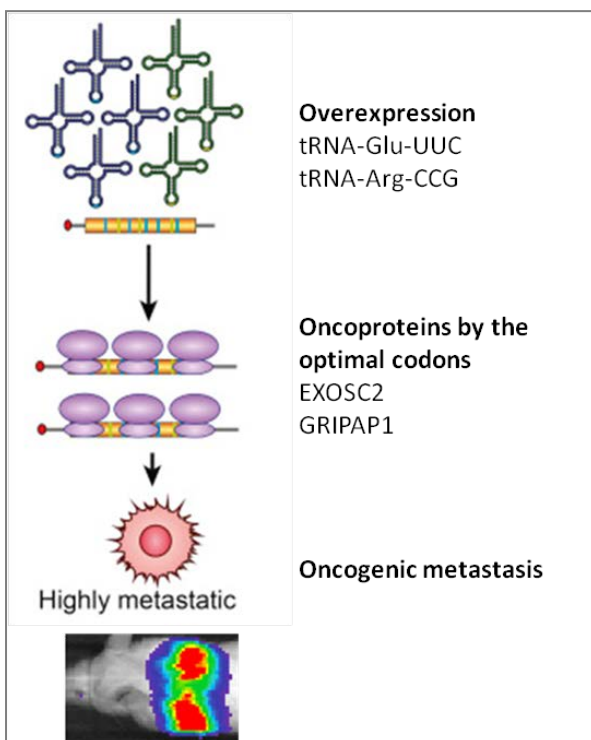


Supplemental Figure 1. (A) An optimal codon is when the cognate tRNA supply is greater than the protein translation demand. A non-optimal codon is when the cognate tRNA supply is short of the demand or when near-cognate tRNAs are used. **(B)** Optimal codons favor faster translation speed and higher decoding accuracy. Non-optimal codons are much slower in translation but favor accurate protein folding, which tend to occur in inter-domain linker regions of the encoded proteins. **(C)** Optimal codons at faster translation elongation speed protect the mRNA from decay. Slow non-optimal codons expose the mRNA for degradation and shorten the mRNA half-lives.



Supplemental Figure 2. Overexpression of tRNA-Glu-UUC and tRNA-Arg-CCG is sufficient to drive oncogenic metastasis with their optimal codons up-regulating oncoprotein EXOSC2 and GRIPAP1 translation. [6].