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**PROGRESSOS RECENTES EM  
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(WORKSHOP)**

**INFORMAÇÕES GERAIS**

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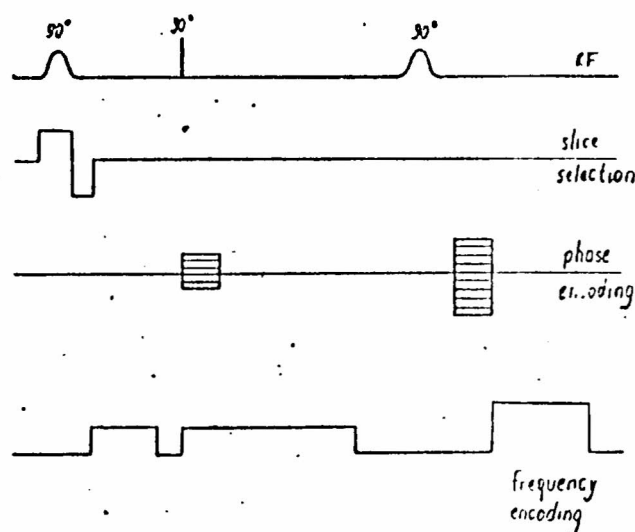
Spin-echo and inversion-recovery techniques have been extensively used in NMR imaging for the generation of respectively  $T_2$ - and  $T_1$ -weighted images, that are important for medical diagnostic purposes. A drawback of these techniques is that for obtaining the weighted images, it is necessary to change the RF pulse sequence.

An imaging technique is described that allows the obtention of simultaneous  $T_1$ - and  $T_2$ -weighted images, without altering the pulse sequence parameters. This technique is based on the application of three  $90^\circ$  pulses<sup>(1)</sup>, following the scheme  $90^\circ - \tau - 90^\circ - (T - \tau) - 90^\circ$ . If  $T \gg 2\tau$ , five echoes are in general produced, the HAHN's echo ( $t = 2\tau$ ), the stimulated echo ( $t = T + \tau$ ) and three secondary echoes ( $t = 2T - 2\tau$ ,  $t = 2T - \tau$ ,  $t = 2T$ ). The amplitudes of HAHN's and secondary echoes possess  $T_2$  dependence, while that of the stimulated echo has a particular dependence on  $T_1$  and  $T_2$ . These echoes may then be used for the generation of images with different  $T_1$  and  $T_2$  contrasts.

The image sequence that codifies spatially the phase and frequency components of the echoes is depicted below<sup>(2)</sup>. In this sequence, the stimulated echo is not affected by the gradients applied between the second and third  $90^\circ$  pulses, because it results from the longitudinal component of magnetization stored during this time interval. The other echoes, but the secondary one at  $t = 2T - \tau$ , which depends only on the gradients applied after the second  $90^\circ$  pulse, are affected by all the gradients applied prior to their formation. This behavior permits the obtention of images with different spatial resolutions when the gradients applied have differing maximum amplitudes.

(1) HAHN, E.L., Spin Echoes. Phys. Review, vol. 80, n° 4, pages 580-594 (1950).

(2) FRAHM, J., MERBOLDT, K.D., HANICKE, W., HAASE, A.- J. Magnetic Resonance 64, pages 81-93 (1985).



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