Translational Termination

- Stop Codons defined by suppressors
- Release Factors
- Ribosomal Recycling Factors
- Stop codons and the 21st amino acid

Termination Codons

- Three codons are the natural stop signals at the ends of coding regions in mRNA
  - UAG
  - UAA
  - UGA
- Mutations can create termination codons within an mRNA causing premature termination of translation
  - Amber mutation creates UAG
  - Ochre mutation creates UAA
  - Opal mutation creates UGA
Amber Mutation Effects in a Fused Gene

- Most suppressor tRNAs have altered anticodons:
  - Recognize stop codons
  - Prevent termination by inserting an amino acid
  - Allow ribosome to move on to the next codon

Stop Codon Suppression
Termination Mutations

- Amber mutations are caused by mutagens that give rise to missense mutations
- Ochre and opal mutations do not respond to the same suppressors as do the amber mutations
  - Ochre mutations have their own suppressors
  - Opal mutations also have unique suppressors

Capecchi Assay for RF

Prokaryotic translation termination is mediated by 3 factors:
- RF1 recognizes UAA and UAG
- RF2 recognizes UAA and UGA
- RF3 is a GTP-binding protein
  - facilitating binding of RF1 and RF2 to the ribosome

Eukaryotes has 2 release factors:
- eRF1 recognizes all 3 termination codons
- eRF3 is a ribosome-dependent GTPase helping eRF1 release

(a) Ribosomes + amino acids (—threonine)
(b) Isolate complex, incubate with EF-Tu and [35S]Thr-tRNA
(c) Add supernatant fraction
Release Factors

- Prokaryotic translation termination is mediated by 3 factors:
  - RF1 recognizes UAA and UAG
  - RF2 recognizes UAA and UGA
  - RF3 is a GTP-binding protein facilitating binding of RF1 and RF2 to the ribosome

- Eukaryotes has 2 release factors:
  - eRF1 recognizes all 3 termination codons
  - eRF3 is a ribosome-dependent GTPase helping eRF1 release the finished polypeptide

eRF1 Molecular Mimicry

Ribosome Recycling Factor

(a) 

(b) 

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Ribosome Recycling

Kiel et al. 2003

Inge-Vechtomova et al. 2003
Selenocysteine

Features of Selenocysteine Proteins
1. SelenoCysteine Insertion Sequence in 3'UTR
2. UGA Stop Codon within open reading frame

Insertion of Selenocysteine

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