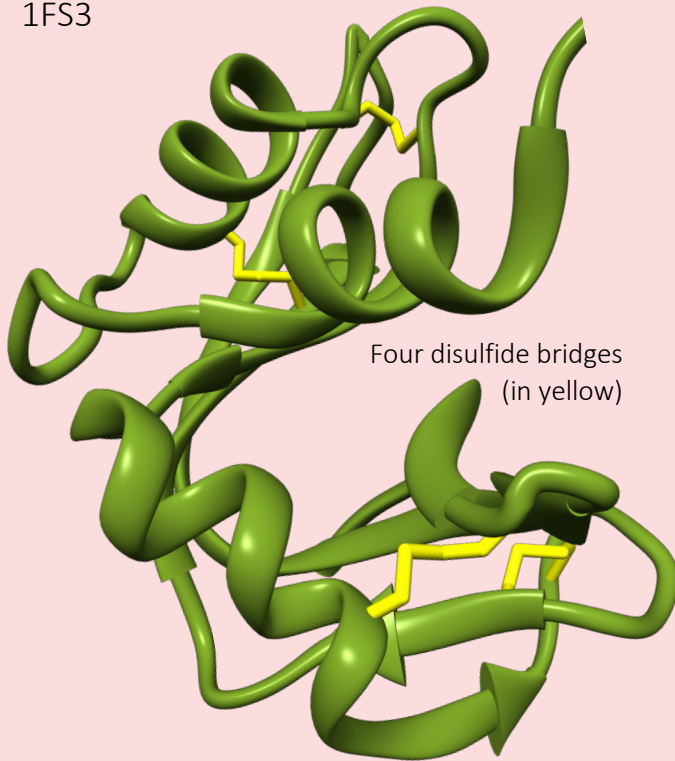


RNA DEGRADING ENZYME

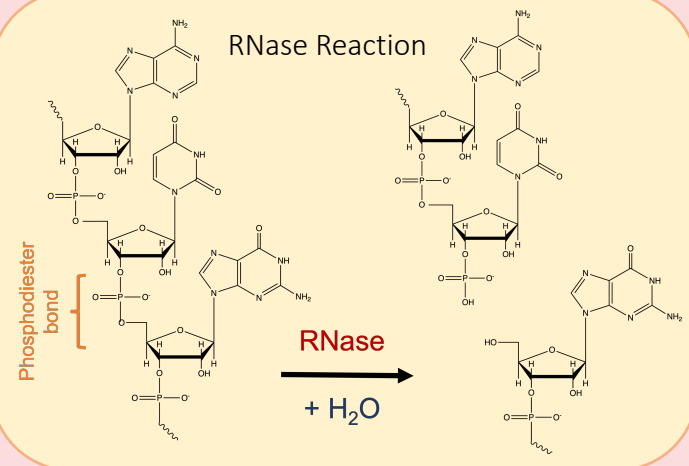
1FS3



RNase A

Ribonuclease A

- degrades RNA into nucleotides by hydrolyzing phosphodiester bonds on 3' end of a pyrimidine (C or U)



STRUCTURE

- small protein consisting of **124 amino acids** (single polypeptide chain)
- folds into **3 helices and 7 beta sheets**
- 4 disulfide bridges** contribute to overall structure
- binding with RNA substrate is based on ionic interactions between positively charged amino acids and negatively charged sugar-phosphate backbone of RNA

FUNCTION

- RNA endonuclease** (cleaves RNA within a strand)
- catalyzes hydrolysis of phosphodiester bonds on 3' end of pyrimidine nucleotides
- two histidines (His12 and His119) important in acid-base catalysis
- involved in RNA processing and RNA turnover
- defense against RNA viruses
- in vertebrates secreted by pancreas into small intestine to digest RNA in food

HISTORY

- because it is small, highly stable, and easily purified, it was used in **biochemical research**
- molecule of key discoveries:
 - proteins can fold spontaneously into their proper structure
 - amino acid sequence (primary structure) dictates three-dimensional structure (tertiary structure)¹
 - catalytic center is made of an arrangement of particular amino acids

Cytotoxicity ²

- can be **cytotoxic**, killing cells by degrading their RNA
- cells produce ribonuclease inhibitors that prevent degradation of cytosolic RNAs
- RNase A derivatives (and other RNases) have been engineered as potential anticancer agents