Method for Estimating Blood Plasma Water Content Using Portable NMR Relaxometry

Tech ID: 32548 / UC Case 2019-590-0

ABSTRACT

Researchers at the University of California, Davis have developed a method of estimating blood plasma water content using nuclear magnetic resonance (NMR) relaxometry.

FULL DESCRIPTION

A large number of medical decisions are based on blood chemistry assays. The accuracy of blood tests can depend on plasma water content ("PWC"), which is not typically measured in clinical laboratories. The current standard method for measuring PWC, lyophilization, requires approximately 24 hours of elapsed time. Such delays can add increased patient risk when a large lab is processing thousands of samples daily and be unacceptable in situations that require urgent treatment decisions.

Blood test results are thus frequently based on an "assumed," standard value of 93% PWC. However, variance in PWC between patients can influence many test results – including blood electrolyte and metabolite tests. Thus, the development of a rapid test to measure PWC would provide clinicians with a means to improve the accuracy of blood chemistry assays and diagnostic tests - improving patient care.

Researchers at the University of California, Davis have developed a method of estimating blood PWC using nuclear magnetic resonance (NMR) relaxometry. This method consists of placing samples in an NMR spectrometer and correlating the decay constants to the percentage of water in plasma samples. Researchers have conducted tests on animal plasma samples and achieved 98+% PWC prediction accuracy - which matches the accuracy of current, standard lyophilization-based techniques. The NMR-based test can help clinicians improve the accuracy of blood chemistry assays and diagnostic tests. Additionally, NMR only requires a small amount of sample (1-2mL), while most tests require a considerably greater volume of blood. NMR is also non-destructive, meaning that the same blood sample can also be used for other subsequent lab tests.

APPLICATIONS

- Test to measure blood plasma water content

FEATURES/BENEFITS

- Faster turn-around compared to existing tests
- Reduce resources wasted on unnecessary testing or treatment
- Requires small sample
- Analysis is non-destructive, allowing the same blood sample to be used in other tests

PATENT STATUS

Country	Type	Number	Dated	Case

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INVENTORS

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OTHER INFORMATION

KEYWORDS

blood, portable NMR, water content, relaxometry, chemistry assays

CATEGORIZED AS

- **Medical**
  - Diagnostics
  - Other

RELATED CASES

2019-590-0

United States Of America Published Application 2022021429 07/07/2022 2019-590

RELATED MATERIALS

- Fricke, S. N., Pourtabib, J., Madsen, J., Chizari, S., Phan, J., Tran, N. K., & Augustine, M. P. (2019). Estimates of blood plasma water content using portable NMR relaxometry. Measurement Science and Technology, 31(3), [035701] - 09/23/2021

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Hemodynamically Responsive Retrograde Endovascular Balloon Occlusion Of The Aorta (REBOA) Simulator
- Scanning for Spoilage of Food Contents in Metallic and Non-Metallic Containers
- Neural Network Machine Learning Applied to Diagnose Acute Kidney Injury
- Machine Learning Based Diagnostic for Identifying Sepsis

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