Quantitative Tool for Neurological Brain Evaluation

CBF quantifies the volume of arterial blood (ml) delivered to 100mg of tissue per minute, thus representing instantaneous capillary flow in tissue.

CBV describes the blood volume of the cerebral capillaries and venules (not arteries) per cerebral tissue volume.

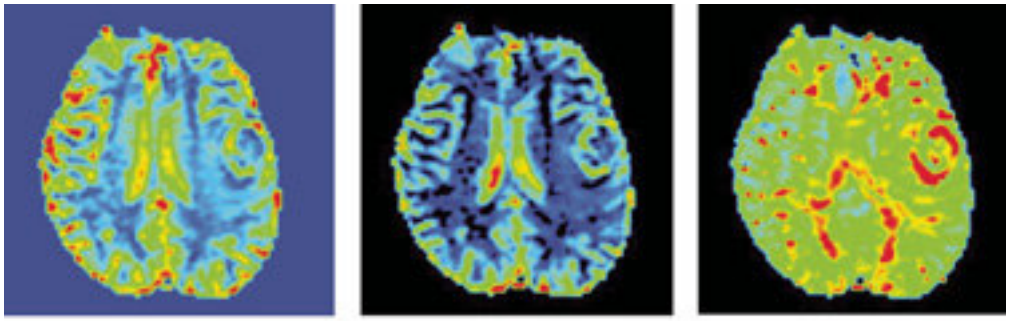
MTT measures the length of time a certain volume of blood spends in the cerebral capillary circulation.

TTP is inversely related to CBF in which reduction of blood flow results in an increase in the time needed for the contrast to reach its peak in the perfused volume of brain tissue.

Mental and neurological disorders affect an estimated 450 million people worldwide, and account for approximately 13 percent of disability-adjusted life years, or DALYs, a measure of the amount of health lost as a result of a particular condition or disease.[1] Disorders such as Alzheimer's, Parkinson's, epilepsy, dementia and stroke pose a growing health problem for nearly all countries. In the U.S. alone, stroke is the third leading cause of death, claiming one in 16 lives according to the American Stroke Association. Of the 700,000 people who experience a stroke each year, 500,000 are sufferers of a first attack and 200,000 experience recurrent attacks. In addition, 87 percent of all strokes are ischemic, whereas intracerebral and subarachnoid hemorrhage strokes make up the remaining 13 percent.[2]

In spite of the acute stroke being a leading cause of serious, long-term illness, many patients are not diagnosed correctly or the diagnose arrives too late for the ischemic stroke patients to benefit from tPA (thrombolysis) treatment, which has to be administered within three hours of the onset of the disease. Therefore, the need to quickly diagnose and correctly differentiate stroke is an important driver in neurological imaging today. MR offers excellent clinical properties for imaging neurological conditions, such as stroke, allows complete assessment in a single exam, and assists physicians in making a differential diagnosis.

To address the growing need for sophisticated neurological imaging, BrainSTAT is a new advanced post-processing tool from GE Healthcare that allows quantitative evaluation of neurological conditions, as well as helps visualize vascular structure and flow in the tissue surrounding brain lesions. As a result, clinicians may use it to more precisely diagnose the extent and severity of ischemic brain disease, and better tailor an individualized therapy plan.



CBF (ml/100mg/min) CBV (ml/100mg) MTT (sec)

These parametric images reflect the spatial distribution of blood flow, blood volume per 100 mg of tissue, and the time it takes for blood to perfuse through the tissue being imaged.

Designed for the new Signa® HDxt MR, BrainSTAT calculates regional cerebral blood flow (rCBF), blood volume (rCBV), mean transit time (rMTT) and time to peak (TTP) for every pixel from a time series of MR image data. The results are visualized as color-coded maps.

Based on the widely accepted, scientifically proven Gamma Variate Fit algorithm, BrainSTAT provides objective and reproducible data on pathologies that may assist clinicians in delivering better, more personalized care. ■

References

1. Mental and Neurological Disorders. July 2006 newsletter by the Disease Control Priorities Project. Available at: http://www.dcp2.org/file/60/DCPP--Mental%20Health.pdf
2. American Heart Association/American Stroke Association. Heart Disease and Stroke Statistics – 2007 Update. Available at: www.americanheart.org