

Derivation of an endogenous small RNA from double-stranded Sox4 sense and natural antisense transcripts in the mouse brain

ABSTRACT

Natural antisense transcripts (NATs) are involved in cellular development and regulatory processes. Multiple NATs at the Sox4 gene locus are spatiotemporally regulated throughout murine cerebral corticogenesis. In the study, we evaluated the potential functional role of Sox4 NATs at Sox4 gene locus. We demonstrated Sox4 sense and NATs formed dsRNA aggregates in the cytoplasm of brain cells. Over expression of Sox4 NATs in NIH/3T3 cells generally did not alter the level of Sox4 mRNA expression or protein translation. Upregulation of a Sox4 NAT known as Sox4ot1 led to the production of a novel small RNA, Sox4_sir3. Its biogenesis is Dicer1-dependent and has characteristics resemble piRNA. Expression of Sox4_sir3 was observed in the marginal and germinative zones of the developing and postnatal brains suggesting a potential role in regulating neurogenesis. We proposed that Sox4 sense-NATs serve as Dicer1-dependent templates to produce a novel endo-siRNA- or piRNA-like Sox4_sir3.

Keyword: Noncoding RNA; Small regulatory RNA; PiRNAs; Endo-siRNAs; Mouse brain development; Antisense RNA; Natural antisense transcripts