TECHNOLOGY

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Non-Invasive Detection of Solid Organ Transplant Rejection

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Background

Researchers at the University of Calgary have developed a non-invasive method to detect solid organ transplant rejection. The new assay presents a relatively fast, inexpensive and non-invasive alternative to the current gold-standard of biopsy-based tests.

The technique involves limited sequencing of cell-free DNA isolated from recipient plasma and using a novel method to assess the relative contribution of recipient versus donor DNA. Circulating cell-free DNA can normally be found in the bloodstream of all individuals. In patients with transplanted organs, the vast majority of the cell-free DNA can be attributed to the recipient's own DNA. In healthy transplant recipients the contribution of circulating DNA from the transplanted organ stays <1%. However, during organ rejection the contribution of donor DNA increases to >3-4% of total circulating DNA[1].

While previous work in this field has established that cell-free DNA is a suitable means of detecting rejection, the method developed by our inventors achieves similar results without prior knowledge of either the patient's or the donor's genomic sequence. Moreover, the method uses a panel of highly polymorphic SNPs and thus does not require whole-genome sequencing. This significantly reduces the time and costs involved in testing. As a result, this method makes it possible to assess the status of a transplanted organ throughout the lifetime of an individual frequently and non-invasively.

Areas of Application

- Active monitoring of transplant rejection status.

Competitive Advantages

- Non-invasive
- Prior sequencing of donor and patient samples is not necessary
- Faster, simpler and less expensive than whole-genome sequencing

Stage of Development

- The method is being tested on clinical samples from various transplanted organs with promising results.

[1] Universal noninvasive detection of solid organ transplant rejection. Proc Natl Acad Sci U S A. 2011 Apr 12;108(15):6229-34