Diagnostic, Prognostic and Therapeutic Uses of Non-Coding RNAs in Leukemia

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SUMMARY

The Rao group at UCLA has developed a method of using lincRNA expression levels as a diagnostic and prognostic tool for B acute lymphoblastic leukemia. Furthermore, regulation of certain leukemia-associated lincRNA may hold therapeutic potential.

BACKGROUND

Acute lymphoblastic leukemia (ALL) is a rare cancer characterized by the overproduction of immature white blood cells known as lymphoblasts. Around 6,000 cases are reported each year in the US and are most prevalent among children ages 2-5. Cytogenetic analysis is used to identify abnormal karyotypes such as chromosome number, translocations, or deletions. This information helps clinicians classify the leukemia to better tailor patient prognosis and treatment, as certain genetic abnormalities (e.g. the bcr-abl translocation) are associated with a worse outcome and require more aggressive treatment. Our current understanding of ALL on a molecular basis has achieved successful treatment in over 80% of affected children, but only 20-40% of adults, with high long-term relapse rates. The lower survival rate in adults may be correlated to the increased incidence of abnormal karyotype in older patients. Given this disparity, better diagnostic and treatment options are needed to address adult patients and those with karyotypes associated with poor prognoses.

INNOVATION

Long intergenic non-coding RNAs (lincRNAs) are involved in gene regulation and are often dysregulated in cancer. Dr. Dinesh Rao and colleagues at UCLA have focused on the expression of lincRNAs in B acute lymphoblastic leukemia (B-ALL) and developed a method to characterize common forms of B-ALL by their respective lincRNA profiles. In patients with no cytogenetic abnormalities, a specific non-coding RNA termed B-ALL associated long intergeneic RNA (BALIR-2) was correlated with poor response to chemotherapy and overall survival. Knockdown of BALIR-2 expression using lentiviral vectors resulted in decreased cell growth and increased apoptosis, suggesting that BALIR-2 is involved in the regulation and response of B-ALL cells. The use of lincRNAs profiles may provide a more accurate diagnostic and prognostic tool, while the control of specific lincRNA expression could form the basis of therapeutic treatment in patients who fail to respond to traditional therapy.

APPLICATIONS

- LincRNA profiles can be used as a diagnostic/prognostic tool in conjunction with cytogenetic analysis in B-ALL patients.
- Specific lincRNAs (such as BALIR-2) can be developed into targets for molecular therapies to treat leukemia. (e.g. knockdown siRNA)

ADVANTAGES

- Differential lincRNA profiles in B-ALL patients provide an orthogonal method for characterizing cancer to improve the accuracy of current diagnostics/prognostics.
- Specific lincRNA profiles may also help determine patient response to chemotherapeutic agents.

STATE OF DEVELOPMENT

The diagnostic and prognostic uses of B-ALL lincRNAs have been demonstrated in cells from human patient samples. The therapeutic use of knockdown has been demonstrated in cultured leukemia cell lines.

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OTHER INFORMATION

KEYWORDS

B acute lymphoblastic leukemia, B-ALL, ALL, lincRNA, non-coding RNA, siRNA, cancer, leukemia

CATEGORIZED AS

- **Biotechnology**
  - Genomics
- **Medical**
  - Disease: Cancer
  - Gene Therapy
  - Screening

RELATED CASES

2013-475-0

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	9,909,188	03/06/2018	2013-475

RELATED MATERIALS

- O'Connell RM, Balazs AB, Rao DS, Kivork C, Yang L, Baltimore D: Lentiviral Vector Delivery of Human Interleukin-7 (hIL-7) to Human Immune System (HIS) Mice Expands T Lymphocyte Populations. PLoS ONE 2010, 5:e12009.
- O'Connell RM, Chaudhuri AA, Rao DS, Baltimore D: Inositol phosphatase SHIP1 is a primary target of miR-155. Proceedings of the National Academy of Sciences 2009, 106:7113-7118.

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