			Log_3	5,257	1		
Initiation factor eIF2Bε	eI2BE_YEAST	P32501	Log_1	5,057	3		
			Log_2	6,049	3		
			Log_3	6,010	3		
Initiation factor eIF2Bγ	eI2BG_YEAST	P09032	Log_1	6,042	3		
			Log_2	6,533	3		
			Log_3	6,035	3		
Initiation factor eIF3a	eIF3A_YEAST	P38249	Log_1	22,254	2	eIF3 complex average of a to g: 23,000	1,200
			Log_2	31,602	2		
			Log_3	28,704	2		
Initiation factor eIF3b	eIF3B_YEAST	P06103	Log_1	22,199	2		
			Log_2	19,081	3		
			Log_3	20,626	3		
Initiation factor eIF3c	eIF3C_YEAST	P32497	Log_1	21,041	1		
			Log_2	17,807	1		
			Log_3	24,582	1		
Initiation factor eIF3g	eIF3G_YEAST	Q04067	Log_1	20,827	3		
			Log_2	26,496	3		
			Log_3	19,430	3		
Initiation factor	eIF3I_YEAST	P40217	Log_1	14,669	4		

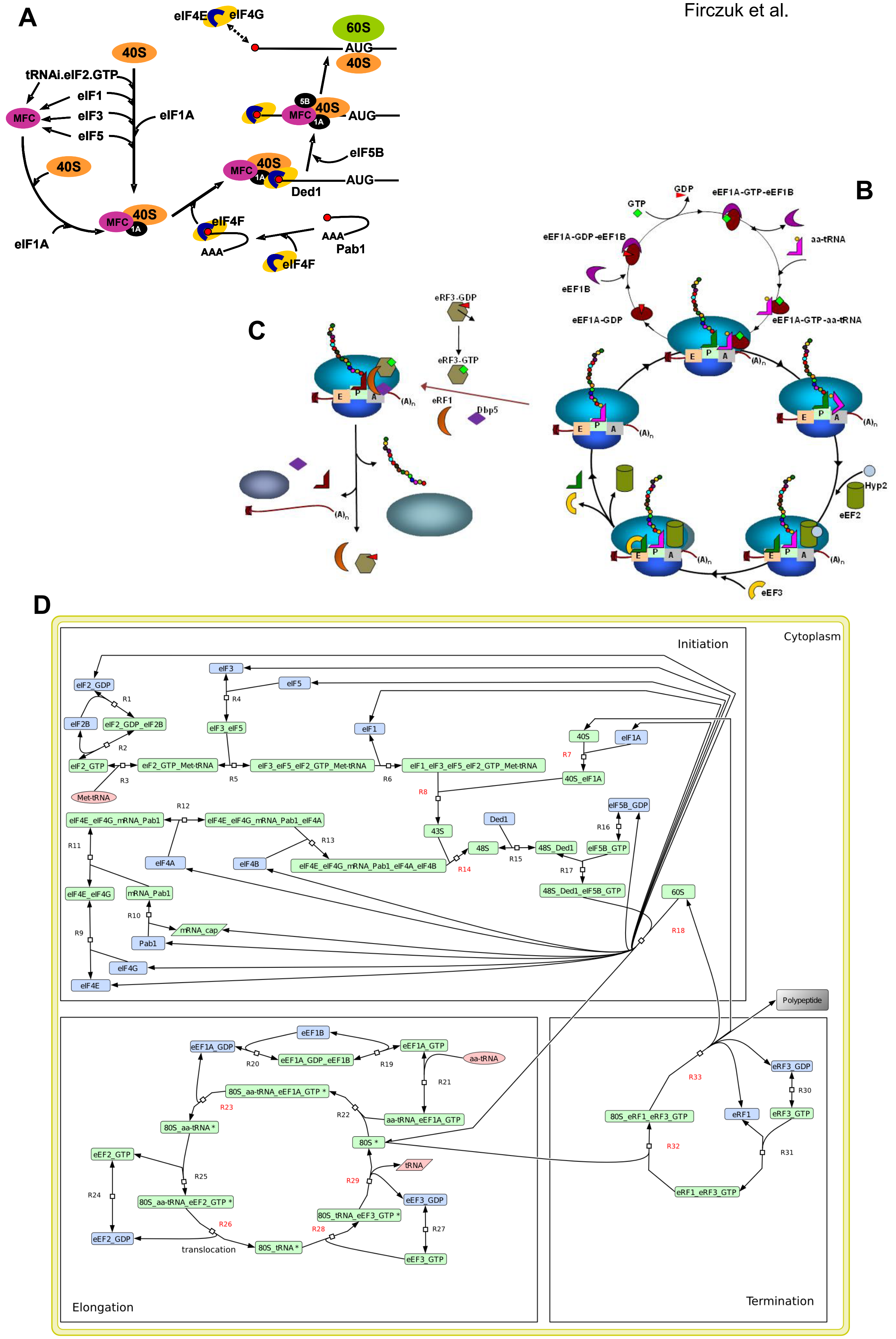
eIF3i			**Log_2**	**17,205**	**4**		
			Log_3	**15,814**	**4**		
Initiation factor eIF4A	**IF4A_YEAST**	**P10081**	**Log_1**	**216,063**	**2**	**eIF4A average: 240,000**	**16,000**
			Log_2	**269,617**	**2**		
			Log_3	**234,767**	**3**		
Initiation factor eIF4B	**IF4B_YEAST**	**P34167**	**Log_1**	**27,655**	**3**	**eIF4B average: 28,000**	**1,400**
			Log_2	**30,976**	**3**		
			Log_3	**26,395**	**2**		
Initiation factor eIF4E	**IF4E_YEAST**	**P07260**	**Log_1**	**69,749**	**3**	**eIF4E average: 80,000**	**5,700**
			Log_2	**90,794**	**3**		
			Log_3	**80,292**	**3**		
Initiation factor eIF4G2	**IF4F2_YEAST**	**P39936**	**Log_1**	**2,338**	**2**	**total eIF4G = 22,000**	**2,700**
			Log_2	**1,975**	**2**		
			Log_3	**2,092**	**1**		
Initiation factor eIF4G1	**IF4F1_YEAST**	**P39935**	**Log_1**	**15,095**	**2**		
			Log_2	**24,323**	**2**		
			Log_3	**20,416**	**2**		
Initiation factor eIF5	**IF5_YEAST**	**P38431**	**Log_1**	**18,246**	**2**	**eIF5 average: 20,000**	**2,000**
			Log_2	**24,357**	**2**		
			Log_3	**18,358**	**2**		
Hyp2	**IF5A2_YEAST**	**P23301**	**Log_1**	**454,271**	**1**	**Hyp2 average: 410,000**	**64,000**
			Log_2	**526,435**	**1**		
			Log_3	**444,213**	**1**		
Initiation factor eIF5B	**IF2P_YEAST**	**P39730**	**Log_1**	**6,066**	**1**	**eIF5B average: 4,800**	**900**
			Log_2	**3,119**	**1**		
			Log_3	**5,135**	**1**		
Elongation factor eEF1A	**EF1A_YEAST**	**P02994**	**Log_1**	**1,036,757**	**1**	**eEF1A average: 1,000,000**	**32,000**
			Log_2	**1,102,238**	**1**		
			Log_3	**991,534**	**1**		
Elongation factor eEF1B	**EF1B_YEAST**	**P32471**	**Label free quantification (MS^E)**			**79,000**	**1,000**
Elongation factor eEF2	**EF2_YEAST**	**P32324**	**Log_1**	**141,480**	**2**	**eEF2 average: 140,000**	**3,900**
			Log_2	**148,778**	**2**		
			Log_3	**135,308**	**2**		
Elongation factor eEF3	**EF3A_YEAST**	**P16521**	**Label free quantification (MS^E)**			**110,000**	**3,500**
Termination factor eRF1	**ERF1_YEAST**	**P12385**	**Log_1**	**23,081**	**2**	**eRF1 average: 22,000**	**1,700**
			Log_2	**19,244**	**1**		
			Log_3	**24,881**	**2**		
Termination factor eRF3	**ERF3_YEAST**	**P05453**	**Log_1**	**14,935**	**1**	**eRF3 average: 14,000**	**400**
			Log_2	**13,893**	**1**		
			Log_3	**13,738**	**1**		
Dbp5	**DBP5_YEAST**	**P20449**	**Label free quantification (MS^E)**			**15,000**	**800**
Ded1	**DED1_YEAST**	**P06634**	**Label free quantification (MS^E)**			**28,000**	**500**

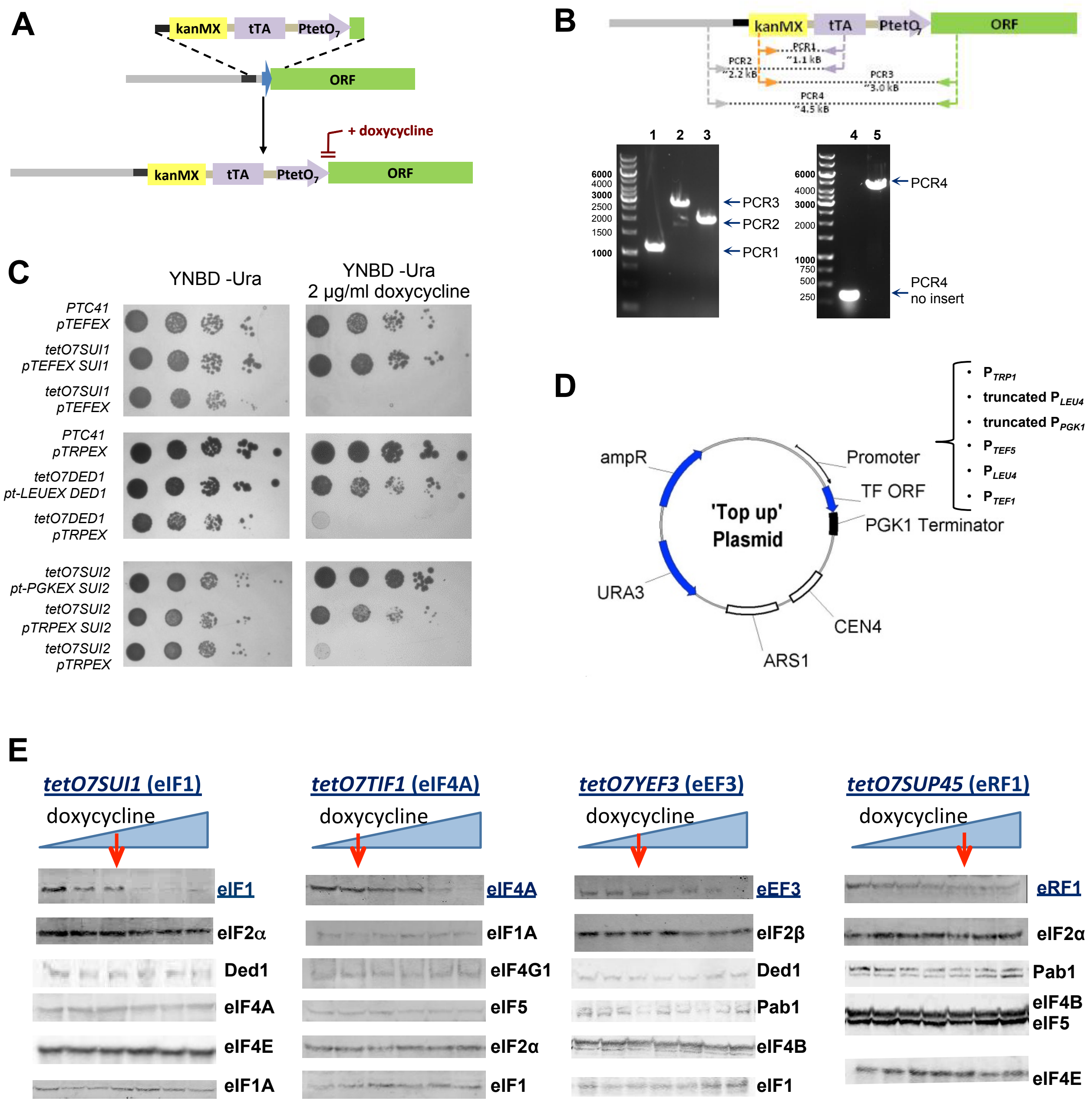
Pab1	**PABP_YEAST**	**P04147**	**Label free quantification (MS^E)**	**44,000**	**1,700**

Supplementary Table VI
Abundance values for translation factors

Summary of the proteins quantitated and the quantitation method used. Proteins of interest in three biological replicates of exponentially growing yeast (Log_1 to _3) were quantitated using QconCAT Q-peptides, selected to represent each protein. Individual abundance values (in copies per cell, cpc) for the biological replicates contain data from multiple analyses, in some instances using two different MS platforms (Waters Xevo triple quadrupole and Thermo LTQ-Orbitrap Velos) for the number of Q-peptides stated (see Supplementary Figure VII for correlation between the two MS instruments used). Errors define biological not technical variance (see Supplementary Figure VII for technical variation). Label-free quantitation data were obtained from data-independent MSE acquisition on a Waters Synapt G2, using four biological replicates of comparable yeast (data provided by P. Brownridge).

Supplementary Figure 1
Firczuk et al.





F

		Relative abundance (% of WT)									
		eIF2α	eIF4A	eIF4E	eIF4G1	eEF1A	eEF1B	eEF2	eEF3	eRF1	Dbp5
Factor under *tet07* control	eIF2α	54	102	98	101	104	102	103	94	105	90
	eIF4A	109	62	103	105	104	98	101	101	99	97
	eIF4E	106	101	48	94	103	107	100	100	104	92
	eIF4G1	102	100	104	63	98	99	98	104	98	101
	eEF1A	110	104	102	102	71	102	106	106	103	96
	eEF1B	109	101	108	106	101	30	113	104	96	102
	eEF2	100	101	105	102	106	81	29	101	106	107
	eEF3	100	99	103	97	98	92	115	68	109	101
	eRF1	104	99	99	101	98	98	102	104	57	101
	Dbp5	101	95	103	99	102	91	91	104	95	37

Supplementary Figure 2
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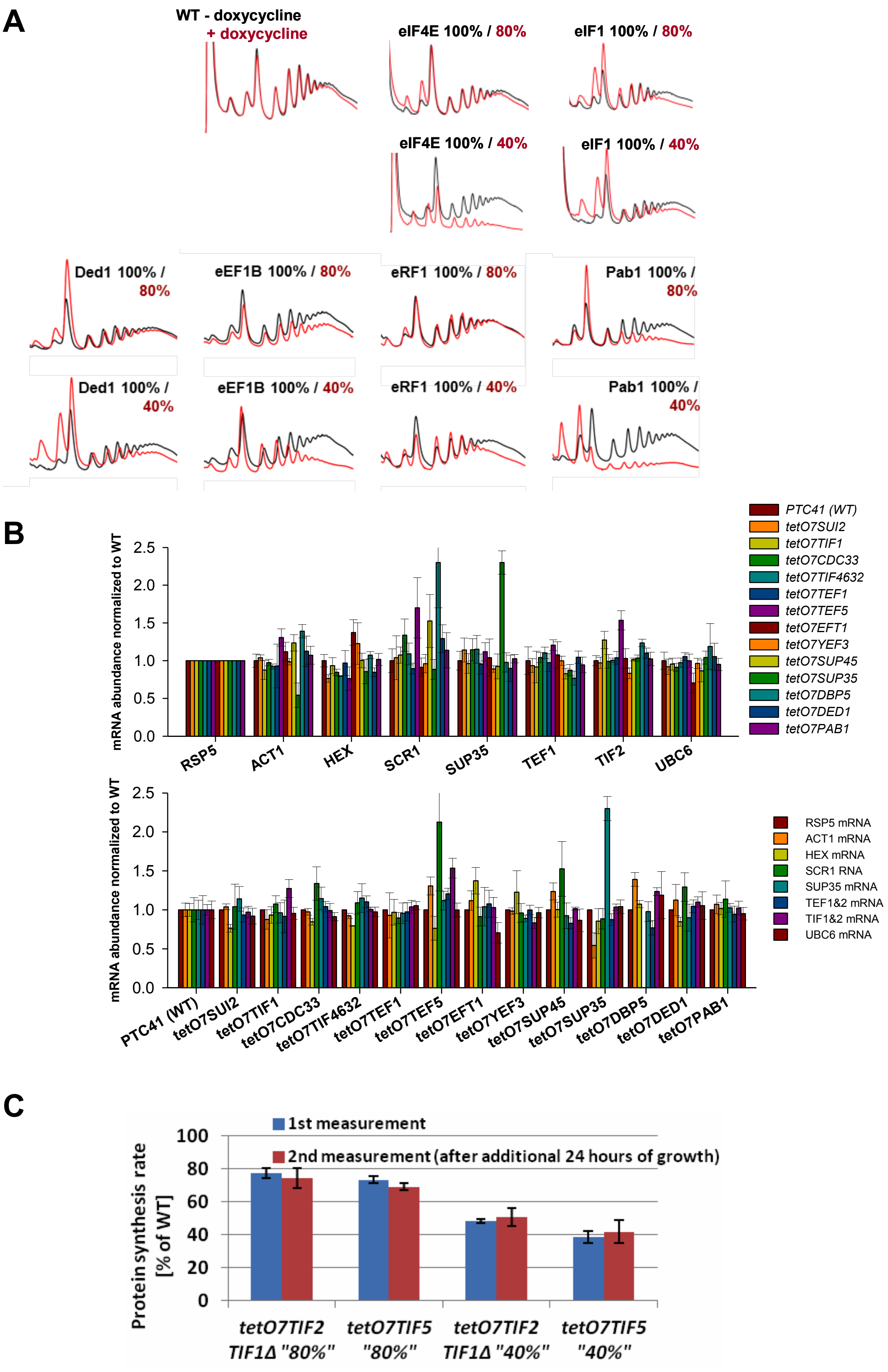

Supplementary Figure 3
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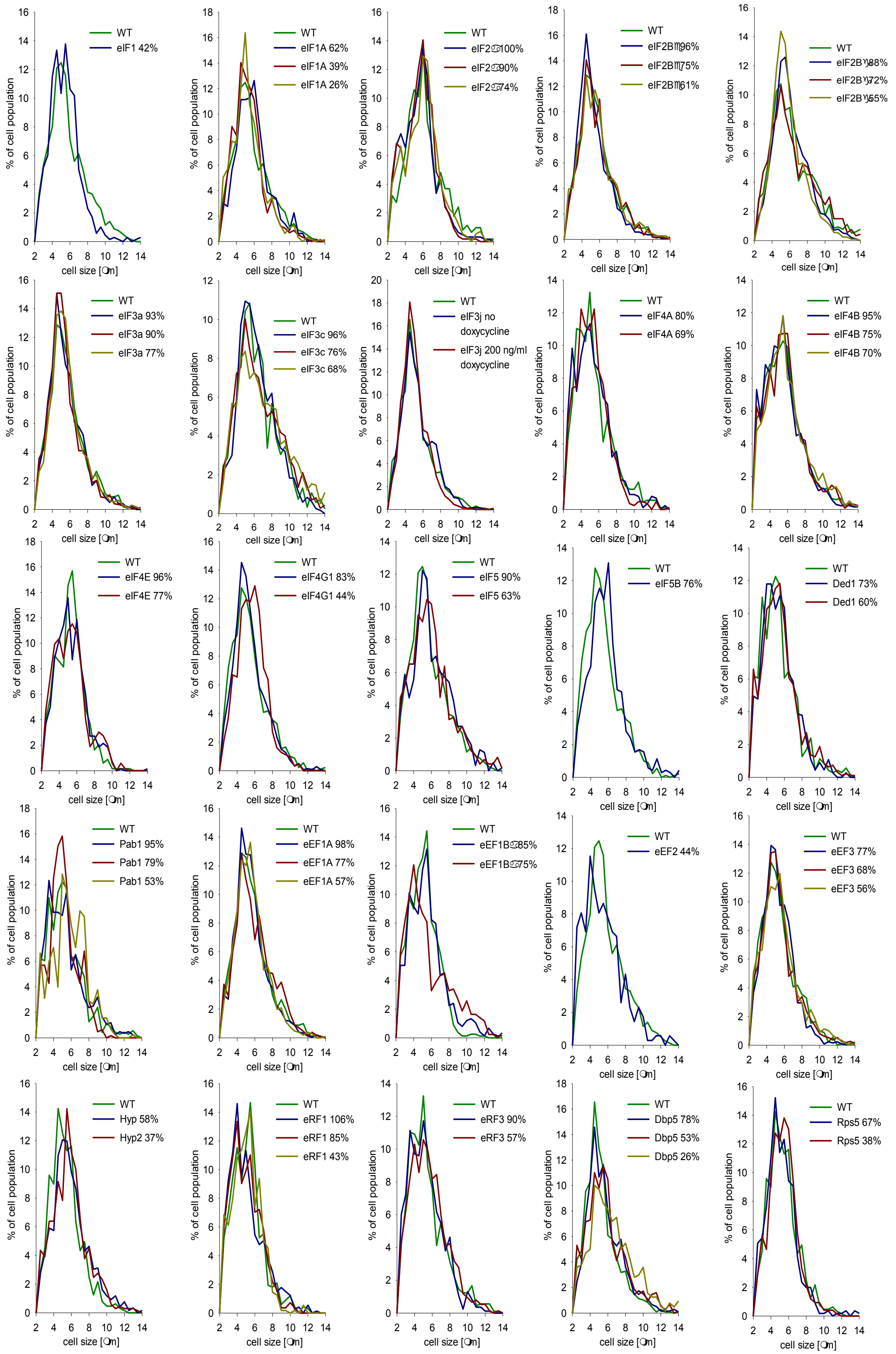

Supplementary Figure 4
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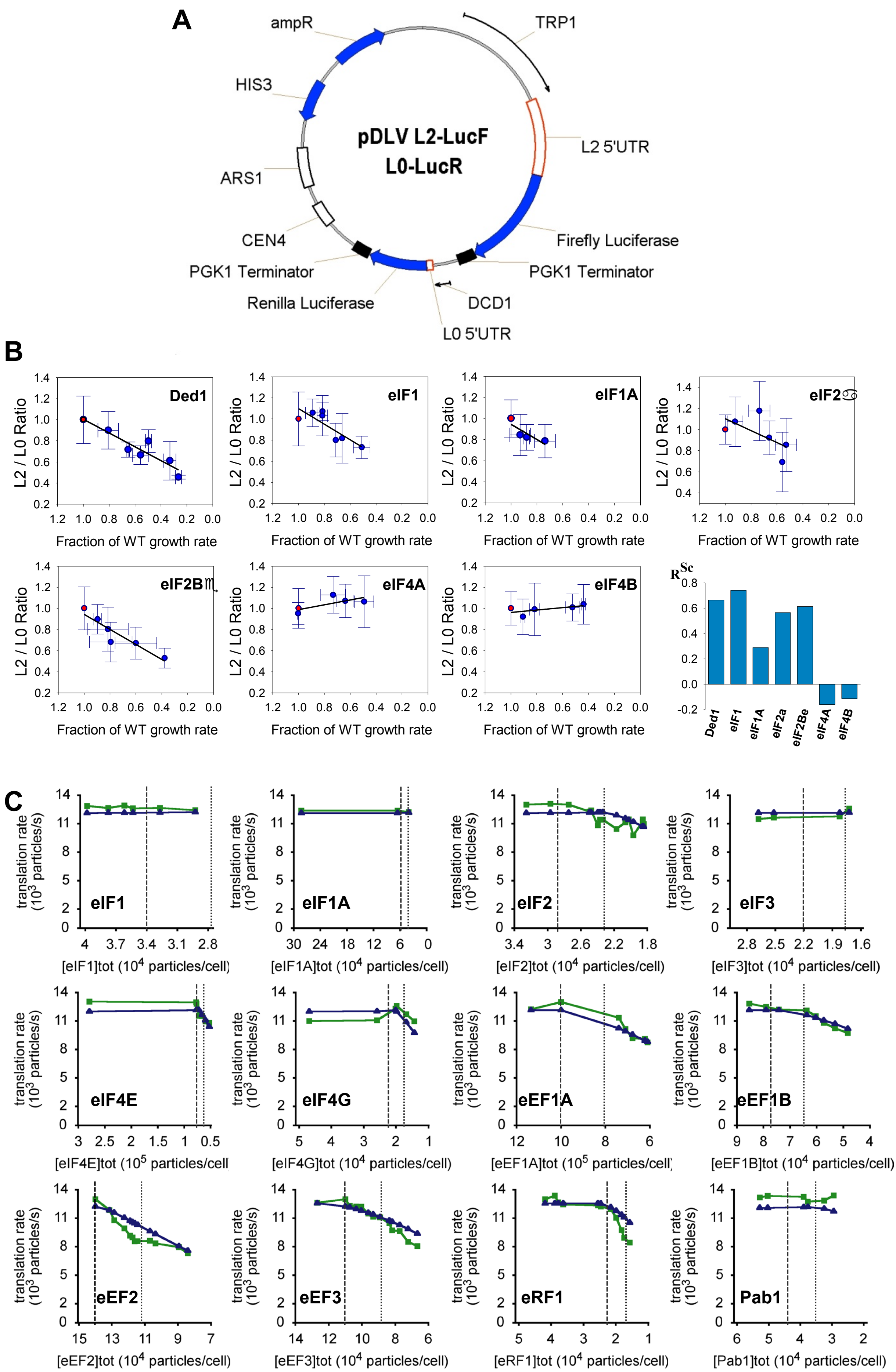
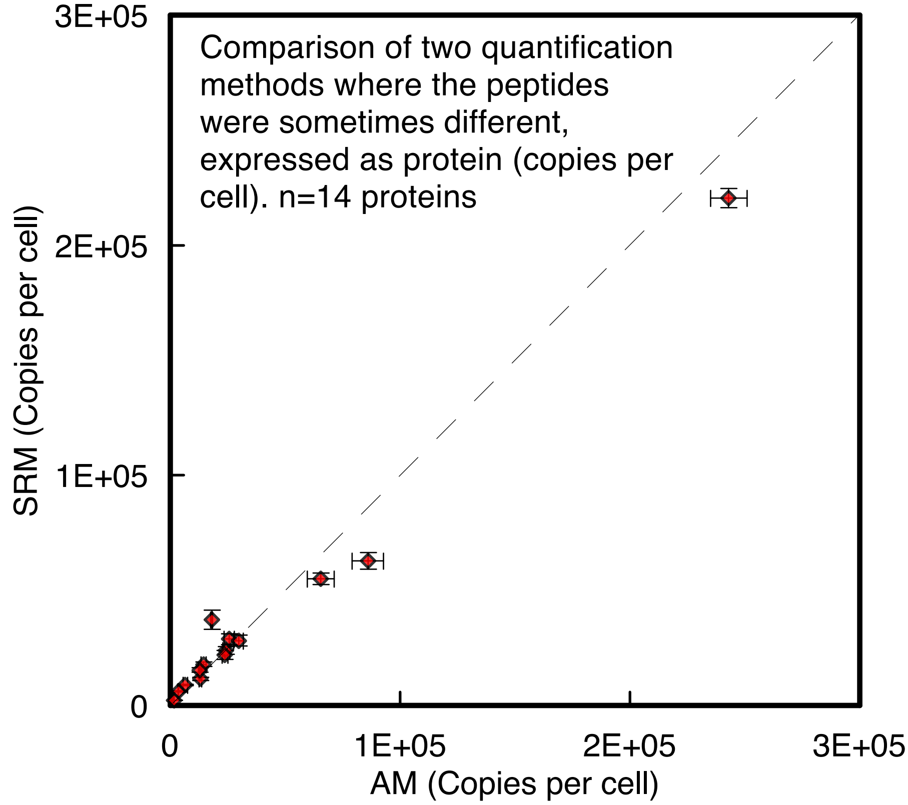
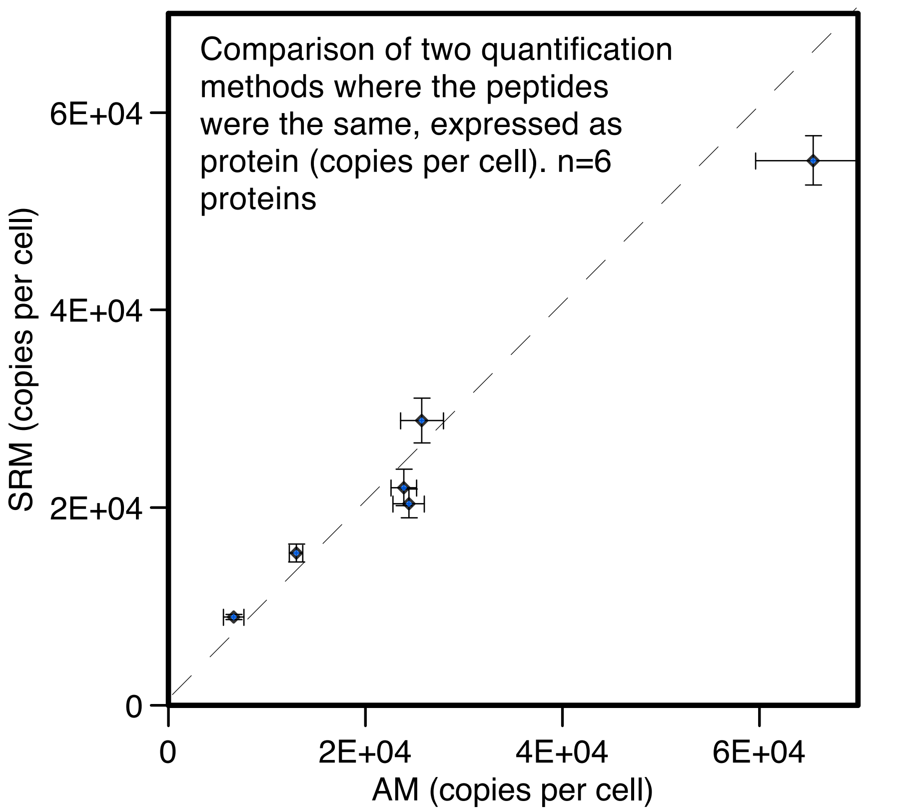


Supplementary Figure 5
Firczuk et al.


Comparison of two quantification methods where the peptides were sometimes different, expressed as protein (copies per cell). n=14 proteins
SRM (Copies per cell)
AM (Copies per cell)
0
1E+05
2E+05
3E+05


Comparison of two quantification methods where the peptides were the same, expressed as protein (copies per cell). n=6 proteins
SRM (copies per cell)
AM (copies per cell)
0
2E+04
4E+04
6E+04

Supplementary Figure 1. Schematic representation of the initiation (*A*), elongation (*B*) and termination (*C*) phases of translation. Panel *D* shows the overall reaction scheme used in the computational model. In order to keep the demand for computational capacity to a reasonable level, it was assumed that elongation cycled through a twenty-codon open reading frame. The full set of model equations are given elsewhere in the Supplementary Information section.

Supplementary Figure 2. Construction and analysis of *tet07* chromosomal integration strains. (*A*) Scheme for integration of the *tet07* regulatory cassette 5' of each translation factor gene. (*B*) Illustration of the method for PCR validation of the chromosomal integrations. The schematic diagram indicates which PCR products are expected from a successful integration experiment, while the stained agarose gels confirm that the expected bands are indeed generated from total genomic DNA, in this case from the *tet07 SUI1* strain. (*C*) Complementation of *tet07* phenotypes was used to confirm correct integration into the chromosome. Three examples are shown: in each case the slow-growth phenotype in the *tet07* strain was fully complemented by transformation using a plasmid bearing the corresponding gene transcribed from a constitutive promoter – this was one of the 'top-up' plasmids referred to in the main text and illustrated in panel *D*. No complementation was observed if an empty 'top-up' plasmid was used. (*D*) Six different promoters were used in the respective versions of the 'top-up' plasmid – these were engineered to provide a wide spread of transcription rates. (*E*) Examples of doxycycline titrations of the intracellular abundance of translation factors under the control of the *tet07* regulatory system. The Western blots reveal how the intracellular abundance of each translation factor encoded by its corresponding *tet07* regulatory system (underlined) was suppressed to varying degrees in response to the presence of different amounts of doxycycline. The vertical red arrows indicate at which point global protein synthesis was nearest to being 80% of the physiological rate. Other factor levels in each strain (i.e. those not under the control of the *tet07* regulatory system) were not detectably affected by the presence of doxycycline. Quantitation was normalized against hexokinase. (*F*) Table showing the relative abundance of translation factors in ten different *tet07* strains (those manifesting $R_1^J > 0$) as determined by calibrated Western blotting. In all cases, data are shown for experiments where the protein synthesis rate had been suppressed to below 80% of the physiological level.

Supplementary Figure 3. Rate control data for the translation factors. (*A*) Sucrose density-gradient analysis reveals changes in the ribosome loading distributions on yeast mRNA. These examples include a wild-type control (lacking any chromosomal *tet07* construct; without doxycycline and plus 8μg ml^{-1} doxycycline, i.e. higher than used with any of the *tet07* strains), and data for the *tet07CDC33* (eIF4E), *tet07SUI1* (eIF1), *tet07DED1* (Ded1), *tet07TEF5* (eEF1B), *tet07SUP45* (eRF1), and *tet07PAB1* (Pab1) strains (Table S1). (*B*) Intracellular mRNA abundance data [ordered along the X-axis according to mRNA species (top) and strain (bottom)] as estimated using RT-qPCR and expressed as a fraction of *RPS5* mRNA, averaged for at least 4 biological replicates and, for ease of comparison, normalized against the wild-type level. The error bars represent standard deviations. In the *tet07SUP35* strain, transcription of *SUP35* is higher than in the wild-type strain. (*C*) Comparison of suppression of protein synthesis in the strains *tet07TIF2* (eIF4A) and *tet07TIF5* (eIF5) after incubation with doxycycline for the period used in experimental work described in this paper and also after an additional 24 hours. The degree of inhibition is stably maintained and there is no sign of any compensatory mutations. This is consistent with our finding that up-regulation of the activity of individual factors does not generally lead to increases in global translation.

Supplementary Figure 4. Analysis of cell-size distributions. Histograms of cell size – each plot shows the distribution of cell diameters across a population of cells from each strain at the stated concentrations of doxycycline. Labelling of the colour-coded plots indicates to what degree the growth of each cell population was inhibited (as a percentage of the wild-type growth rate).

Supplementary Figure 5. Determination of the scanning ratio for the translation factors. (*A*) The scanning ratio assay plasmid. This contains two independent promoters (P_{TRP1} and P_{DCD1}) of comparable strength coupled to a short (L0; 65 nucleotides) and a long (L2; 1240 nucleotides) 5'UTR (Berthelot at al. 2004). Expression from the two promoter/5'UTR combinations was measured via the activities of the firefly and renilla luciferase reporters, respectively. (*B*) Plots of the L2/L0 ratio versus growth rate. The bar graph summarizes the R^{Sc} values for those factors where R^{Sc} is not zero. While most *tet07* strains showed no change in the L2/L0 ratio as a function of modulation of intracellular factor abundance, five strains manifested a positive dependence of this ratio on factor abundance. Most other strains showed a slope of zero (data not shown), and a small number manifested a small negative value for R^{Sc} (two examples are shown here: eIF4A and eIF4B). The negative slopes were small relative to the error estimates, and we therefore counted these results and the zero slope results as 'no change' (see Table 1). Since negative values for R^{Sc} would indicate a lack of enhancement of scanning by the factor under study, this mode of categorization is consistent with our procedure for identifying factors that stabilize scanning on longer 5'UTRs. The red point, set at 1.0 in each case, is the ratio observed for the wild type strain in which the addition of doxycycline does not affect the abundance of any of the translation factors. (*C*) Outputs from the computational model. The *in silico* translation machinery manifests properties that closely resemble those of the *in vivo* system. Here we see the relationship between global protein synthesis rate and the intracellular abundance of each factor. Each plot features the experimental data (green; rate of global protein synthesis vs molecules of translation factor per cell) compared to the predicted relationship from the model (blue). The vertical lines indicate the points on the x-axis (intracellular abundance in molecules per cell) at the 100% physiological level (dashed) and at the 80% level (dotted).

Berthelot K, Muldoon M, Rajkowitsch L, Hughes J, McCarthy JEG (2004) Dynamics and processivity of 40S ribosome scanning on mRNA in yeast. *Mol. Microbiol.* **51:** 987–1001

Supplementary Figure 6. Comparison of Accurate Mass (AM) and Selected Reaction Monitoring (SRM) quantitation. Some proteins in the study were quantified by both AM and SRM approaches (see Materials and Methods section). For these proteins, the quantitation values were compared either for all peptides (top panel) or using the same peptide for each protein (lower panel).