

Change of ADC value of breast cancer in patients undergoing neoadjuvant chemotherapy: preliminary study

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Introduction: To our knowledge study about the change of ADC (apparent diffusion coefficient) value of breast cancer in patients undergoing neoadjuvant chemotherapy has not been reported, whether ADC value can reflect response of breast cancer to it in the tumor cellular level should be studied actively.

Purpose: To investigate ADC value change of breast cancer in patients undergoing neoadjuvant chemotherapy.

Methods: Fifteen women (total of 17 tumors) between the ages of 41 and 62 years with biopsy-confirmed invasive breast cancer underwent bilateral breast MRI-DWI examination (GE EXCITE HD1.5T) prior to neoadjuvant chemotherapy (AT regimen) and after the first cycle therapy. ADC values were measured respectively on ADC map and analyzed by SPSS. DWI was performed by SE-EPI (B=1000, 2 NEX, acquisition time about 40~50s) with ASSET technique (array spatial sensitivity encoding technique).

Results: ADC values of all tumors, except for 2, increased to different extent after neoadjuvant chemotherapy, although the size of most tumors shrunk only slightly after 1 cycle therapy. Table 1 showed mean ADC values prior to and after treatment.

Table 1.

Mean ADC value prior to therapy (mm ² /s)		Mean ADC value after therapy (mm ² /s)		<i>t</i>	<i>P</i>
<i>x</i>	<i>s</i>	<i>x</i>	<i>s</i>		
1.0524x10 ⁻³	0.2756x10 ⁻³	1.2908x10 ⁻³	0.4028x10 ⁻³	-3.8870	0.001

Discussion and Conclusion: Many studies have shown that tumor water diffusion is associated with tumor cellularity [1-2]. The spatial gradation of increasing diffusion from cellular/solid viable tumor to the acellular necrotic region of human gliomas has been noted [3] and suggests that the temporal evolution from viable tumor to treatment-induced necrotic tumor should be documented by an increasing diffusion coefficient as well. Our preliminary results revealed ADC value increased significantly after the first cycle neoadjuvant chemotherapy compared with that prior to treatment, so DWI can reflect response of breast cancer to neoadjuvant chemotherapy in the tumor cellular level by ADC value. The relationship between the change of ADC value and that of the tumor size are being studied by our group. Whether it can provide early evidence of neoadjuvant chemotherapeutic efficacy in breast cancer patients prior to the completion of the therapeutic regimen should be studied further.

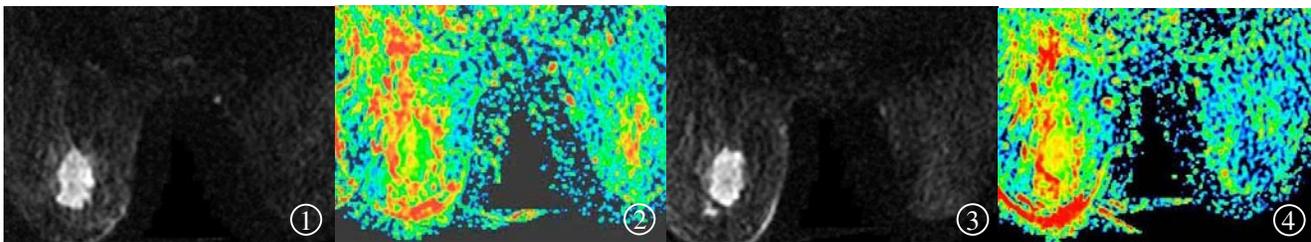


Fig1, 2. A case of 62 years old patient with invasive ductal carcinoma. Prior to neoadjuvant chemotherapy, the tumor showed hyperintensity on DWI (Fig1) and lower ADC (Fig2) (From green to blue to red on ADC color map, ADC values increase gradually). Fig3, 4. The same case. After the first cycle neoadjuvant chemotherapy, ADC value of tumor increased, on ADC rainbow map, the area of red colour at the center part of the tumor enlarged (Fig4).

Reference:

- [1] Gupta RK, et al. Magn Reson Med. 1999;41:2-7.
- [2] Lyng H, et al. Magn Reson Med. 2000;43:828-836.
- [3] Chenevert TL, et al. Radiology. 1990;177-405.