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ECR 2023 / C-18634

Anatomical regions and Body Mass Index: A Specific Absorption Rate (SAR) problem

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Purpose

The aim of this study is the analysis of SAR during MRI scans, and correlate them with gender, Body Mass Index, type of pulse sequence, acquisition time and the radiofrequencies applied on pulse sequences, and also the anatomic area.

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Methods and materials

Subjects had to be over 18 years of age and perform MRI exams specific anatomical areas; in a total of 123 MRI exams in total - 33 Cranioencephalic, 18 Abdominal, 17 Pelvic, 17 Breast, 20 Knee and 18 Lumbar Spine exams. The MRI equipment from which the data was extracted was a Siemens Magnetom Symphony equipment from Siemens AG, Siemens Healthcare Sector, with a magnetic field strength of 1.5 Tesla with a type of superconducting magnet; the bandwidth of the transmitter is 500 kHz and...

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Results

In Table 1, we can see the distribution of the age group by anatomical zone, with the range being from 21 to 88 years. All anatomical areas have a close average age, with knee examinations corresponding to the lowest average age and abdominal examinations the highest mean age. [Table 1] Table 2 shows the patients' height, weight and BMI, by anatomical zone. The average height is relatively equal for all anatomical areas, all around 1.60 m, with a deviation of 0.097. [Table 2] Actual and...

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Conclusion

The role of MRI exams in the diagnosis of the patient has been growing and, therefore, also the interest in the biological effects inherent to their performance. In this context, the concept of Specific Absorption Rate - SAR - emerges, which measures the energy rate of the radio frequencies absorbed per unit mass in the tissue and allows monitoring of the temperature increase when performing MRI exams. From the descriptive and inferential analysis of the data, it can be concluded that, in general, it is...

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Personal information and conflict of interest

C. Romão: Nothing to disclose A. F. C. L. Abrantes: Nothing to disclose L. P. V. Ribeiro: Nothing to disclose S. I. Rodrigues: Nothing to disclose J. Pinheiro: Nothing to disclose R. P. P. Almeida: Nothing to disclose

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Table 1 - Sample details for age, mean, standard deviation (SD), Minimum and Maximum.

	Age Group in Years			
	Mean	SD	Min	Max
Brain	52.8	1.1	3.0	80.0
Abdomen	61.9	3.8	3.0	84.0
Pelvis	63.4	3.2	4.0	78.0
Breast	53.5	3.4	3.0	67.0
Lower	47.9	3.4	3.0	70.0
Spine	58.7	3.8	3.0	80.0
Total	58.4	3.8	3.0	80.0

Table 1: Sample details for age, mean, standard deviation (SD), Minimum and Maximum.

Table 2 - Sample by height, weight, and BMI.

Table 1. Summary of participant characteristics								
		Brain	Abdomen	Pelvis	Breast	Lower	Spine	Total
Height (m)	Mean	1.65	1.67	1.65	1.61	1.63	1.64	1.64
	SD	0.09	0.11	0.09	0.06	0.10	0.11	0.10
	Min	1.50	1.50	1.50	1.50	1.48	1.48	1.48
	Max	1.87	1.89	1.79	1.68	1.87	1.77	1.89
Weight (kg)	Mean	78.87	71.89	77.20	66.09	76.88	77.79	79.11
	SD	16.99	11.71	16.90	11.11	16.94	17.41	17.71
	Min	45.00	46.00	46.00	50.79	49.00	55.50	46.00
	Max	126.0	111.3	108.3	101.3	109.4	119.3	110.3
BMI (kg/m ²)	Mean	25.83	21.93	26.18	25.11	26.77	26.66	26.90
	SD	5.20	4.90	4.87	4.84	5.33	4.80	5.17
	Min	18.79	15.57	19.74	18.64	18.59	19.48	15.57
	Max	43.60	41.87	37.95	38.04	39.93	39.47	48.90
N		33	18	17	17	30	18	111

Table 2: Sample by height, weight, and BMI.

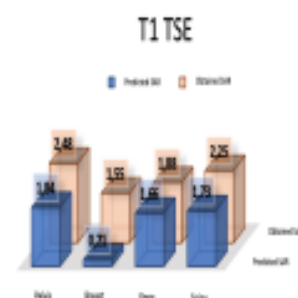


Figure 1 - SAR mean values for predicted and obtained values (W7kg).

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Figure 2 - SAR mean by % for different anatomical areas.

Fig 2: SAR mean by % for different anatomical areas.

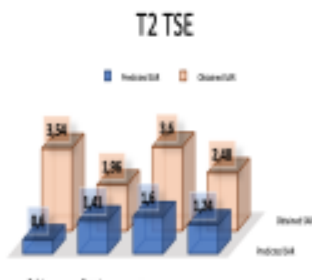


Figure 3 - Mean SAR values, predicted and obtained (W7kg) for T2 TSE in different anatomical areas.

Fig 3: Mean SAR values, predicted and obtained (W7kg) for T2 TSE in different...

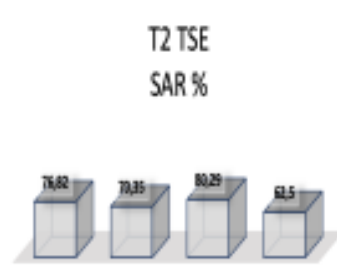


Figure 4 - Mean SAR % for T2 TSE in different anatomical areas.

Fig 4: Mean SAR % for T2 TSE in different anatomical areas.

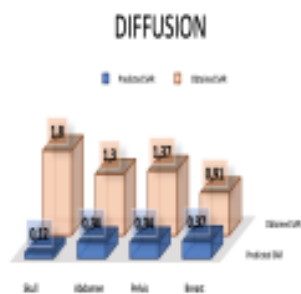


Figure 5: Mean SAR values, predicted and obtained ((W/kg) for Diffusion.

Fig 5: Mean SAR values, predicted and obtained ((W/kg) for Diffusion.

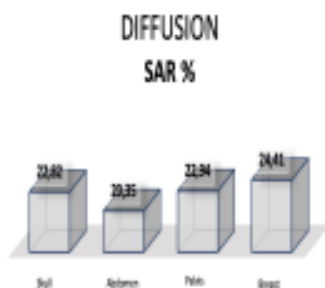


Figure 6: Mean SAR % for Diffusion in different anatomical areas.

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