

## MCDB 3500 Lecture 19 3/11/02

Figures: 3.1, 3.2, 3.3, 3.15, 3.16, 3.17, 3.18, 17.1, 17.2, 17.7, 17.9, 17.11, 17.13, 17.19, 17.20, 17.25, 17.28, 17.33  
(1<sup>st</sup> Ed.: 3.1, 3.2, 3.3, 3.15, 3.16, 3.17, 3.18, 17.1, 17.2, 17.7, 17.9, 17.11, 17.13, 17.19, 17.20, 17.25, 17.28, 17.33)

### Prokaryotic translational initiation

tRNA Charging at the CCA-3' end

by Aminoacyl-tRNA synthetase (Fig. 17.2)  
20 synthetases for 20 aa  
--Highly specific

#### 1. Dissociation of Ribosomes

$30S + 50S = 70S$

IF-1 --promotes dissociation  
IF-3 -- binds to free 30S and block re-association

#### 2. Formation of 30S Initiation Complex

Onto the 30S ribosomal subunit, add

-initiation factors  
-N-formyl-methionine or fMet- tRNA<sub>f</sub><sup>Met</sup> (by IF-2)  
-mRNA (by IF-3) through Shine-Dalgarno (SD) seq.

tRNA<sub>f</sub><sup>Met</sup> recognizes AUG, GUG, UUG  
tRNA<sub>m</sub><sup>Met</sup> recognizes only AUG

#### 3. Formation of 70S Initiation Complex

Load 50S ribosomal subunit

-IF-1 and IF-3 dissociate.  
-Hydrolysis of GTP when IF-2 leaves.

## Eukaryotic Translational Initiation

-40S + 60S = 80S

-Begins with Methionine, not fMet.

-Initiating tRNA is still different, called tRNA<sub>i</sub><sup>Met</sup>

-No Shine-Dalgarno sequence.

-5' end of the mRNA is capped.

### Scanning model of initiation

Finds caps first and scan for the initiation sequence.

Kozak sequence: CCRCCAAUGG

ORF: Open reading frame.

### Initiation Factors

**eIF-2:** Like IF-2, recruits Met-tRNA<sub>i</sub><sup>Met</sup>

**eIF-3:** keeps ribosome from reassociating (on 40S)

**eIF-6:** keeps ribosome subunits apart (on 60S)

**eIF-1:** involved in many steps of initiation

**eIF-5:** promotes reassociation of the ribosomal units

eIF-4: eIF-4F

eIF-4E: cap binding activity

eIF-4A: stabilizes 4E, DEAD box protein

Helicase activity (req. ATP)

eIF-4G: RNA binding protein.

Promotes binding of 4A to mRNA.