CONCEPT: REVIEW OF PROKARYOTIC VS EUKARYOTIC GENE EXPRESSION

●Prokaryotic & eukaryotic gene expression differs significantly in both transcription & translation:

Prokaryotic vs. Eukaryotic Gene Expression		
Characteristic	**Prokaryotic**	**Eukaryotic**
Requirements for Transcription Initiation	_____ factors	_____ factors
Ribosome Size	_____S (30S + 50S Subunits)	_____S (40S + 60S Subunits)
Location of Transcription & Translation	Transcription: _____ Translation: _____	Transcription: _____ Translation: _____
Simultaneous Transcription & Translation?	_____	_____
Requires mRNA Processing?	_____	_____
Introns & Exons?	_____	_____
Mono- vs. Poly-cistronic	BOTH mono & polycistronic	Only _____-cistronic

PRACTICE: Which of the following statements about gene expression is FALSE?

a) More than one RNA polymerase can be transcribing a specific gene at a given time.
b) Transcription begins at a DNA site called a promoter.
c) Transcription factors are required for transcription initiation in eukaryotes.
d) More than one ribosome can be translating a specific mRNA at a given time in prokaryotes.
e) A stop codon in the mRNA signals the end of translation.

PRACTICE: Which of the following statements concerning transcription in bacteria is FALSE:

a) There are a variety of sigma factors that affect transcription.
b) Sigma factors are parts of RNA polymerase that recognize promoter regions.
c) It occurs in the nucleus.
d) Termination occurs when a stem-loop is formed or due to the presence of Rho protein.
e) The prokaryotic mRNA does not include introns & does not need to be processed.

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PRACTICE: All the following are involved in prokaryotic transcription but:

a) RNA polymerase.
b) Transcription factors.
c) A Rho protein.
d) A promoter.
e) A sigma factor.

PRACTICE: Which of these answers are major differences between eukaryotes and prokaryotes in gene expression?

a) Eukaryotes have monocistronic mRNA while prokaryotes can have polycistronic mRNA.
b) Eukaryotic transcription occurs in the nucleus, while prokaryotic transcription occurs in the cytoplasm.
c) Eukaryotes use transcription factor proteins in transcription, while prokaryotes use sigma factors.
d) Simultaneous transcription and translation occur in prokaryotes but not eukaryotes.
e) All of the above are major differences between eukaryotic and prokaryotic transcription.

PRACTICE: Why can prokaryotes perform transcription and translation simultaneously while eukaryotes cannot?

a) Because in prokaryotes, transcription and translation both occur in the cytoplasm.
b) Because in eukaryotes, transcription and translation do not occur in the same location within the cell.
c) Because prokaryotes have polycistronic mRNA while eukaryotes have monocistronic mRNA.
d) Because prokaryotes use sigma factors while eukaryotes use transcription factors.
e) A and B.
f) B and C.
g) C and D.