significant. Results are summarized in Table 1 with an example of studied patient in Figure 1.

<table>
<thead>
<tr>
<th></th>
<th>Contrast</th>
<th>Without Contrast</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area/Volume</td>
<td>-</td>
<td>+</td>
<td>0.036</td>
</tr>
<tr>
<td>Mean</td>
<td>+</td>
<td>-</td>
<td>n.s.</td>
</tr>
<tr>
<td>Skewness</td>
<td>+</td>
<td>-</td>
<td>0.007</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>-</td>
<td>+</td>
<td>0.046</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>-</td>
<td>+</td>
<td>n.s.</td>
</tr>
<tr>
<td>Entropy</td>
<td>+</td>
<td>-</td>
<td>0.007</td>
</tr>
</tbody>
</table>

Conclusion: Contrast medium administration significantly influences morphological and textural features derived from CT of NSCLC. The difference can be related both to technical factors and to different tissue components of which it is expression. As these features are known predictors of different NSCLC outcomes and may be included in predictive models useful for the creation of therapeutic decision-making systems, the standardization of technical protocols seems appropriate.

Material and Methods: Sets of homogenous agar, agarose and polyvinyl alcohol (PVA) gel phantoms were created, as shown in Figure 1, to optimise DKI parameters to be representative of prostate cancer. For this purpose, different concentrations of agar (1.0% - 1.5% - 2.0% - 2.5% - 3.0% weight/volume percentage (w,v)), agarose (0.5% - 1.0% - 1.5% - 2.0% - 2.5% - 3.0% w,v) and PVA (5.0% - 7.5% - 10.0% - 12.5% - 15.0% - 20% w,v) were used. A Siemens MAGNETOM® Skyra 3T system was used to acquire an MR scan of the phantoms using a single-shot spin-echo echo-planar sequence with different diffusion weighting levels “b value” (0 to 4000 s/mm² in intervals of 500). Analysis of DKI was performed on a pixel-by-pixel basis in-house software (MATLAB).

Results: As the concentration of the gel increases, there are more restrictions to the water diffusion; therefore, the non-Gaussanity of the diffusion propagator and the kurtosis increases. According to the kurtosis (K) and diffusion coefficient (D) results, the measured kurtosis decreases for decreasing b(max). This sensitivity of diffusion kurtosis was obtained in all of the phantoms but more in agarose gels in comparison with PVA and agar samples.

Figure 2a shows the signal intensities (I) of agarose phantoms for each b values as well as the importance of noise floor in high b values (Fig. 2b).
Conclusions: We demonstrated the feasibility of making and using gel phantoms for the assessment of isotropic diffusion kurtosis to use in the characterization of early stage prostate cancer treated with prostate brachytherapy. We have shown that the rectified noise floor, which exists in standard magnitude data, increases the systematic error of the diffusion coefficients D and K. Further studies are in progress to minimize the impact of noise floor in DKI.

EP-1879
Difference between PET and RMI fusion on delineation variability for liver metastases
R. Tanguy1, A. Gaumier1, M.P. Sunyach1, G. Beldjoudi1
1Centre Léon Bérard, Radiation Therapy, Lyon, France

Purpose or Objective: Liver metastases delineation on the dosimetric computed-tomography (CT) scan is associated with high inter-observer variations. Many authors are using a fusion of the dosimetric CT scan with a magnetic resonance imaging (MRI) to define the target volume and lower the inter-observer variations. In our center we are using PET-CT / dosimetric CT fusion or RMI / dosimetric CT fusion to delineate liver lesions depending on physicians habits. We wanted here to evaluate the benefit of each imaging registration on contouring variability.

Material and Methods: Four patients (pts) were treated with stereotactic body radiation therapy (SBRT) for 6 liver metastases. Each pt had a CT scan simulation, a liver-MRI and a PET-CT before treatment. Four physicians delineated the liver lesions on the fused PET-CT and on the fused RMI. For each pt, each physician made 2 contours on the CT scan in the following order: first with the PET-CT fusion available (PET/CT), then with the CT/MRI fusion available (RMI/CT). The percentages of common contoured volumes (CCV) on the PET-CT and RMI/CT were defined using the formula: (common volume of all the physicians of the group / delineated volume of the physician) x 100. The Jaccard index (ratio between delineated volume and the union volume obtained using the boolean operators) was also calculated.

Results: The volume of the delineated lesions were (mean +/- SD) 18.8 cc +/- 12cc vs 20.8 cc +/- 13.6 cc on PET/CT and RMI/CT respectively (p=0.63). The common contour volume wasn’t statistically different between the two contouring modalities with (mean +/- SD) 56.2% +/- 21.5% vs 63.3% +/- 13.9% for PET/CT and RMI/CT respectively (p=0.1) even if there was a trend for a lesser variability for RMI fusion. The overall Jaccard index (mean +/- SD) was 0.34±0.15 and 0.46±0.19 for PET/CT and RMI/CT respectively (p=0.26).

Conclusion: A PET/CT fusion didn’t improve the volume variation among the radiation oncologists compared to a RMI fusion. The CCV and Jaccard index were still unsatisfying with both PET/CT and RMI/CT fusion and we are planning to assess the potential impact of a liver metastases contour made by a radiologist to further improve the inter-observer variability.

EP-1880
Validation of the use of digital camera for the prediction of skin toxicity in breast radiotherapy
M. Poli1, S. Bresciani1, A. Miranti1, A. Di D aio1, A. Maggio1, M. Gatti1, P. Gabriele1, M. Stasi1
1Candiolo Cancer Institute - FPO- IRCCS, Medical Physics, Candiolo, Italy
2Candiolo Cancer Institute - FPO- IRCCS, Radiotherapy, Candiolo, Italy

Purpose or Objective: Skin reactions are one of the most common side effects in breast cancer patient treated with radiotherapy. In this work a preliminary validation of the use of a digital camera, as a cheap and easy tool for early prediction of acute skin side effects, is presented.

Material and Methods: Twelve patients undergoing breast radiotherapy were photographed once a week with a digital camera system, composed of a reflex Canon 3D0 (CMOS sensor, 8.2 Megapixels) and a Tamron SP AF17-50mm f/2.8 XR. Patients were treated with two different techniques: conventional 3DCRT with Varian TrueBeam STx linac (8 patients) and Tomotherapy HD (4 patients). All photographic shots were acquired in manual-raw mode with the same exposure and white balance setup. Shots were converted in the best quality format available (TIFF) and post-processed in Lab color space (Color Space Converter plugin for ImageJ. NIH) to amplify color differences. From the channel related to image redness (a*), a skin redness level was obtained for each photographed fraction by using ImageJ. In particular, two regions of interest (ROIs) were identified: one inside the treatment field (IF) and one out-of-field (OF). Redness value histograms, related to each ROI, was acquired, plotted and used to evaluate the degree of skin redness level. ROI-redness (RR) was defined as the maximum redness value of the related histogram. The OF ROI defined the redness baseline. If RR values were plotted as a function of the corresponding fraction number and fitted with a line; the slope of this of this line is defined as RR gradient. For each patient, skin toxicity, evaluated with RTOG criteria, was compared to the RR gradient.

Results: G1 and G2 toxicities were experienced by 10 and 2 patients, respectively. A strong relation between RR gradient and skin toxicity was found: an average RR gradient of (0.24±0.09) redness/fraction was found for G1 patients, while an average RR gradient of (0.54±0.15) redness/fraction was found for G2 patients. Due to the small statistical power of the present sample, p-values were not evaluated. The trend of the fit may be correctly assessed since the first 2 weeks of treatment. Changes in skin redness were found when comparing patients treated with conventional 3DCRT with those treated with Tomotherapy. In fact, several hot spots were noticed for the conventional treatments rather than for the volumetric irradiations, that resulted in a more homogeneous skin redness.