



# Understanding biological factories to fuel drug discovery

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## ABOUT THE LECTURE

Bringing together chemistry, structural biology and computational approaches, Jamie Williamson revealed how molecular machines construct the proteins responsible for carrying out vital processes in the cell. He then helped visualize the assembly of these machines and revealed how they are central target for antibiotics and cancer therapies. Williamson's work highlighted the importance of basic, curiosity-driven research as the fundamental starting point for significant future outputs in science and medicine.

## TOP TAKEAWAY POINTS

1. Ribosomes are large cellular machines which use our genetic instructions to make the necessary proteins that carry out everyday biological processes. **Ribosomes are essential for all cells** and there are approximately 70,000 ribosomes in every cell.
2. The process of making these proteins in the cell is called translation, which depends on the precise assembly of the ribosome components. Using cutting-edge, microscopic imaging, **the Williamson lab is developing a detailed, three-dimensional map of how this assembly process takes place.**
3. Ribosome assembly has evolved a balance between both sequential and parallel steps. **This biological flexibility provides efficiency for rapid cell growth**, which has implications for cellular maturation, bacterial infections and cancer proliferation.
4. Many powerful antibiotics, such as streptomycin and tetracycline work by **binding to bacterial ribosomes specifically and stopping the bacteria from building proteins.** Similarly, a number of anticancer drugs slow tumor growth by blocking the ribosome assembly process.
5. The approach taken by Williamson and the team continues to reveal new insights about ribosome dynamics, **which could help inform a new class of targeted antibiotics and cancer therapies.** The lab typifies the research culture of the institute, where high-risk, high-reward basic science plays a key role in supporting the entire enterprise of medicine.

