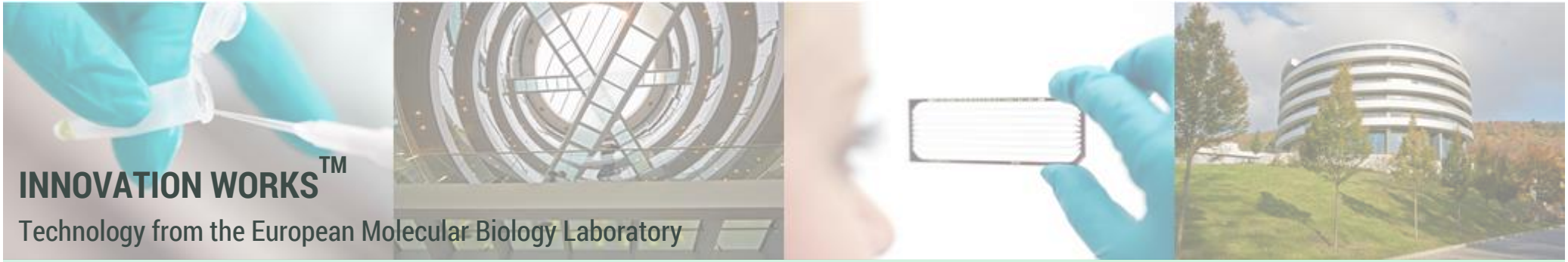

INNOVATION WORKS™

Technology from the European Molecular Biology Laboratory

# mircoRNA-142, a novel pluripotent stem cell marker and differentiation regulator

EMBLEM Ref. 2016-018

## Challenge

- pluripotent stem cells hold great promise in regenerative medicine
- subpopulations of stem cell cultures that differ in the response to differentiation cues are “overlooked” by current markers

## Commercial Opportunity

- further development of miR-142 in a novel tool for stem cell culturing on a collaboration and/or license basis
- access to materials (e.g. cell lines) and know-how

## Technology

- fluorescent reporter cell line available to monitor intracellular miR-142 levels on single cell basis
- increasing the miR-142 expression level can lock a stem cell in a pluripotent state, insensitive to differentiation stimuli
- the technology is established in mouse embryonic stem cells (mESCs)
- the technology can be adapted to all mammalian stem cells, including human
- potential to further develop the technology in a platform for the identification of compounds that influence pluripotency

## Contact

Dr. Jürgen Bauer, bauer@embl-em.de

## Key Inventors

Dr. Pierre Neveu, Group Leader, European Molecular Biology Laboratory (EMBL), Heidelberg, Germany

## Intellectual Property

EP15200521.1, filed 16.12.2015

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TECHNOLOGY TRANSFER

# mircoRNA-142, a novel pluripotent stem cell marker and differentiation regulator

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Stem cells have great potential in regenerative medicine ant cell therapy. However, the underlying mechanisms of the regulation of pluripotency vs. differentiation are not well understood yet. MicroRNAs (miRNAs) are small, non-coding RNAs that act as post-transcriptional regulators of gene expression. There is growing evidence that miRNAs act as key players in stem cell homeostasis and cell fate decisions.
Researchers at EMBL have generated a reporter cell line of mouse embryonic stem cells (mESCs) that represents the expression level of the miRNA 142 (miR-142) by a fluorescence signal. It was shown that the mESCs could be divided into two subpopulations by the reporter, one of them containing cells with high miR-142 level and the other population showing a low expression of miR-142.

These two subpopulations could not be identified by other stem cell markers such as Nanog or Oct4, indicating that miR-142 acts upstream of other common stem cell markers.

Further investigation showed that two states of miR-142 (“high” and “low”) interconvert stochastically in stem cell cultures. A high expression level of miR-142 locks the cells in an undifferentiated stat, making them insensitive to differentiation cues, whereas cells with a low miR-142 profile react to those cues and undergo differentiation.
Therefore, miR-142 provides a powerful tool to maintain a stem cell culture in a uniform, undifferentiated state.

## Reference

Sladitschek & Neveu 2016, PLoS One
doi: 10.15252/msb.20156525