In magnetic resonance imaging (MRI), lumbar disc herniation (LDH) detection is challenging due to the various shapes, sizes, angles, and regions associated with bulges, protrusions, extrusions, and sequestrations. Lumbar abnormalities in MRI can be detected automatically by using deep learning methods. As deep learning models gain recognition, they may assist in diagnosing LDH with MRI images and provide initial interpretation in clinical settings. YOU ONLY LOOK ONCE (YOLO) model series are often used to train deep learning algorithms for real-time biomedical image detection and prediction. This study aims to confirm which YOLO models (YOLOv5, YOLOv6, and YOLOv7) perform well in detecting LDH in different regions of the lumbar intervertebral disc. Materials and methods: The methodology involves several steps, including converting DICOM images to JPEG, reviewing and selecting MRI slices for labeling and augmentation using ROBOFLOW, and constructing YOLOv5x, YOLOv6, and YOLOv7 models based on the dataset. The training dataset was combined with the radiologist's labeling and annotation, and then the deep learning models were trained using the training/validation dataset. Results: Our result showed that the 550-dataset with augmentation (AUG) or without augmentation (non-AUG) in YOLOv5x generates satisfactory training performance in LDH detection. The AUG dataset's overall performance provides slightly higher accuracy than the non-AUG. YOLOv5x showed the highest performance with 89.30% mAP compared to YOLOv6, and YOLOv7. Also, YOLOv5x in the non-AUG dataset showed the balance LDH region detections in L2-L3, L3-L4, L4-L5, and L5-S1 with above 90%. This illustrates the competitiveness of using non-AUG datasets to detect LDH. Conclusion: Using YOLOv5x and the 550 augmented dataset, LDH can be detected with promising both in non-AUG and AUG datasets. By utilizing the most appropriate YOLO model, clinicians have a greater chance of diagnosing LDH early and preventing adverse effects for their patients [1)].

1)
Prisilla AA, Guo YL, Jan YK, Lin CY, Lin FY, Liau BY, Tsai JY, Ardhianto P, Pusparani Y, Lung CW. An approach to the diagnosis of lumbar disc herniation using deep learning models. Front Bioeng Biotechnol. 2023 Sep 4;11:1247112. doi: 10.3389/fbioe.2023.1247112. PMID: 37731760; PMCID: PMC10507264.