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### Feasibility of Using Statistical Tests in Evaluation of Non-uniformity

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#### Abstract:

Introduction: Non-uniformity test is essentially the only required daily QC procedure in nuclear medicine practice. Noise creates statistical variation or random error in a flood image. Non-uniformity on the other hand does not have statistical nature and may be regarded as systemic error. The present methods of non-uniformity calculation do not distinguish between these two types of error. The Jarque-Bera and Kolmogorov-Smirnov tests were examined as alternative methods in calculation of non-uniformity in flood test images. Methods: Using the Monte carol method, uniform and non-uniform flood images of different matrix sizes and count density were generated. The uniformity of the images was calculated using the present and proposed methods. The results were also tested using 1300 planar images of 128x128 matrix size. Results: The proposed methods were more accurate and sensitive to non-uniformity at low count density. However, their precisions were less than the conventional methods. There were no significant differences between these procedures at high count density. Conclusion: The integral and differential uniformity do not distinguish between noise always present in the data or in occasional non-uniformity. In a uniform intact flood image, the difference between maximum and minimum pixel count (the value of integral uniformity) is much more than recommended values for non-uniformity. After filtration of image this difference decreases but still remains high. The proposed methods are more sensitive to non-uniformity at low count density and may be used as alternative methods in daily uniformity test.

#### Keywords:

Nuclear Medicine , Quality control , Non-uniformity test , Kolmogorov-Smirnov , Jarque-Bera

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