GATA1 Expression in Myeloproliferative Neoplasms (MPNs)

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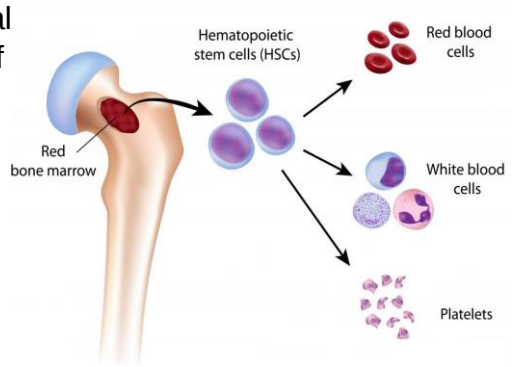
Myeloproliferative Neoplasms (MPNs)

- MPNs are types of blood cancers which arise as a result of abnormal changes (mutations) in the DNA of bone marrow cells that produce blood cells (haematopoietic stem cells - HSCs).
- As seen in the diagram, HSCs usually give rise to various blood cells.



- MPNs are generally characterised by dysfunction and/or over-production of blood cells.[1]
- The subcategories of MPNs were revised in 2016 by the World Heath Organisation and this research looks at 3 of the main subcategories including.[2,3]
  - Polycythaemia Vera (PV)
  - Myelofibrosis (MF)
  - Essential thrombocythemia (ET)

GATA-binding factor 1 (GATA1)

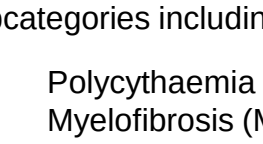
- GATA1 is a gene that plays a key role in the development of red blood cells (RBCs) and platelets.
- This gene mediates the maturation of RBCs from their precursors known as erythroblasts.
- GATA1 is also involved in the key stages that lead to the development of blood platelets from their precursors, including megakaryoblasts, promegakaryocytes and megakaryocytes.

Project Aims

- To investigate alterations in GATA1 expression in blood samples obtained from patients with ET, PV and MF.
- To evaluate whether GATA1 expression can be used as a diagnostic biomarker in the differential diagnosis of MPN subtypes.

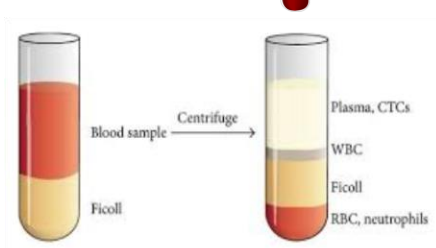
Methods

1



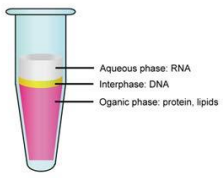
Peripheral blood was collected from a healthy control and MPN patients with ET, PV and MF.

2



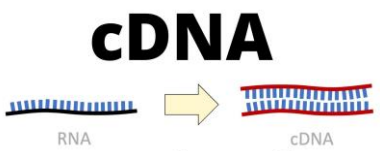
Ficoll- Paque separation technique was used to separate mono-nucleated cells from peripheral blood.

3



RNA was extracted using TRIzol/chloroform extraction technique.

4

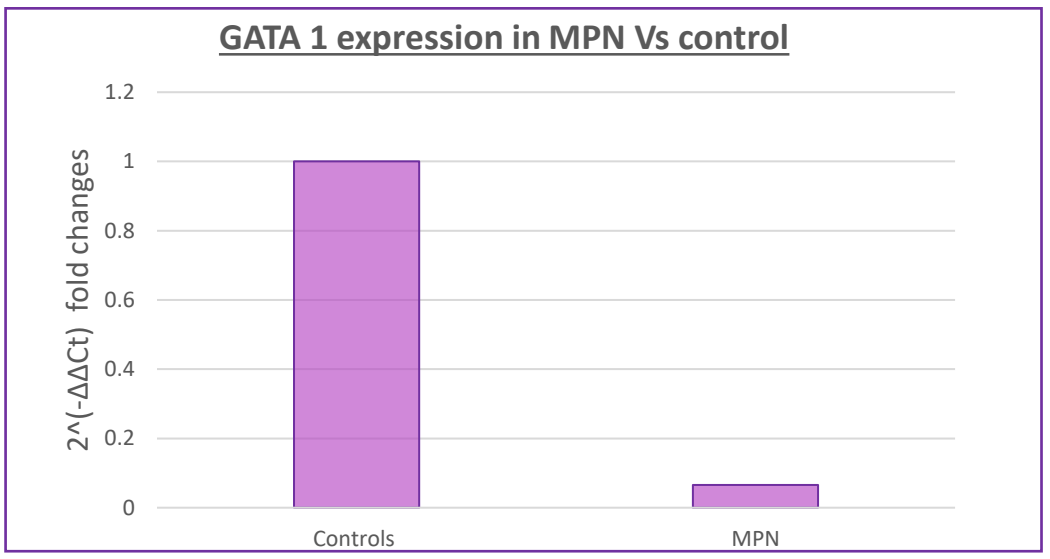


cDNA was synthesised using High-capacity cDNA reverse Transcription Kit (Applied Biosystems)

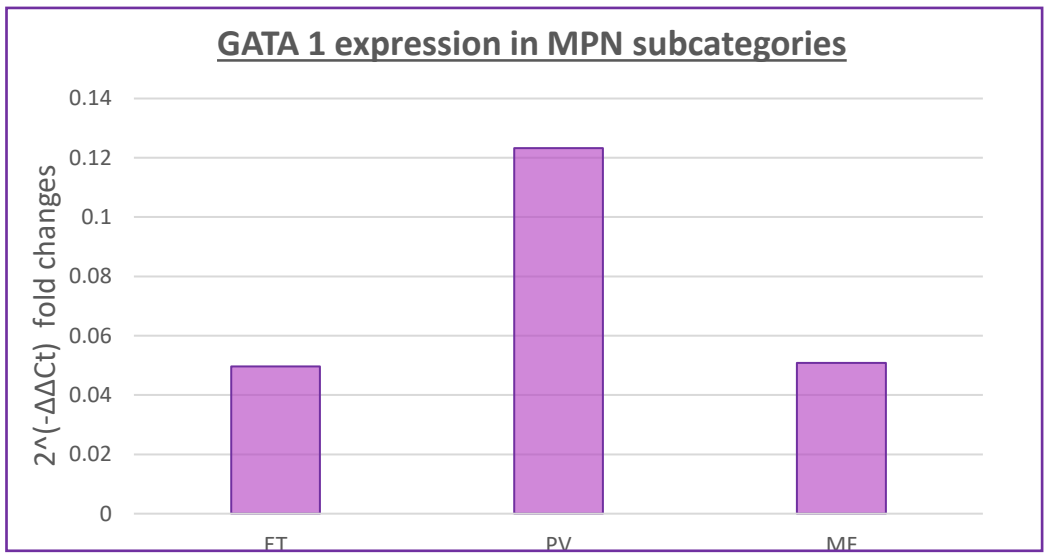
5

Quantitative PCR was ran in Rinaldi-Simmonds lab.

Results



- As seen in the graph above, compared to the control samples, GATA1 expression is significantly reduced in MPN



- GATA1 expression was higher in PV than in ET and MF
- GATA1 expression was similar in both ET and MF

Conclusion

- GATA1 expression can possibly be used as a diagnostic biomarker in the differential diagnosis of MPN subcategories since expression is altered in all three subcategories studied.
- GATA1 expression is similar in ET and MF

Discussion

- A larger cohort size could improve the reliability of the data and allow for T tests or ANOVA tests. This is could also confirm whether GATA1 expression can be used as a differential biomarker in MPN diagnosis.

References

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Acknowledgements

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