

Comparing Circular RNA Levels in the Brains of Old and Young Mice by Analyzing RNA Sequencing Data

Bauer, Matthew

The regulation and function of non-coding RNA is an important issue. Circular RNA (circRNA) is a prevalent type of non-coding RNA that forms a loop with itself. In *Drosophila melanogaster*, the circRNA seems to accumulate as the organism ages. To investigate this trend in the brain of a mammal, *Mus musculus*, whole-transcriptome data generated with modern high-throughput sequencing techniques was used. Computer programs were then developed to analyze the 100-million RNA-fragment sample from each mouse brain. To search for circRNA, a custom nucleotide reference string was encoded for each of 1599 different RNA circles. Comparing the 100 million RNA-fragment nucleotide sequences with these custom references revealed the presence of hundreds of thousands of circRNA. The levels of circRNA in three 22-month-old mice were compared with those in three 1-month-old mice, for the 349 different circRNA that each were observed over 100 times in the old or young mice. The differences between old and young mice were quantified by calculating the Student's t-statistic for each of these circRNA species, and for circRNA in aggregate. The statistics of the ratios of circRNA levels in young and old mice brains were also examined. CircRNA appears to accumulate as mice age, but additional samples are needed to firmly exclude the null hypothesis.