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## The effect of HIV/AIDS on human brain based on MRI images

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Human immunodeficiency virus (HIV) belongs to a subset of retroviruses called lentiviruses (or slow viruses), which means that there is an interval between the initial infection and the onset of symptoms. Upon entering the bloodstream, HIV infects the CD 4+T cells and begins to replicate rapidly. Acquired immunodeficiency syndrome (AIDS) is the final stage of HIV infection. The brain may be affected by a variety of abnormalities in association with HIV infection. Researchers have found significant damage in the brains of HIV-positive patients whose viral load is effectively suppressed by anti-retroviral therapy; But It is unclear how HIV causes such brain injury. Understanding these mechanisms is important to develop appropriate neuro-protective interventions for those people in Sudan, Africa and all over the world. The main core of this thesis is to develop an algorithm which can be used to explore the effect of HIV/AIDS on human brain based on MRI images. Compare the variations of brain cells between normal and abnormal cases and selecting the proper statistical features. Ten positive HIV/AIDS patients -provided written consent-, with detailed medical history was obtained, On the other hand the same number of cases, gender, age, of negative HIV volunteers, Participate this study at Royal Care International Hospital, Khartoum, Sudan. In this study, we presented a statistical based method to assess and analyze given MR brain images after applying tow dimension discrete wavelet transform, it proves that the effectiveness of twelve of statistical features derived from thirty five of statistical features for assessment the normal and abnormal brain tissues on digital MRI. The statistical features achieved the best results which used for implementation algorithm for brain cell changes detection for positive HIV patients in comparison to negative cases with sensitivity of 83.1%, specificity of 88.1% , positive predictive of 87.5%, negative predictive of 83.9% and the overall performance of 85.6%.

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