

DNA FUNCTION WEBINAR

TUESDAY | MARCH 8 6:30 - 8 PM CST

PRESENTER:

TIM HERMAN, PhD

MSOE Center for BioMolecular Modeling &
3D Molecular Designs

The Importance of Being Modified!

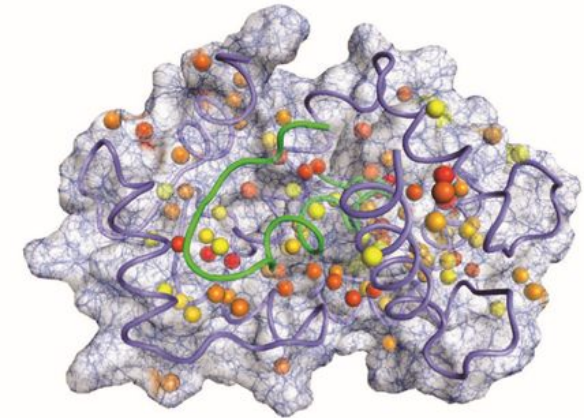


**MODELING
MARVELS**
2022 EDUCATORS WEBINARS

Its not just A's and T's and G' and C's....

Life as we know it only works because of many critical modifications of our 4 (5) nucleotides.

We will consider several of these modifications here....

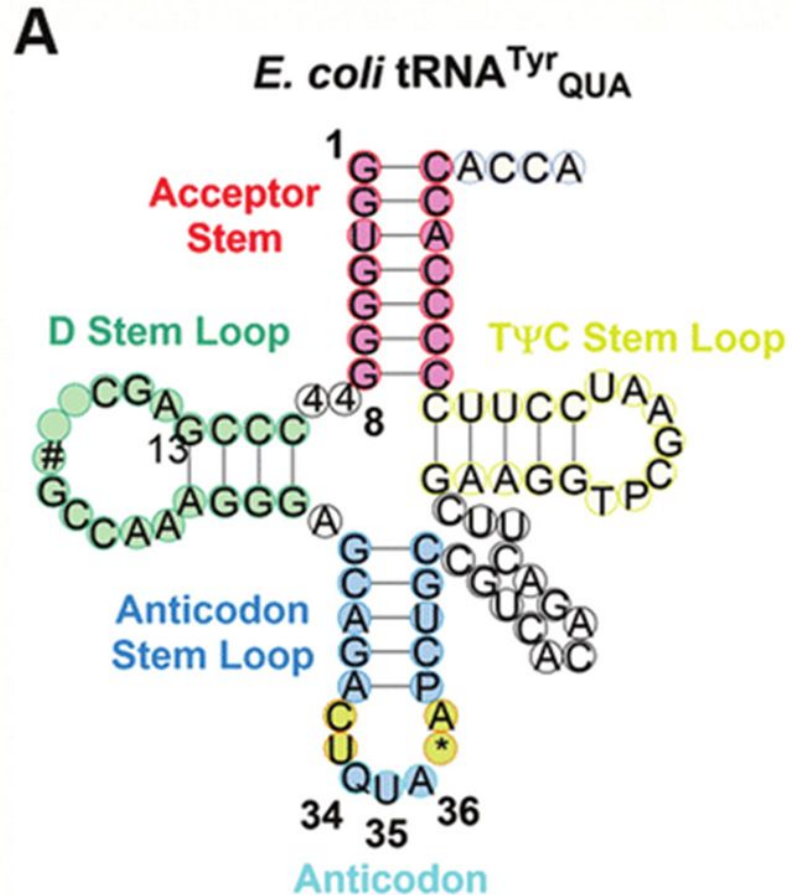


*Life is
Complicated*
Let's deal with it. . .

Four Base Modifications... *that make life even more interesting.*

- **tRNA Modifications... pseudouridine**
- **5' Cap on mRNA**
- **Epigenetics... methylation of CpGs**
- **mRNA vaccines**

tRNA Modifications



Legend of tRNA modifications:

T: m5U

P: pseudouridine

Q: queosine

D: dihydrouridine

4: s4U

7: m7G

\: m5Um

#: Gm

*: ms2i6A



WHY?

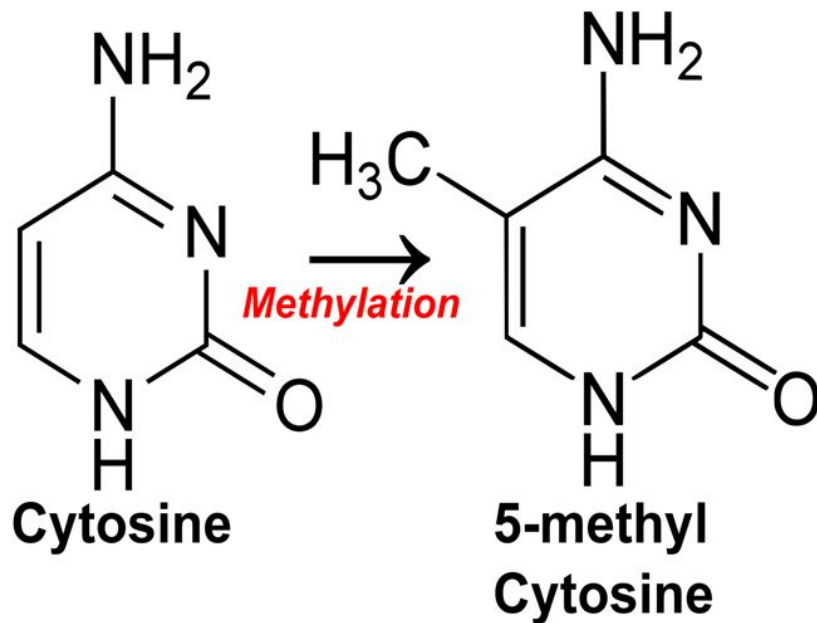
Epigenetics, *the methylation of Cytidine*

Epigenetics is the study of how your behaviors and environment can cause changes that affect the way your genes work. **Unlike genetic changes, epigenetic changes are reversible and do not change your DNA sequence, but they can change how your body reads a DNA sequence.**

WHY?

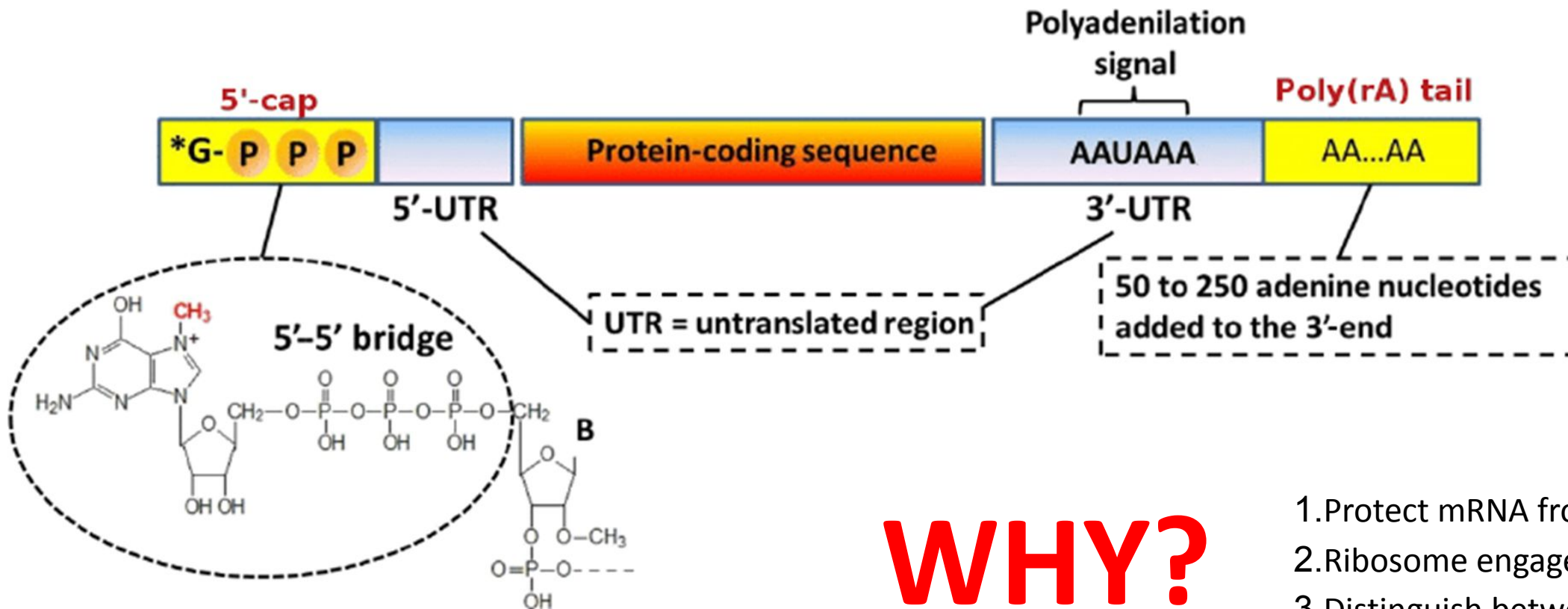


In epigenetics, the Cytosine of the dinucleotide sequence CpG
....is methylated at the #5 carbon.



WHY?

The 5' Cap on mRNA

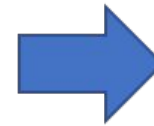
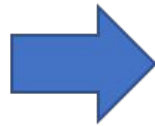


WHY?

1. Protect mRNA from degradation
2. Ribosome engagement site...
3. Distinguish between viral RNA and endogenous mRNA

mRNA Vaccines...*yesterday's science today!*

- CoV2 RNA genome published in December of 2020....
- mRNA vaccine for CoV2 approved for emergency use in less than 1 year



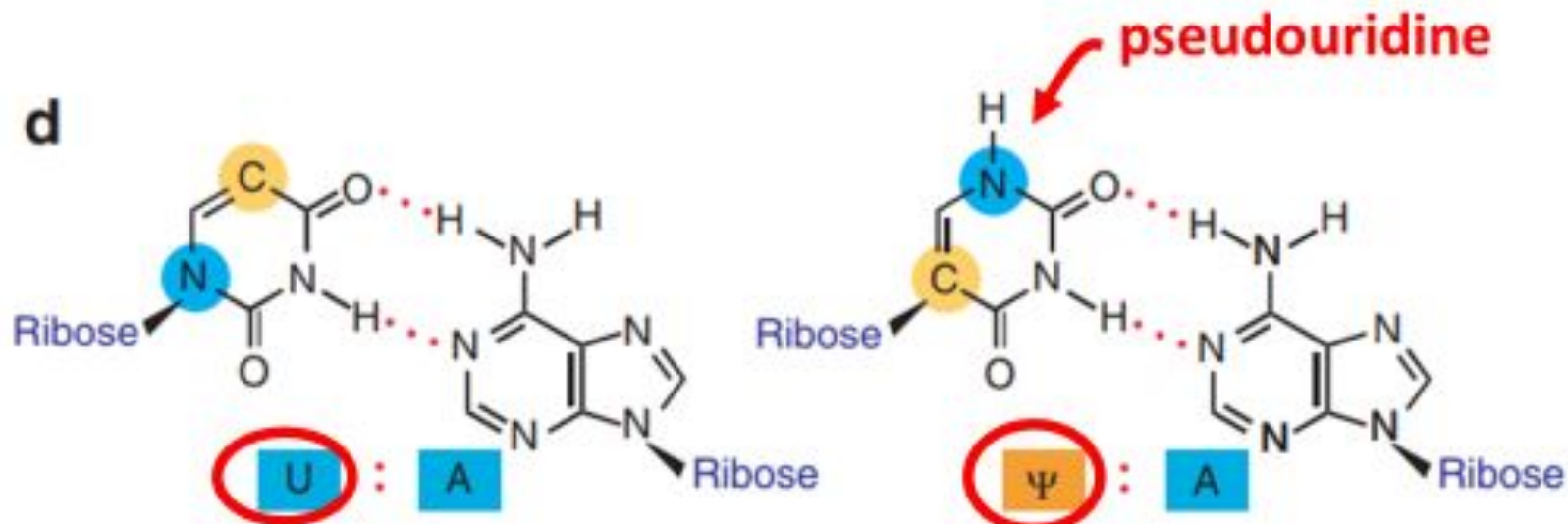
Kati Kariko... *persistence rewarded*

Incorporation of Pseudouridine Into mRNA Yields Superior Nonimmunogenic Vector With Increased Translational Capacity and Biological Stability

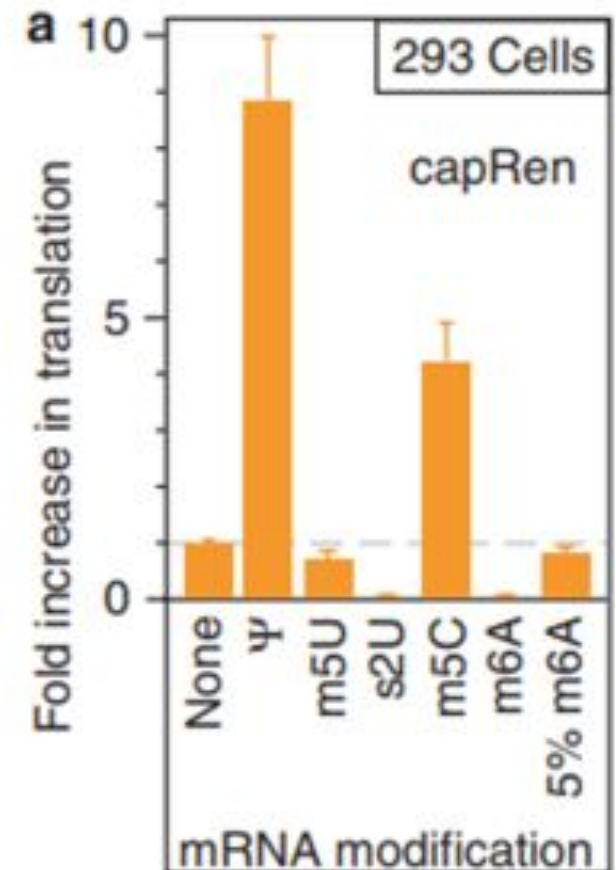
WHY?

Katalin Karikó¹, Miromi Muramatsu¹, Frank A Welsh¹, János Ludwig², Hiroki Kato³, Shizuo Akira³ and Drew Weissman⁴

Molecular Therapy vol. 16 no. 11, 1833–1840 nov. 2008

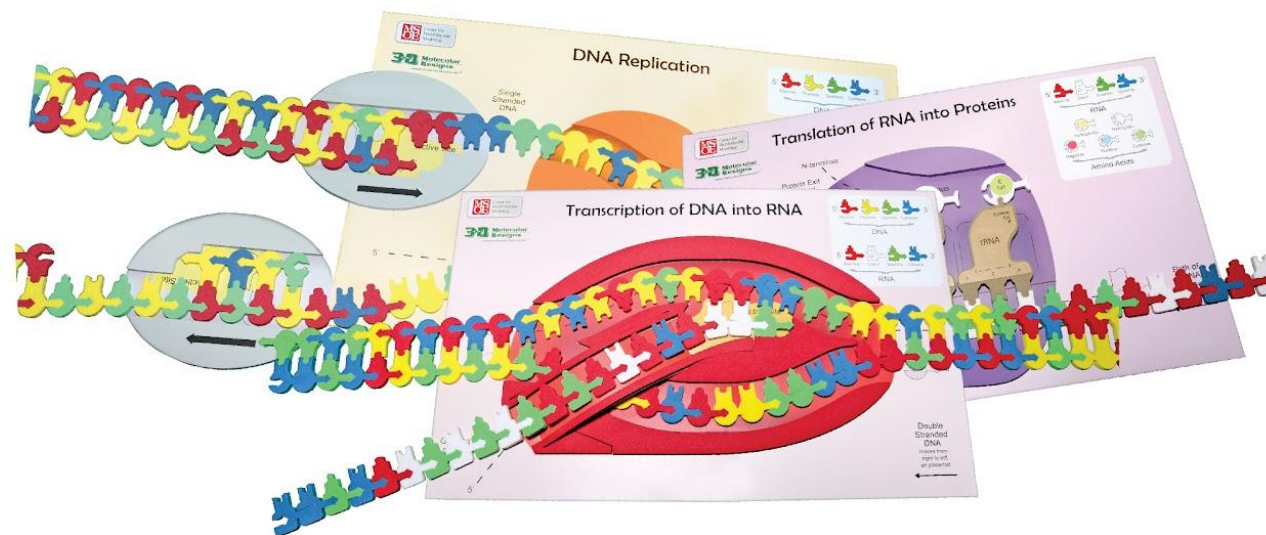
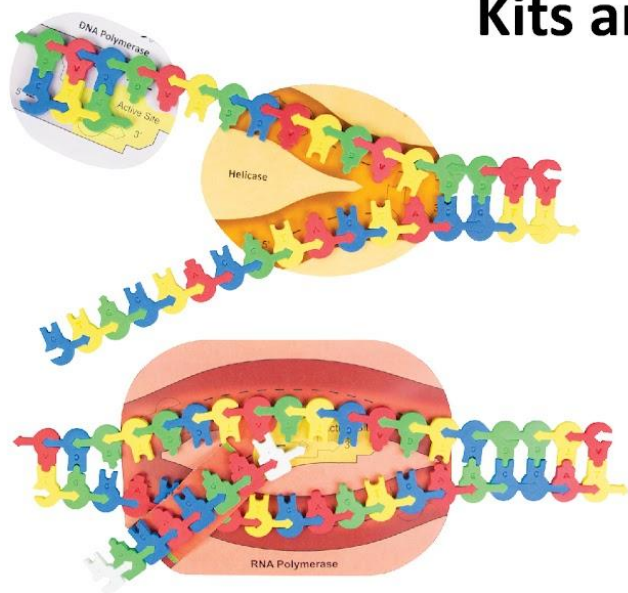


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THANK YOU FOR ATTENDING!

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