

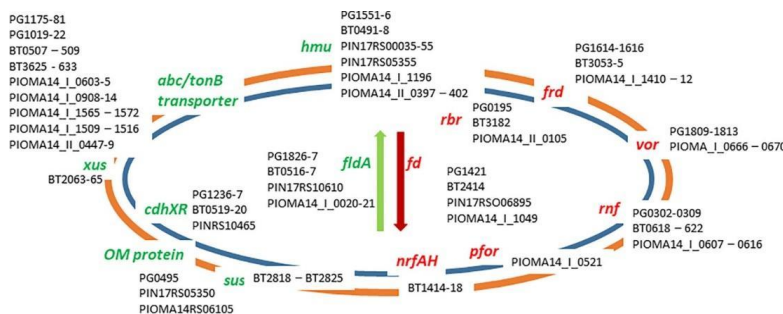
## Bacterial Fld-Fd/Rbr ratio as a biomarker for iron levels

Taking advantage of Bacteroidetes gene expression to quantify iron levels in specific tissues

Dangerous medical conditions such as infectious diseases and cancer are worsened by free iron levels in the tissue. The ability to quantify free iron levels in tissue is an important aspect of monitoring disease progression and treatment. Current approaches in free iron level quantification in tissues is difficult and requires further chemical administration to patients. Therefore, a need exists to establish easier and safer methods of free iron level quantification at the tissue level.

### The technology

Bacteroidetes are a specific strain of bacteria with high populations in the human gut and mouth. These bacteria uniquely modulate their gene expression depending on the levels of free iron in the environment. For example, in iron depleted conditions, Bacteroidetes upregulate expression of the Fld gene while down regulating expression of the Fd/Rbr gene (Figure 1). Thus, the ratio of Fld-Fd/Rbr can be used to quantify the levels of free iron in tissues such as the gut and mouth. Determining free iron levels at the tissue level is critical during consideration of disease progression and treatment strategies for conditions such as cancer and infectious diseases. Current strategies for determining free iron levels in tissue are more invasive and rely on the administration of chemicals, such as immunofluorescent compounds, to patients. Therefore, this method of tissue free iron quantification is more accurate and less invasive to the patient.



**Figure 1:** Examples of iron-dependent gene modulation in *Bacteroidetes*. Genes upregulated in iron-deficient conditions are shown in green. Genes downregulated in iron-deficient conditions are shown in red.

### Benefits

- » Simple free iron quantification
- » Disease progression monitoring and treatment
- » Improved method of measuring free iron levels in specific tissues

### Applications

- » Cancer and infectious diseases

#### Patent status:

Provisional Patent Pending: U.S. rights are available.

#### License status:

This technology is available for licensing to industry for further development and commercialization.

#### Category:

Biomedical

#### VCU Tech #:

23-077F

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