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A NEW COMPUTATIONAL SOLUTION TO COMPUTE THE UPTAKE INDEX FROM 99MTC-MDP BONE SCINTIGRAPHY IMAGES

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Summary: The appearance of bone metastasis in patients with breast or prostate cancer makes the skeleton the organ most affected by metastatic cancer. It is estimated that these two cancers lead in 80% of the cases to the appearance of bone metastasis, which is considered the main cause of death. 99mTc-methylene diphosphonate (99mTc-MDP) bone scintigraphy is the most commonly used radionuclide imaging technique for the detection and prognosis of bone carcinoma. With this work, it was intended to develop a computational solution to extract from 99mTc-MDP bone scintigraphy images quantitative measurements of the affected regions in relation to the non-pathological regions. Hence, the computed uptake indexes from a new imaging exam were compared with the indexes computed from a previous exam of the same patient. We evaluated the scintigraphic images of 15 patients (7 females and 8 males) with bone carcinoma in two distinct time exams. The bone scans were obtained approximately 3 hours after the injection of 740MBq of 99mTc-MDP. Using active shape models, it was possible to segment the regions of the skeleton more prone to be affected by the bone carcinoma.The metastasis were obtained using the region growing algorithm. The uptake rate was calculated from the relation between the maximum intensity pixel of the metastatic region in relation to the maximum intensity pixel of the skeletal region where the metastasis was located. The obtained indexes were compared against the evaluations in the clinical reports of the patients. It was possible to verify that the indexes obtained are inline with the clinical evaluations of the 30 exams analyzed. However, there were 2 cases where the clinical evaluation was unclear as to the progression or regression of the disease, and when comparing the indexes, it is suggested the progression of the disease in one case and the regression in the other case. Based on the present results, it is possible to verify that the computed indexes allow a quantitative analysis to evaluate the response to the prescribed therapy. Thus, the developed solution is promising to be used as tool to help the technician at the time of clinical evaluation.