INTRODUCTION
Cervical spondylotic myelopathy (CSM) is the most common type of spinal cord dysfunction in patients older than 55 years [1]. Unlike it is fragile in acute compression injury such as trauma, spinal cord is rather tolerant of slowly progressive and chronically compression such as CSM. Yet the exact pattern of chronic injury in CSM remains less investigated.

With respect to healthy cervical spinal cord of human beings, the intrinsic microarchitecture varied among the dorsal, lateral and ventral columns of white matter as well as gray matter in terms of fractional anisotropy (FA) under diffusion tensor imaging (DTI) [2]. It was reported that gray matter was stiffer than white matter in bovine spinal cord [3]. It was questioned whether the tissue responses to chronic compression varied in different regions of spinal cord.

This study aimed to investigate the regional diffusivity changes of the enclosed cord in the narrow canal of CSM patients using ten imaging (DTI) technique.

MATERIALS AND METHODS
Subjects
A total of 37 volunteers were recruited in this study with informed consent including 25 adult healthy subjects (46±17 years old) and 12 cervical spondylotic myelopathy (CSM) patients (64±11 years old). The procedures and protocols in this study were approved by the authors’ Institutional Review Board (UW 04-104 T/426).

MRI evaluation
The T1-weighted, T2-weighted and diffusion tensor images of whole entire cervical spinal cord were scanned using a 3.0-Tesla MRI scanner (Philips Achieva). Diffusion MRI images were acquired using pulsed sequences: spin-echo echo-planar imaging (SE-EPI). Diffusion gradients in 15 directions were applied with b-value = 600 s/mm². The imaging parameters were as follow: FOV =80x80 mm, slice thickness = 7 mm, slice gap = 2.2 mm, fold-over direction = AP, NEX = 3, resolution =1x1.26x7.0 mm³, recon resolution =0.63x0.64x7.0 mm³, TE / TR = 60 ms/5 heart beats. The image slice planning was the same as the anatomical axial T1W and T2W images, with 12 slices covering the cervical spinal cord from C1 to C7. Fractional anisotropy (FA) were measured in gray matter (GM), the ventral, lateral and dorsal columns of white matter (WM) respectively.

RESULTS
Clinical evaluations A variety of clinical symptoms were recorded for 12 CSM patients, including numbness (8), clumsy hands (4) or gait disturbance (2), bladder incontinence (1) as well as weakness (2) and neck pain (1) etc. As shown in Figure 2&3, FA values were consistently lower in the dorsal and lateral columns of WM in CSM patients.

CONCLUSIONS
CSM-related diffusion anisotropy changes were region-dependent. The significant lower FA value in dorsal and lateral column of WM suggested more severe demyelination changes in those two regions, which was consistent with clinical features showing sensory deficit. Such chronic injury pattern contributed to the understanding of CSM pathomechanism. Regional analysis of diffusivity changes of the myelopathic cord might help direct surgical intervention to the appropriate level of concern.

ACKNOWLEDGEMENTS
The study is supported by the General Research Fund of the University Grant Council of Hong Kong (771608M).