OMICS International
conferenceseries.com

J Nucl Med Radiat Ther 2015, 6:4
http://dx.doi.org/10.4172/2155-9619.S1.003

International Conference on Medical Physics

August 03-05, 2015 Birmingham, UK

Nonlinear magnitude and linear phase behaviors of complex T2* imaging

Zikuan Chen and **Vince Calhoun**
The Mind Research Network and LBERI, USA

The underlying source of brain imaging by T2*-weighted magnetic resonance imaging (T2*MRI) is the intracranial inhomogeneous tissue magnetic susceptibility (denoted byχ) that causes an inhomogeneous field map (via. magnetization) in a main field. By decomposing T2*MRI into two steps, we understand that the 1st step from aχsource to a field map is a linear but non-isomorphic spatial mapping, and the 2nd step from the field map to a T2* image is a nonlinear mapping due to the trigonometric behavior of spin precession signals. The magnitude and phase calculations from a complex T2* image introduce additional nonlinearities. In this report, we look into the magnitude and phase behaviors of the T2* image (signal) by theoretical approximation and Monte Carlo simulation. We perform a 1st-order Taylor expansion on the intravoxel dephasing formula of T2* signal and show that T2* magnitude is a quadratic mapping of the field map and T2* phase is a linear isomorphic mapping. By Monte Carlo simulation of T2*MRI for a span of echo times (with B0=3T and TE= [0,120] ms), we first confirm the quadratic magnitude and linear phase behaviors in the small phase angle regime (at TE<30ms), and then provide more general magnitude and phase nonlinear behaviors in large phase angle scenarios (at TE>30ms). By solving the T2*MRI inverse, we perform χtomography by reconstructing the χsource from a T2* phase image. For large phase angle scenarios, we show that imperfect phase unwrapping imposes additional distortions on the χ tomography.

zchen@mrn.org

Suitability of electrolyzed oxidizing water for the disinfection of hard surfaces and equipment in radiology

Robert Pintaric[1], **Joze Matela**[1] and **Stefan Pintaric**[2]
[1]University Medical Centre Maribor, Slovenia
[2]University of Ljubljana, Slovenia

Background: Hospitals are faced with increasingly resistant strains of micro-organisms. When it comes to disinfection, individual parts of electronic equipment of angiology diagnostics such as patient couches of computer tomography (CT) and magnetic resonance imaging (MRI) scanners prove to be very hard to disinfect. Disinfectants of choice are therefore expected to possess properties such as rapid, residue-free action without any damaging effect on the sensitive electronic equipment. This paper discusses the use of the neutral electrolyzed oxidizing water (EOW) as a biocide for the disinfection of diagnostic rooms and equipment.

Methods: The CT and MRI rooms were aerosolized with EOW using aerosolization device. The presence of micro-organisms before and after the aerosolization was recorded with the help of sedimentation and cyclone air sampling. Total body count (TBC) was evaluated in absolute and log values.

Results: The number of micro-organisms in hospital rooms was low as expected. Nevertheless, a possible TBC reduction between 78.99–92.50% or 50.50–70.60% in log values was recorded.

Conclusions: The research has shown that the use of EOW for the air and hard surface disinfection can considerably reduce the presence of micro-organisms and consequently the possibility of hospital infections. It has also demonstrated that the sedimentation procedure is insufficient for the TBC determination. The use of Biocide aerosolization proved to be efficient and safe in all applied ways. Also, no eventual damage to exposed devices or staff was recorded.

robert.pintaric@gmail.com