

# Structure Reveals How Antibiotic Streptomycin Works

## Scientific Achievement

Determined the specific structural details of how streptomycin, used to treat tuberculosis, interrupts ribosome protein synthesis, leading to bacterial cell death

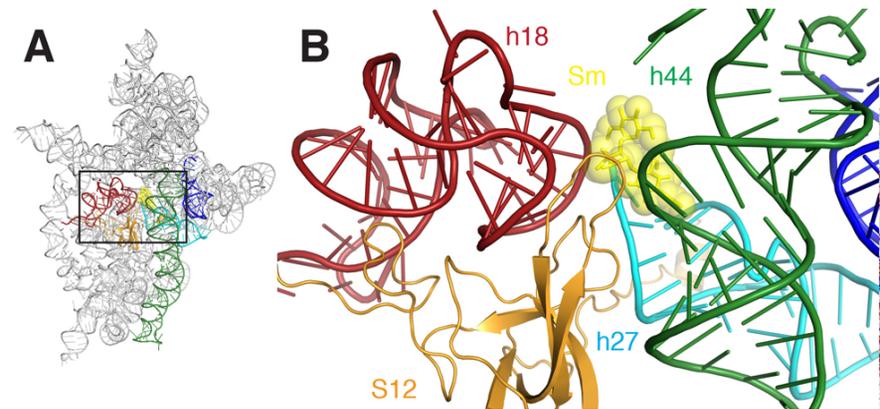
## Significance and Impact

Results will guide future studies of how mutations in bacterial ribosomes may be able to counteract the effect of streptomycin and allow the bacteria to survive

## Research Details

- Streptomycin binds to the smaller of the two main ribosome molecule subunits, impairing its ability to “read” messenger RNA (mRNA) to determine the right amino acid sequence to use in building proteins.
- X-ray crystallography at beamline X25 reveals that streptomycin binding induces structural changes to the subunit, causing it to misread the mRNA.
- In particular, two key molecular helices, which make up the subunit’s mRNA decoding site, are forced apart. This slight change in orientation causes incorrect decoding.

Work was performed at Brookhaven National Laboratory



A) A ribbon diagram of the ribosome’s streptomycin binding site. B) A close-up of the rectangular area outlined in A. Streptomycin is represented as yellow sticks and spheres, helices are colored red, dark green, cyan, orange, and blue.

H Demirci, F Murphy IV, E Murphy, S Gregory, A Dahlberg, and G Jogl, *Nat. Commun.* **4**, 1355 (2013)