Age-related Changes of Prostate Peripheral Zone in Normal Adults£ºEvaluation by DTI

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Target audience：radiologist；urologist

objective The feasibility and reproducibility of diffusion tensor imaging (DTI) to assess prostate tissue has been confirmed by several studies recently [1-3]. But few studies have suggested the age-related changes of prostate peripheral zone in normal adults with DTI. So the purpose of our study was to evaluate the correlation between the DTI parameters of MD/FA values on prostatic peripheral zone and age in normal adults.

Methods 57 normal adults were divided into 4 groups by age: group A (20~35 years, n =20) , group B (36 ~50 years, n =12) , group C (51 ~ 65 years, n =13) , group D (>65 years, n =12) . The MD values and FA values of prostatic peripheral zone were measured. Correlations between the MD/FA values and age were analyzed.

Results The MD values in the group A, B, C and D were $(1601\pm194)\times10^{-6}mm^2/s$, $(1859\pm202)\times10^{-6}mm^2/s$, $(2185\pm160)\times10^{-6}mm^2/s$, $(2456\pm185)\times10^{-6}$ mm^2/s respectively. Statistically significant difference was found among four groups (F =60, P <0.01) . The FA values among different groups were $(248\pm21)\times10^{-3}$, $(222\pm27)\times10^{-3}$, $(193\pm18)\times10^{-3}$, $(173\pm29)\times10^{-3}$, there were statistical significances between groups (F =29, P <0.01) . Pearson analysis suggested that the peripheral zone MD values were positive correlation with ages (r=0.882, p<0.001), and the FA values negative correlation with ages (r=-0.782，p<0.001).

Discussion Our preliminary results showed that the normal peripheral zone of prostate gradually changed with age, MD values has the ascending trend, while FA values tend to decrease. The ADC and FA of prostate provided by DTI may reflect physiological features and pathological changes at the micron level [4]. The ADC value may attribute to the fact that higher diffusion value may appear in older peripheral zone with more glandular tissue and prostatic fluid. Along with the age growth, the peripheral gland start to branch, presenting the shape of gland bubble; fibers reduce between acinus, scattering distribution, thus diffusion anisotropy ratio decreases, tend to isotropic, FA values decrease accordingly.

More than 70% of prostate cancer arise within the peripheral zone, previous studies found that changes in cell size, cell membrane structure and cancerous tissue hyperplasia of fibrosis in disorder were factors causing MD value and FA value differences, but our study also showed that age is also an important factor of the DTI parameters differences.

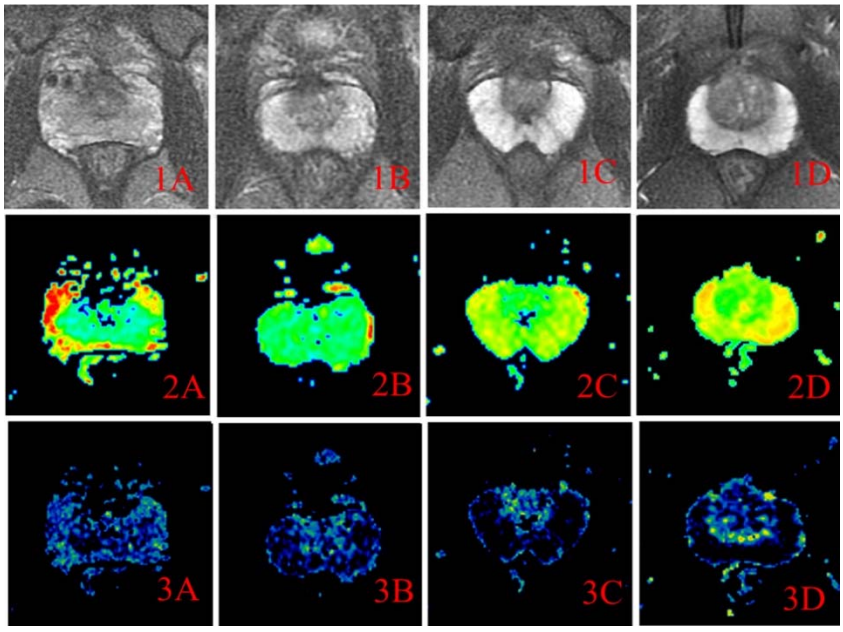

Fig.1 A~D FS-T2WI map of prostate in normal adults, the age were 23, 42, 55 and 71 years old respectively. **Fig.**2 A~D MD map，corresponding with Fig.1 A~D, show yellow and red area in peripheral zone of prostategradually increased with age, MD values has the ascending trend. **Fig.**3 A~D FA map，corresponding with Fig.1 A~D, show blue area was replaced by black in peripheral zone of prostate gradually increased with age. FA values tend to decrease. **Fig.** 4 Pearson correlation test of MD values and age. **Fig. 5** Pearson correlation test of FA values and age

Conclusion The MD values and FA values of normal prostate peripheral zone is different in different age groups, and MD values were increased with age , while FA values decreased. So when diagnosing prostate-relative diseases by DTI, we should take into consideration of the age.

References

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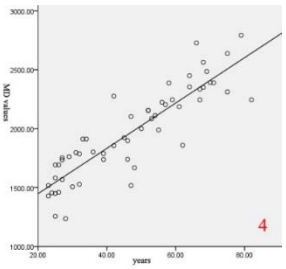

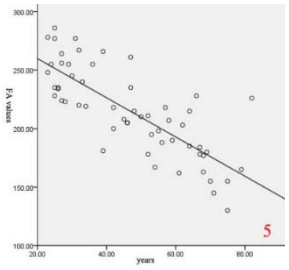

Table 1 MD values and FA values of different age groups in normal prostate peripheral

groups	numbers	MDvalues（$\times10^{-6}mm^2/s$）	FA values（$\times10^{-3}$）
Group A(20~35years old)	20	1601±194	248±21
GroupB(36~50years old)	12	1859±202	222±27
Group C(51~65years old)	13	2185±160	193±18
Group D(>65years old）	12	2456±185	173±29