# What are microRNAs?

RNAs are a diverse group of molecules, including messenger RNAs (mRNAs) that code for proteins and short noncoding RNAs, such as microRNAs (miRNAs).

miRNAs are 18-25 nucleotides long, and since they are noncoding, they do not offer instructions to make a protein such as mRNAs do.

Rather, miRNAs regulate gene expression after RNAs have been transcribed through the formation of the RNA-induced silencing complex (RISC). Usually binding to the 3′ untranslated region, the miRNA in the RISC can degrade the bound RNA. When bound to mRNAs, the RISC can interfere with protein production by degrading the mRNA.


## miRNAs and disease

miRNA gene regulation is important for maintaining cellular homeostasis by ensuring that their gene targets are expressed at the appropriate levels. If a specific miRNA is overexpressed, then its gene targets may not produce enough protein. Conversely, if the specific miRNA is underexpressed or if the sequence is mutated, too much protein may be produced.

Due to their key roles in mRNA regulation, changes in miRNA activity can have significant impacts on health and disease. One prominent example is cancer, where disruption of miRNA networks can lead to uncontrolled cell growth. miRNAs also play key roles in cardiovascular, immunological, and hepatic diseases.

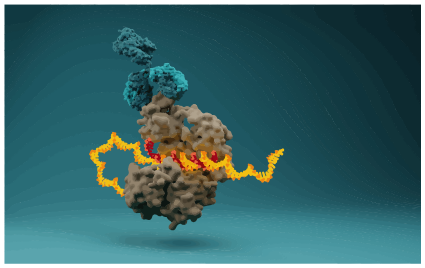
In addition, miRNAs are abundant in the brain and play significant roles in healthy neural development. Incorrect gene expression from changes in miRNA activity have been implicated in neurological disease as well.

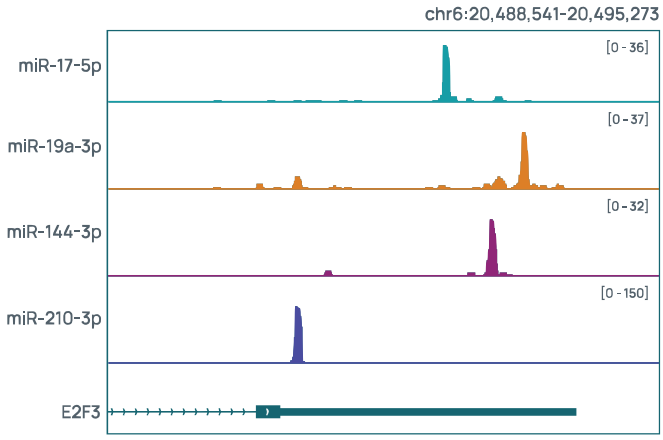
## miR-eCLIP+ at Eclipsebio

Since miRNAs are key drivers of disease, researchers have begun using miRNAs as biomarkers to identify diseases early and as targets for therapeutics such as anti-mRNA oligonucleotides (AMOs). At Eclipsebio, we have developed miR-eCLIP+ to directly identify where and how miRNAs are binding on mRNA and to design cell-type specific mRNA-based therapies.

miR-eCLIP+ uses our enhanced crosslinking immunoprecipitation technology to target and sequence the miRNAs and mRNAs within the RISC. This process allows us to directly locate miRNA binding along an mRNA without relying on computational predictions that can miss key binding events.

By directly locating where miRNAs bind, we can reveal how miRNA regulatory networks change in disease or help guide the development of effective AMOs.






miR-eCLIP+ directly shows specifically where miRNA binds. These peaks show where miRNA binds on the 3′ UTR of E2F3.

Interested in studying miRNA binding in your system of interest or along your therapeutic? Contact us to get started.