Bibliographic Cite	Literature Type	Level of Evidence	Purpose	Population	Intervention and Outcome Measures	Results/ Recommendations	Limitations
Chang MY, Lee SH, Ha JW, et al. Predicting bone marrow edema and fracture age in vertebral fragility fractures using MDCT. AJR Am J Roentgenol. 2020; 215(4):970-977.	Single center retrospective	Low	To evaluate whether CT features can predict bone marrow edema (BME) on MRI and fracture age in vertebral fragility fractures.	Patients who had undergone both spine CT and spine MRI within 7 days were recruited. 189 thoracolumbar compression fractures in 103 patients (14 men, 89 women; mean age, 76 years). All patients were included, regardless of outpatient, inpatient, or emergency department setting.	The presence and extent of BME were assessed on MRI to divide fractures into those with and without BME. The group with BME was then classified for subgroup analysis into fractures with extensive BME (comprising 50% or more of the vertebral body) and those with BME comprising less than 50% of the vertebral body. On CT, five features (presence of cortical or endplate fracture line, presence of trabecular fracture line, presence of condensation band, change in trabecular attenuation, and width of paravertebral soft-tissue change) were analyzed.	All five CT findings were predominantly seen in fractures with BME (p < 0.001). Elevated trabecular attenuation, presence of a cortical or endplate fracture line, and paravertebral soft-tissue width showed excellent diagnostic indication for fractures with BME (ROC AUCs: 0.990, 0.976, and 0.950, respectively). In the subgroup with extensive BME, paravertebral soft-tissue width was significantly higher, whereas the change in trabecular attenuation was lower compared with those with BME comprising less than 50% of the vertebral body (p < 0.001). When BME was present, fracture age was not significantly different between the two subgroups, and only greater trabecular attenuation elevation was predictive of older fracture age on linear mixed model analyses (p < 0.001). Interobserver agreement was good for the trabecular fracture line factor and excellent for all other factors. The authors conclude that CT features accurately correlate with the presence and extent of BME in vertebral fragility fractures. Elevation of trabecular attenuation was the only significant image predictor of fracture age.	First, its retrospective study design including fracture age analysis was the main limitation of this study. Second, multiple myeloma can be present with normal bone marrow signal intensity. VCFs from multiple myeloma can appear benign in 38% of cases. Even symptomatic acute or subacute compression fracture in patients with multiple myeloma may not show BME. Finally, to simplify CT analyses, authors evaluated vertebral bodies only with fractures that were confirmed on MRI. Thus, they could not evaluate the false-positive rate of CT diagnosis of VCFs.
He X, Zhao L, Guo X, et al. Differential diagnostic value of 18F-FDG PET/CT for benign and malignant vertebral compression fractures: Comparison with magnetic resonance imaging. Cancer Manag Res. 2018; 10:2105-2115.	Single center retrospective	Low	To evaluate the differential diagnostic value of 2-[fluorine-18]-fluoro-2-deoxy-D-glucose (18F-FDG) positron emission tomography (PET)/computed tomography (CT) for benign and malignant vertebral compression fractures (VCFs), where the diagnostic accuracy of 18F-FDG PET/CT was compared with MRI.	87 patients (55 males and 32 females; mean age: 68 years; age range: 60–79 years) with 116 VCFs were retrospectively evaluated. Forty-two cases did not have any primary malignancy, whereas 45 cases had histories of malignant tumors	MRI was performed in all the 87 patients, whereas 18F-FDG PET/CT was executed in 51 patients. Three malignant features (convex posterior cortex, epidural mass formation, and pedicle enhancement) from MRI and the maximum standardized uptake value (SUVmax) from 18F-FDG PET/CT were evaluated in benign and malignant VCFs, respectively. Sensitivity, specificity, positive predictive value, and negative predictive value of MRI and 18F-FDG PET/CT were compared in the differentiation of malignant from benign VCFs.	Results showed that the sensitivity and specificity for predicting malignant VCFs were 75.6% and 77.3% for convex posterior cortex, 82.9% and 813% for epidural mass formation, and 85.7% and 70.8% for pedicle enhancement. 18F-FDG PET/CT demonstrated higher sensitivity (100%) but lower specificity (38.9%) as compared to MRI with regard to differentiation between benign and malignant VCFs. A significant difference in the SUVmax values was observed between the benign and malignant fractures (2.9 ± 1.0 vs 5.0 ± 1.8, P < 0.01). Besides the value of SUVmax, it has been noticed that the FDG uptake pattern differed in malignant and benign fractures. The authors conclude that significant MRI findings such as convex posterior cortex, epidural mass formation, and pedicle enhancement are highly suggestive of malignancy. 18F-FDG PET/CT reliably differentiated the fractures of malignant from benign based on both SUVmax and 18F-FDG uptake pattern. In a situation where MRI findings are not diagnostic, 18F-FDG PET/CT provides additional information as it has high sensitivity and is semiquantitative.	Firstly, the optimal cutoff value of SUVmax as suggested is generated from a single-center retrospective study. Such a SUVmax value cannot be used as a general threshold for differentiating the lesions of malignant from benign. The recommended SUVmax threshold for practice required multicenter study with a large population. Additionally, in this study, the MR imaging protocol primarily used T1 and T2 sequences for the evaluation of VCFs, and additional sequences (such as DWI) were not routinely performed in spine MRI.
Liao X, Jin Z, Shi L, et al. Prevalence of ossification of posterior longitudinal ligament in patients with degenerative cervical myelopathy. Cervical spine 3D CT observations in 7210 cases. Spine (Phila Pa 1976). 2020; 45(19):1320-1328.	Cross-sectional study	Low	To investigate the prevalence of ossification of posterior longitudinal ligament (OPLL) in patients with degenerative cervical myelopathy (DCM).	A total of 7210 DCM patients (4546 males and 2664 females; mean age: 54 years, age range from 18 to 89 years) who underwent cervical spine three-dimensional computed tomography (3D-CT) at the Shanghai Changzheng Hospital between January 2012 and December 2016 were included in this study.	Demographic data including age, sex, height, body weight, body mass index (BMI), concomitant diabetes mellitus (DM), and hypertension were recorded. The imaging diagnosis criterion for OPLL was thickness >2mm on axial imaging. All images were reviewed by five experienced spinal surgeons who were familiar with the diagnosis of OPLL. They reviewed the images without knowing the original radiological reports to determine the diagnosis of OPLL before release of the radiological reports.	The overall prevalence of OPLL in the 7210 DCM patients was 18.22%, including 19.73% in males and 15.65% in females, with a significant difference between the two groups (P<0.001). The prevalence of OPLL in DM and hypertensive patients was significantly higher than that in non-DM and normotensive patients (24.16% vs. 18.76% and 22.26% vs. 17.91%, both P<0.001). Comparison by age and BMI showed that the prevalence of OPLL was the highest in the 70- to 79-year age group (21.91%) and obesity group (26.51%), respectively. The authors conclude that this CT-based study revealed that the overall prevalence of OPLL in DCM patients was 18.22%. Furthermore, old age, male sex, comorbid hypertension or DM, and high BMI were risk factors for cervical OPLL. Given its high prevalence, CT examination is suggested to identify possible OPLL in DCM patients.	The authors note several limitations. First, to analyze a larger sample to reduce bias and the premise of maintaining the high reliability assessment, they note failure to evaluate the detailed characteristics of OPLL, which may help to elucidate the pathogenesis of OPLL. In addition, the proportion of symptomatic patients with OPLL remains unclear. Further studies are needed to verify these results.
Liu P, Liang Y, Bian C, et al. Diagnostic accuracy of MR, CT, and ECT in the differentiation of neoplastic from nonneoplastic spine lesions. Asia Pac J Clin Oncol. 2020; 16(5):e192-e197.	Single center retrospective	Low	To provide guidance for appropriate imaging examinations for diagnosing spinal tumors or tumor-like lesions.	The study included 121 patients (62 men and 59 women, between 24 and 83 [57.2 ± 13.9] years of age) with supected spinal tumors. Exclusion criteria included incomplete imaging data, unclear pathological diagnoses, accompanying metabolic bone disease, spinal surgery, current treatment for infections, or history of antituberculosis treatment.	Each patient underwent ≥ 2 imaging examinations, including computerized tomography (CT), magnetic resonance (MR), and/or emission computed tomography (ECT). All patients were diagnosed by pathology after core needle or surgical biopsies. The results were compared with those of pathological examinations using paired chi squared tests, and comparedwith each other. Statistical indicators that tested the consistency of the results included McNemar's and kappa coefficients, as well as receiver operating characteristic curves.	The differences among MR, CT, ECT, and pathology were not significant. The kappa coefficient of MR, CT, and ECT was 46.1%, 36.0%, and 55.9%, respectively. The area under the curve of ECT, MR, and CT scans was 0.809, 0.705, and 0.704, respectively; and the differences among them were significant (P < .05). Post hoc multiple comparisons showed no significant differences among imaging examinations in terms of sensitivity, specificity, misdiagnosis rate, and coincidence rate (P > .05). However, significant differences were noted in the kappa coefficient and missed diagnosis rate (P < .05). The authors conclude that, although ECT was the most accurate imaging method, its high cost and large radiation dosage limit its widespread application. Furthermore, MR verified spinal tumors more effectively; however, CT excluded them more efficiently. In summary, when all factors are considered, MR is still the optimal modality for the diagnosis of spinal tumors, especially during the initial screening.	Study was limited by the number of cases in which ECT was not further divided into PET/CT and SPECT/CT imaging. Therefore, the difference between these two techniques is not clear. Moreover, the tumors were not differentiated into benign or malignant, and images may have shown some variance.

Shim E, Lee JW, Lee E, et al. Cervical spondylotic myelopathy: Diagnostic performance of radiologists with varying levels of experience in comparing MR images acquired using field strengths of 1.5 and 3 Tesla. Acta Radiol. 2019; 60(10):1314-1320.	Retrospective study	low	To compare the performance of both 1.5 and 3-T MRI modalities for diagnosing cervical spondylotic myelopathy (CSM) among radiologists with varying experience levels.	A total of 79 patients were enrolled in this study (48 men, 31 women; mean age¼56.8 years; age range = 30–75 years). The cord was evaluated at a total of 632 cervical disc levels among the 79 patients (eight cervical disc levels per patient).	Four independent readers with different levels of experience reviewed 1.5-T and 3-T MR images of 79 patients with cervical spondylopathies. For both field strengths, images were evaluated for the depiction of intramedullary T2 hyperintensity of the cord according to disc level using a 5-point scale. The score was transformed into a 3-point certainty scale, which converted to absolute value (0 = equivocal, 1 = probable, 2 = definite lesion). Linear mixed model statistics were used to compare the depiction and certainty scale between 1.5-T and 3-T images. Inter-observer agreement was assessed by using Kendall's W statistics.	Inter-observer agreements among the four readers were 0.718 for 1.5-T and 0.784 for 3-T MR images. Diagnostic accuracy of each reader was slightly increased using 3-T and varied regardless of level of reader experience. The certainty of CSM diagnosis was significantly improved using 3-T field strength. Equivocal lesions were significantly decreased in 3-T MRI in all readers. The authors conclude that, compared with 1.5-T MRI, 3-T imaging increased the certainty of the lesion and decreased the number of equivocal lesions in patients with CSM. Diagnostic accuracy was not affected by levels of reader experience.	The present study has several limitations. First, the protocols used to acquire 1.5-T MRI data at outside hospitals were heterogeneous. Second, the gold standards of myelopathy were made by consensus readings owing to the nature of spinal cord lesions that could not be pathologically confirmative and no definite relationships with the clinical complaints such as neck pain. Third, the pattern of intramedullary T2 hyperintensity of the cord was not assessed. There are many studies that have reported a difference in the prognosis of patients according to the shape, margin, and degree of signal intensity of cervical myelopathy on T2W images. The agreement rate and diagnostic certainty of 3-T and 1.5-TMR images may be different depending on patterns of intramedullary T2 hyperintensity.
Shroyer S, Boys G, April MD, et al. Imaging characteristics and CT sensitivity for pyogenic spinal infections. Am J Emerg Med. 2022; 58:148-153.	Single center prospective	Low	To describe pyogenic spinal infection (PSI) imaging characteristics and to estimate CT sensitivity for these infections.	A total of 88 PSI patients (mean age 55 years) presenting to a community emergency department were included.	Authors examined the MRI reports from the patient cohort and reported the prevalence of each PSI type (spinal epidural abscess/infection, vertebral osteomyelitis/discitis, septic facet, and paravertebral abscess/infection) according to contemporary nomenclature. In a 14 patient subcohort who underwent both CT and MRI studies, authors reported the sensitivity for each PSI from a post hoc blinded overread of the CT imaging by a single neuroradiologist.	The PSI prevalence included: spinal epidural abscess/infection (SEA) in 61 (69%), vertebral osteomyelitis/discitis (VO/D) in 54 (61%), septic facet (SF) in 15 (17%), and paravertebral abscess/infection (PVA) in 53 (60%). Of the SEAs, 82% (50/61) were associated with other spinal infections, while 18% (11/61) were isolated SEAs. The overall CT sensitivity in a masked overread was 79% (11/14) for any PSI, 83% (10/12) for any infection outside the spinal canal, and only 18% (2/11) for SEA. The authors conclude that patients found to have vertebral osteomyelitis/discitis, septic facet, and paravertebral infections frequently had a SEA coinfection. CT interpretation by a neuroradiologist had moderate sensitivity for infections outside the spinal canal but had low sensitivity for SEA.	The authors note several limitations. The sample size of patients having both imaging studies was small due to the rarity of PSI, which could result in wide CT sensitivity variation. Second, inter-rater reliability of both the CT overreads and diagnostic MRI interpretations was not measured for infection types. The contemporary PSI nomenclature was not available for the original CT interpretations, possibly underestimating the original CT reading sensitivity and misclassifying some PSIs. Also, our single-center study may not have captured the full spectrum of PSI.
Sun Q, Hu H, Zhang Y, et al. Do intramedullary spinal cord changes in signal intensity on MRI affect surgical opportunity and approach for cervical myelopathy due to ossification of the posterior longitudinal ligament? Eur Spine J. 2011;20(9):1466-73.	Randomized controlled trial	high	The aim of the current study was first to analyze the effect of intramedullary spinal cord changes in signal intensity (hyperintensity on T2-weighted imaging and hypointensity on T1-weighted imaging) on magnetic resonance imaging (MRI) on surgical opportunity and approach for cervical myelopathy due to OPLL.	56 patients (mean age of group A = 57.5; mean age of group P = 59.3) with cervical myelopathy due to OPLL were enrolled and assigned to either group A (receiving anterior decompression and fusion, n = 27) or group P (receiving posterior laminectomy, n = 29).	Fifty-six patients with cervical myelopathy due to OPLL were enrolled and assigned to either group A (receiving anterior decompression and fusion, n = 27) or group P (receiving posterior laminectomy, n = 29). All the patients were followed up for an average 20.3 months (12-34 months). The clinical outcomes were assessed by the average operative time, blood loss, Japanese Orthopedic Association (JOA) score, improvement rate (IR) and complication. To determine the relevant statistics, the authors made two factorial designs and regrouped the data of all patients to group H (with hyperintensity on MRI, n = 31), group L (with hypointensity on MRI, n = 19) and group N (no signal on MRI, n = 25), and then to further six subgroups as well: AH (with hyperintensity on MRI from group A, n = 15), PH (with hyperintensity on MRI from group P, n = 16), AL (with hypointensity on MRI from group A, n = 10), PL (with hypointensity on MRI from group P, n = 9), AN (no signal intensity on MRI from group A, n = 12) and PN (no signal intensity on MRI from group P, n = 13). Both hyperintensity on T2-weighted imaging and hypointensity on T1-weighted imaging had a close relationship with the JOA score and IR.	The pre- and postoperative JOA score and postoperative IR of either group H or group L was significantly lower than that of group N ($P < 0.05$), regardless of whether the patients had received anterior or posterior surgery. On the other hand, both the JOA score and IR of subgroup AH were higher than those of subgroup PH at 1 week, 6 and 12 months postoperatively ($P < 0.05$), as well as between subgroup AL and PL but in group N, there was no difference between the subgroup AN and PN ($P > 0.05$). In conclusion, regardless of hyperintensity on T2-weighted imaging or hypointensity on T1-weighted imaging in patients with OPLL, severe damage to the spinal cord is indicated. Surgical treatment should be provided before the advent of intramedullary spinal cord changes in signal intensity on MRI. The anterior approach is more effective than posterior approach for treating cervical myelopathy due to OPLL characterized by intramedullary spinal cord changes in signal intensity on MRI.	
Won YI, Choi Y, Yuh WT, et al. Validity of magnetic resonance imaging (MRI) in the primary spinal cord tumors in routine clinical setting. Sci Rep. 2022; 12(1):10151.	Single center retrospective	Low	To assess the validity of MRI in predicting the pathology and location of spinal cord tumors in routine clinical settings.	A total of 820 patients (376 male, mean age 49) with primary spinal cord tumors and pathological confirmation were included. Excluded were patients with primary bone tumors such as chordoma or giant cell tumors, metastatic tumors, or extraforaminal tumors.	The location of primary spinal cord tumors was decided based upon the operation records. Pathological specimens obtained during surgery were examined by neuropathologists. To reflect daily routine clinical practice, authors accepted the report of a neuroradiologist as it is rather than re interpreting MRI scans by a panel of experts. All the neuroradiologists had more than ten years of experience. The location of the tumor by MRI reports and their diagnosis were each compared with the reference standards set as the tumor location identified by operation record and the pathology reported in pathological reports, respectively.	For tumor location, 456 were intradural extramedullary; 165 were intramedullary, and 156 were extradural. The overall sensitivity and specificity were over 90.0%. However, the sensitivity became lower when the tumor resided simultaneously in two spaces such as in the intradural-and-extradural or intramedullary-and-extramedullary space (54.6% and 30.0%, respectively). Most common pathology was schwannoma (n = 416), followed by meningioma (114) and ependymoma (87). Sensitivities were 93.3%, 90.4%, and 89.7%, respectively. Specificities were 70.8%, 82.9%, and 76.0%. In rare tumors such as neurofibromas, and diffuse midline gliomas, the sensitivity was much lower (less than 30%). For common locations and pathologies, the validity of MRI is generally acceptable. However, for rare locations and pathologies, MRI diagnosis still needs some improvement.	There is considerable variability in the specificity and sensitivity of diagnoses for various lesions. More importantly, the sensitivity of rare tumors is low. Possibly this is because these rare tumors have no imaging feature distinguishing them from other tumors, and the number of cases experienced by neuroradiologists may also be different. Location is also difficult to track if it spans multiple spaces. Even in rare cases, it is important to increase sensitivity to maintain a uniform validity. In addition, technological advances are not fully translated into a diagnosis of primary spinal cord tumors.