Supplementary Material

Methodological Details

~~ADC-map~~ Textural Features Database Creation of ADC-Maps and Computation of RF-Classifiers

The processing pipeline of our dedicated CARD-application included the following steps: (**i.**) ~~loading~~ Loading of ADC-maps located in the file system; (**ii.**). ADC-map normalization which is performed by definition of a contour in normal appearing white matter (NAWM); the ADC-maps are scaled such, that *mean* value of the ADC-map pixels within this NAWM-contour is set to a predefined reference value. This data normalization is necessary to eliminate difference in signal levels in the ADC-maps recorded on different MR-scanners and head coil setups; (**iii.**) After normalization, the neuroradiologist defines within each slice in which the tumor is visible a contour around the *complete* tumor affected zone. Per image and lesion a total of 94 texture parameters (to be described in more detail below) were ~~determined~~ computed for each patient. ~~A by the *number-of-pixels-of-each-contour* weighted texture~~ Averages of texture parameters were computed ~~averages~~ over the complete lesion appearing in multiple images; each average being a weighted average with the weighting factor being the number of pixels in each slice. ~~for e~~Each texture parameters is ~~computed and~~ stored, together with the patients' age, into a feature database. ~~–~~For each differential diagnosis pair, a separate Random Forests classifier has been computed.

Computed Texture Features

From the normalized ADC-map the following t*exture maps* are computed for each pixel based on a 5x5 pixel neighborhood (all texture maps are indicated in **CAPITAL BOLD** symbols): Histogram based maps: (**a.**) ADC-map itself (**ORIG**); (**b.**) local **AVER**aged; **c.** local **VARI**ance; **d.** local **ST**andard **DEV**iation; (**e.**) local **SKEW**ness; (**f.**) local **KURT**osis; (**g.**) local **VA**riance-of-**VA**riance. Additionally the following **C**ooccurence [1,2] matrix based texture *maps* are computed: **(h.)** Angular Secondary Moment (**CASM**); (**i.**) **C**-matrix **MEA**n (**CMEA**); (**j.**) **C**-matrix **CON**trast (**CCON**); (**k.**) **C**-matrix **DIS**similarity (**CDIS**); (**l.**) **C**-matrix **HOM**ogeneity (**CHOM**); (**m.**) **C**-matrix **MAX**-probability (**CMAX**); (**n.**) **C**-matrix **ENT**ropy (**CENT**); (**o.**) **C**-matrix **ENE**rgy (**CENE**); (**p.**) **C**-matrix **VAR**iance (**CVAR**); (**q.**) **C**-matrix **COR**relation (**CCOR**). Note that from each ADC-map, 17 derived texture maps are computed, and the exact relationship between the original ADC-map, texture parameter maps and texture parameters are displayed in Figure 3 of the main text. From these maps a total of 94 texture parameters were computed. In the main text of the article an example of an ADC-map with its associated 17 texture maps are displayed in Figure 1 for a patient having a PA. In this study the raters defined contours that surrounded the *complete* tumor affected volume, including cystic components, edema and high cellular density tumor areas. These contours are used to demark the lesion in all texture maps. For each set of pixels defined in each texture map that is enclosed by the user defined contour, the following statistical texture-parameters (indicated in *small italic* symbols) were derived: (*i.*) *mean*, (*ii.*) *st*andard deviation (*stdev*), (*iii.*) variance (*var*), (*iv.*) skewness (*skew*); (*v.*) kurtosis (*kurt*) and (*vi.*) variance of variance (*vava*) are computed. This results in a *theoretical maximum* of 17 x 6 = 102 computed texture parameters from which a total of 94 texture parameters were used (without the variance of variance parameters) as input for the RF-classifiers. In Suppl_Mat_Figure 2 the relationship between the ADC-maps, computed texture maps, and computed texture parameters is displayed. For example the textural feature **CENT**-*kurt* is the kurtosis of the cooccurence entropy map [3].

References Supplementary Material

1. Haralick RM, Shanmugam K, Dinstein I. Textural Features for Image Classification. *IEEE Trans Syst Man Cybern* 1973; SMC-3: 610–621.
2. Haralick RM. Statistical and structural approaches to texture. *Proc IEEE* 1979; 67: 786–804.
3. Slotboom J, Pedrosa de Barros N, Bauer S, et al. Computer Aided Radiological Diagnostics: Random Forest Classification of Glioma Tumor Progression using Image Texture Parameters derived from ADC-Maps. In: *Proceedings 23rd Scientific Meeting, International Society for Magnetic Resonance in Medicine*. Toronto

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