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Rapid Blood Test to Predict Covid-19 Disease Severity

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Why in News

Scientists at **Washington University School of Medicine in St Louis (WUSTL)** have published a paper showing that **a relatively simple and rapid blood test can predict which Covid-19 patients are at highest risk of severe complications or death.**

Key Points

- **About the Blood Test:**
 - It **measures levels of mitochondrial DNA**, a unique type of DNA molecule that normally resides inside the energy factories of cells.
 - Mitochondrial DNA spilling out of cells and into the bloodstream is **a sign that a particular type of violent cell death** is taking place in the body.
- **Study Conducted:**
 - The team **evaluated 97 patients with Covid-19**, measuring their mitochondrial DNA levels on the first day of their hospital stay.
 - They found that **mitochondrial DNA levels were much higher in patients who eventually were admitted to the ICU, incubated or died.**
This association was **independent of a patient's age, sex and underlying health conditions.**

- **Significance:**

- The test **could serve as a way to predict disease severity** as well as a tool to **better design clinical trials**, identifying patients who might, for example, benefit from specific investigational treatments.
- The test **could serve as a way to monitor the effectiveness of new therapies**. Presumably, effective treatments would lower mitochondrial DNA levels.
- Further, the test **predicted outcomes as well as or better than existing markers of inflammation** currently measured in Covid patients.
 - Most other markers of inflammation measured in patients with Covid-19, including those still under investigation, are **general markers of systemic inflammation, rather than inflammation specific to cell death**.
 - **Inflammation is the body's innate response to injury or infection** (including trauma, surgery, burns, and cancer).

Certain proteins are released into the bloodstream during inflammation; if their concentrations increase or decrease by at least 25%, they can be used as systemic inflammatory markers.

Mitochondrial DNA

- It is the **small circular chromosome found inside mitochondria**.

The mitochondria are **organelles found in cells that are the sites of energy production**. They **produce cellular energy** in the form of **adenosine triphosphate (ATP)**, hence they are called '**power houses**' of the cell. The mitochondria **divide by fission**.
- It is **different in a way from the DNA (Deoxyribonucleic Acid) that's in the nucleus**.
 - Mitochondrial DNA is **small and circular**. It has **only 16,500 or so base pairs** in it. It encodes different proteins that are specific for the mitochondrial.
 - The **nuclear genome is linear** and is made of **3.3 billion DNA base pairs**.
 - The mitochondrial genome is not enveloped, and it is **not packaged** into chromatin.
 - Mitochondrial DNA, unlike nuclear DNA, is inherited from the mother, while nuclear DNA is inherited from both parents.
- If there's a **defect in some of those mitochondrial DNA bases**, that is to say a **mutation**, one will have a **mitochondrial disease**, which will involve the inability to produce sufficient energy in things like the muscle and the brain, and the kidney.

Source: IE