X-ray angiography using kinetic imaging: optimizing image signal-to-noise ratio

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Disclosures

I have the following potential conflicts of interest to report:

• I received travel support from the Semmelweis University

• I am employed by and receiving honoraria from Kinepict Health Ltd as a researcher
How is it made?

- Raw series
- Standard deviation
- Averaging or summation
- Mask image
- Subtracted series
- Kinetic image
- sumDSA image
Which one is better?

SumDSA

Kinetic image
Signal-to-Noise Ratio, SNR

Signal = mean intensity difference

Noise = background standard deviation

SNR depends on radiation and contrast agent dose. The higher the dose, the higher the SNR.

Used software: FIJI / ImageJ
Parameters of our study

- 42 patients, 42x3 angiographies
- Abdominal, pelvic and femoral regions
- 1903 measuring point (10-20 per image)

Images aquired by Marcell Gyánó, MD Heart and Vascular Center of Semmelweis University
Types of images

1. Raw, sumDSA (rsDSA):
   no post-processing

2. Siemens post-processed sumDSA (ssDSA):
   rsDSA + Pixel Shift + other (Siemens Syngo - 2016)

3. Kinetic image:
   generated by Kinepict Software
# Results of SNR measurements

<table>
<thead>
<tr>
<th>Confidence interval</th>
<th>rsDSA</th>
<th>ssDSA</th>
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</thead>
<tbody>
<tr>
<td>&lt; 2.5%</td>
<td>1.34</td>
<td>0.78</td>
</tr>
<tr>
<td>&gt; 97.5%</td>
<td>7.68</td>
<td>5.53</td>
</tr>
<tr>
<td>median</td>
<td>3.26</td>
<td>2.28</td>
</tr>
</tbody>
</table>
The relation of SNR and „bolus shape“

SNR is the same in both images.

2-times higher SNR in the kinetic image

3-times higher SNR in the kinetic image

6-times higher SNR in the kinetic image
Conclusions – Dose reduction

- 2-3 times better SNR which can be improved by alternative contrast agent administration methods

- **Propective aim:** significant reduction of radiation and contrast agent dose
Thank you for your attention

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Contact us, if you would like to participate in our research!