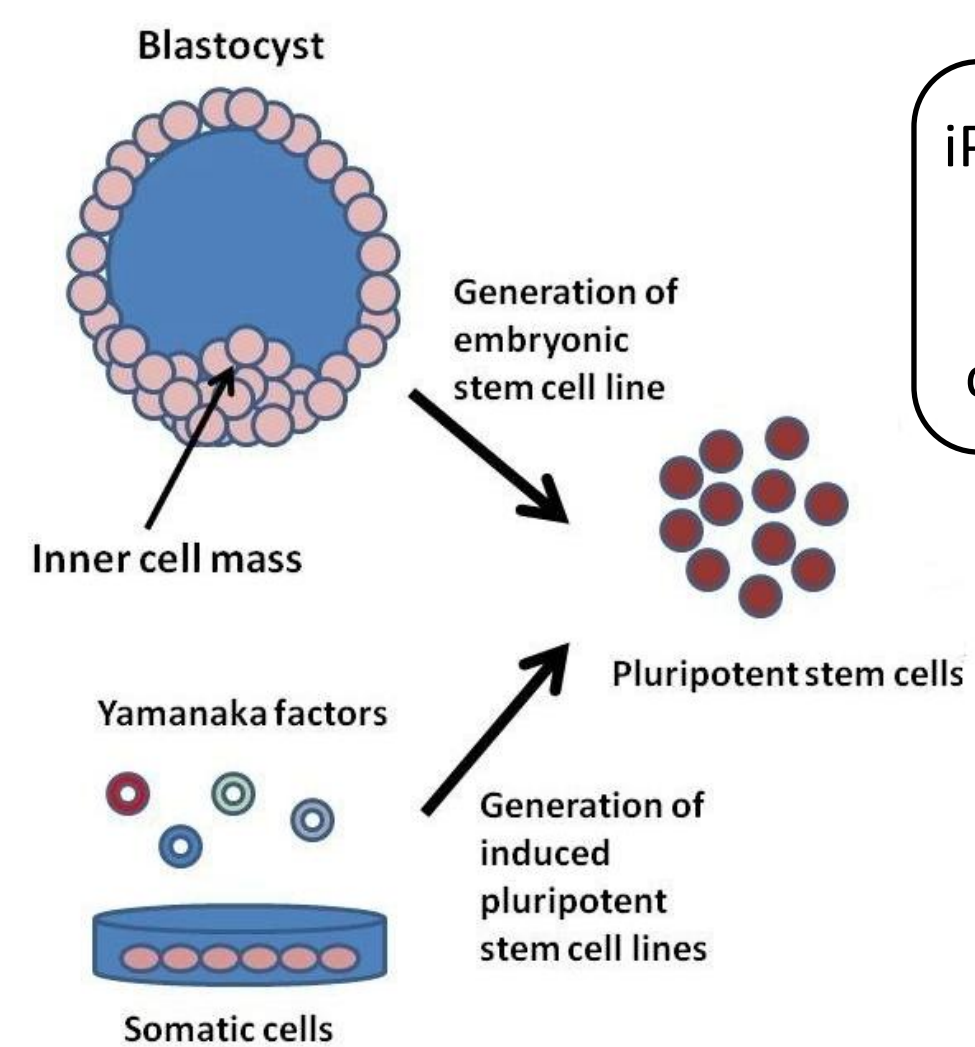


# Investigation of SOX-2 Protein from *E. coli* Bacteria

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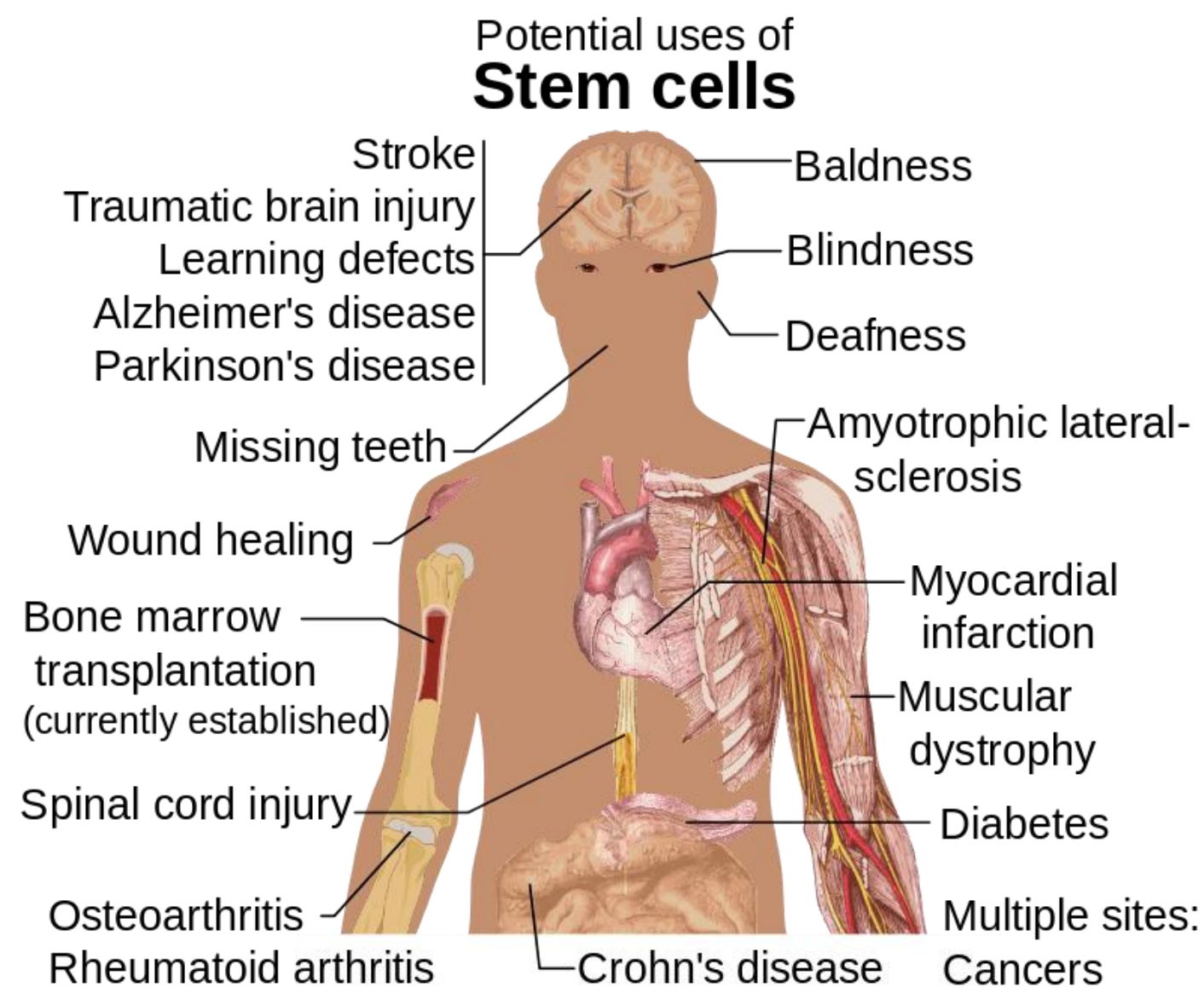
## 1. What are stem cells & how are they used?

### Embryonic (ESCs) vs Induced Pluripotent (iPSCs)



iPSCs can then be made into supportive cell types (e.g., support cells for neurons, etc.)

### Stem cell treatment for patients



## 2. What are we studying specifically?

- SOX-2 binds to and bends DNA to make modifications to amino acids which are the building blocks of protein (important for iPSCs creation)
- Lysine (K) 73** gives cells the ability to change into any cell type & causes SOX-2 to leave the nucleus
- Threonine (T)** also gives cells the ability to change into any cell type & increases gene creation for the cell

N—HMG—C  
1 41 109 317

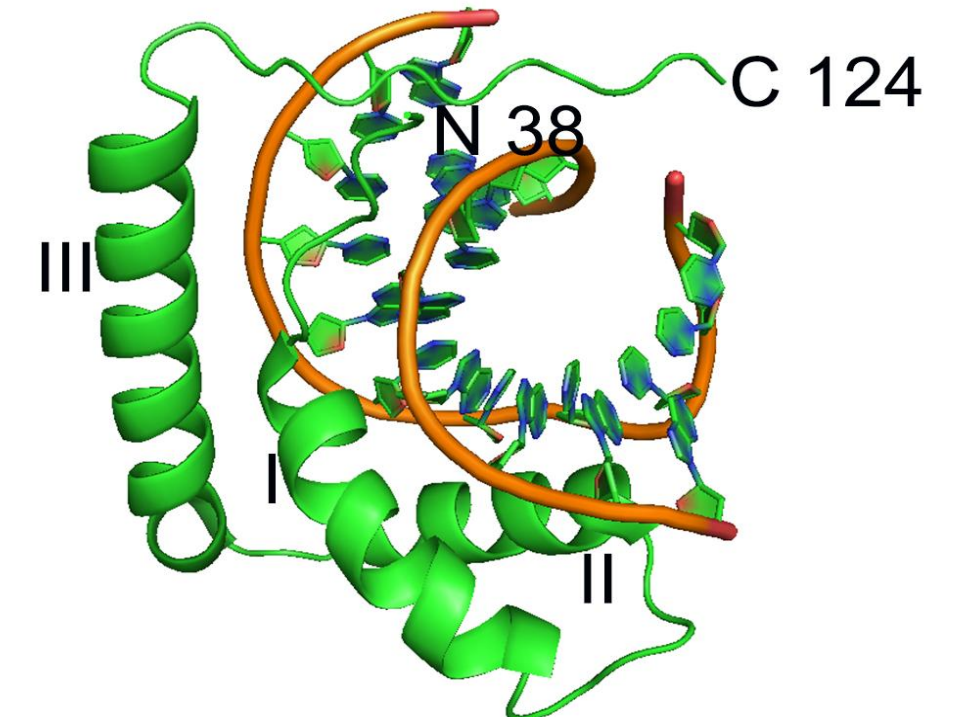
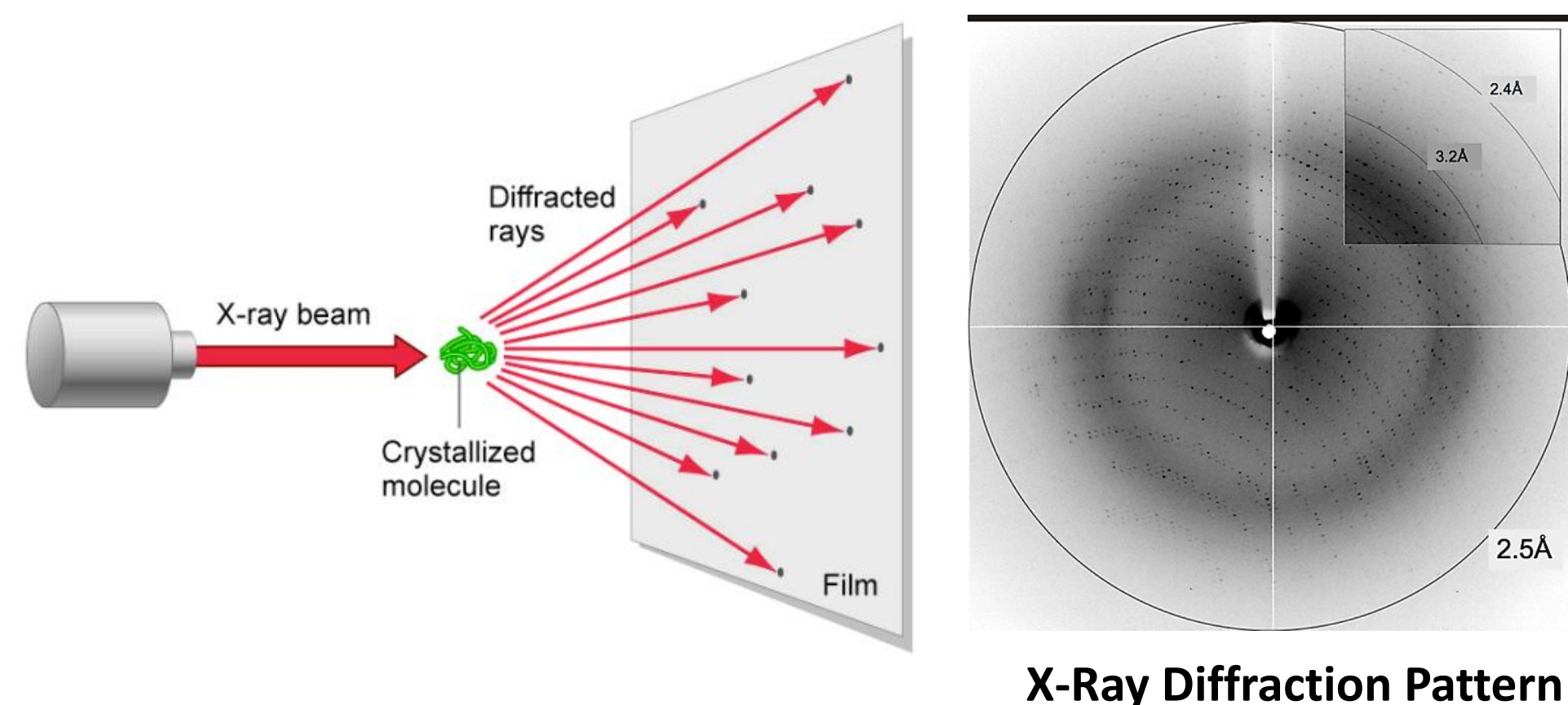
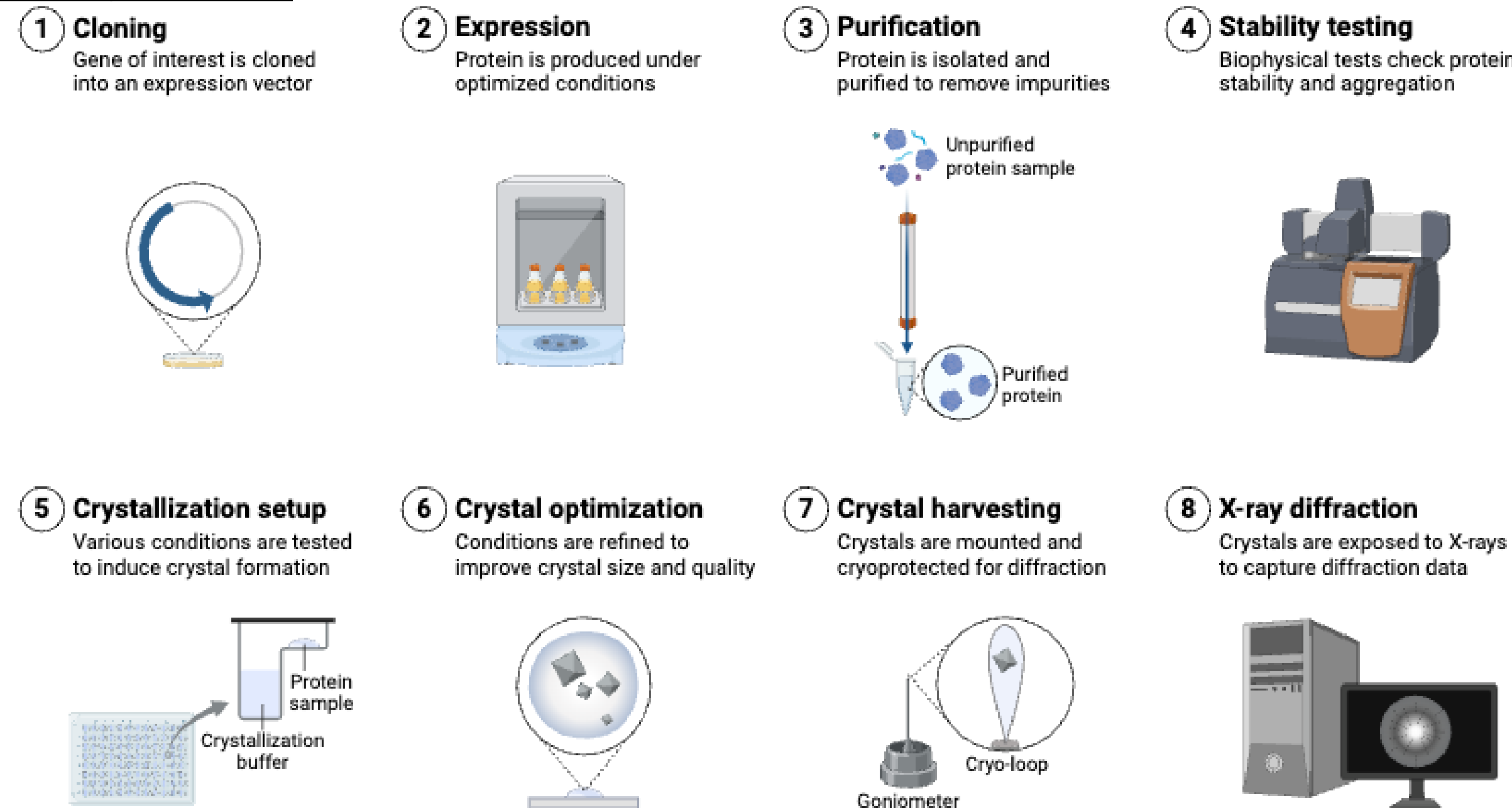


Image of the SOX-2 protein (top)  
X-Ray crystal structure of the HMG region of SOX-2 bound to DNA (Bottom)

## 3. How are we studying this?

### Protein Expression

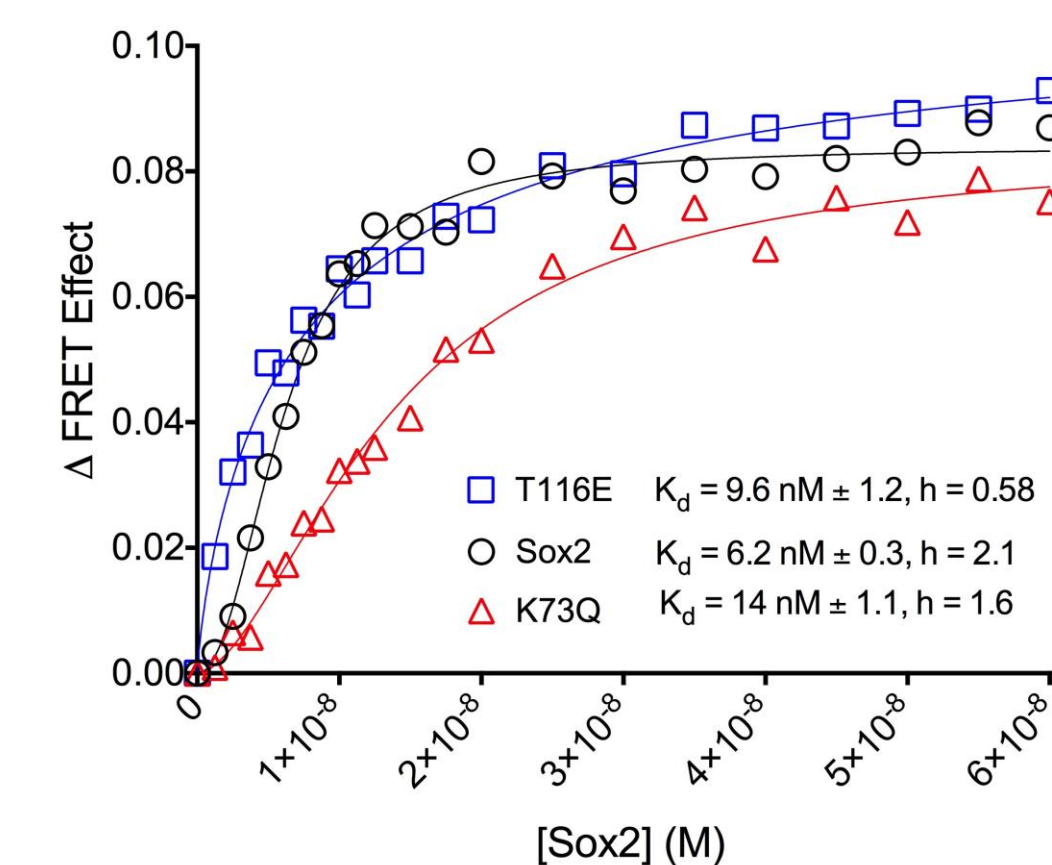


### Fluorescence Resonance Energy Transfer (FRET)

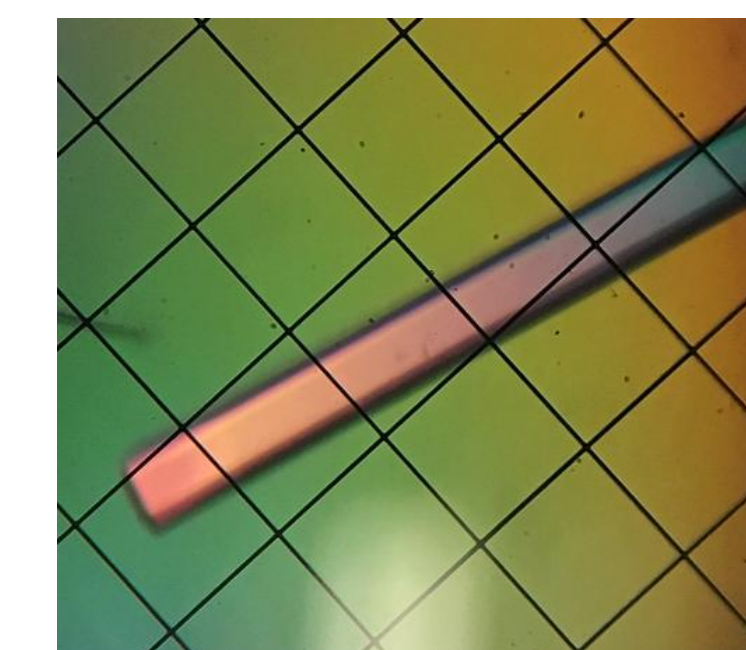
- Used to measure DNA binding and bending ability of SOX-2 and our 2 target proteins.

## 4. What did we find?

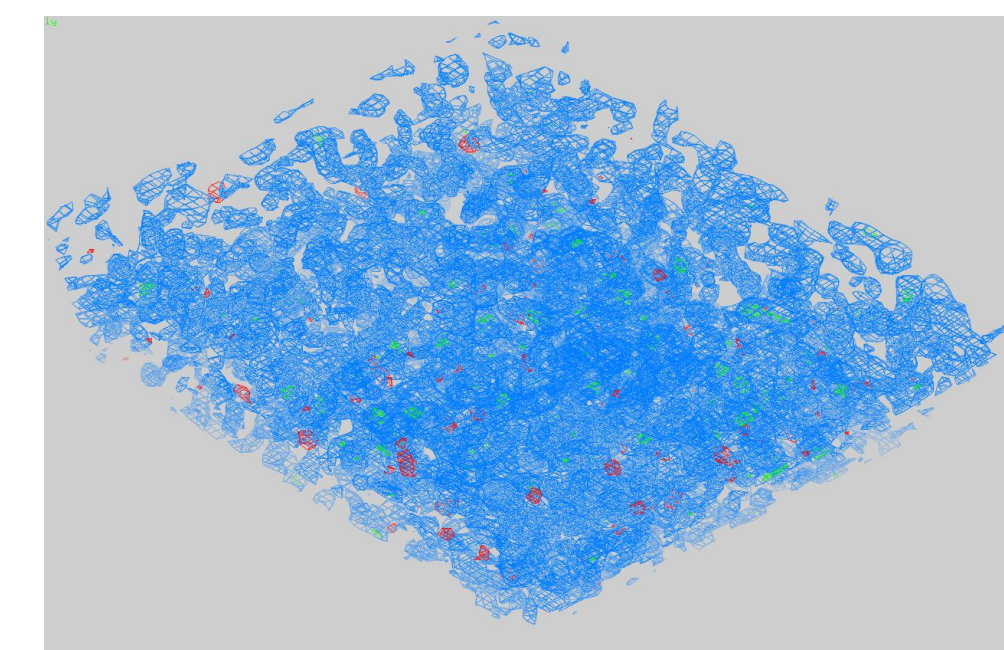
### FRET DNA Binding and Bending



### X-Ray Crystallography



SOX-2/DNA crystalized in 20% PEG 3350  
Diffracted X-rays to 2.8 Å



SOX-2/DNA Electron Density Map

- SOX-2 binds to DNA with strong connections
- T116 makes DNA very non-adhesive, but helps in DNA bending
- K73 leads to low DNA binding, low cooperativity, & decreased bending

**\*Future work to continue x-ray imaging on both SOX-2 targets**

## 5. Why is this important for Colorado?

- Understanding how to more efficiently generate iPSCs
- Could lead to better access for Colorado Blood Cancer Institute patients