



Low back pain, part 1

Primary care work-up of acute and chronic symptoms

Robert I. Cohen, MD • Pradeep Chopra, MD • Carole Upshur, EdD

Low back pain may present as acute pain or as an acute exacerbation of a chronic pain problem. Acute low back pain is self-limited, with 90% of affected individuals recovering within 3 weeks to 3 months. Pain duration of more than 4 weeks warrants a more complete work-up, including ruling out malignancy. Pain duration of more than 6 months defines chronic pain, which is frequently associated with affective and behavioral components. When taking the history, determine pain intensity, location, pattern of radiation, onset, and duration. A gentle physical exam may help locate the source of pain through palpation and maneuvers, such as the straight leg raise test. Imaging is recommended for patients with a clinical finding that raises suspicion of spinal malignancy.

Cohen RI, Chopra P, Upshur C. Low back pain, part 1: Primary care work-up of acute and chronic symptoms. *Geriatrics* 2001; 56(Nov):26-37.

Back problems are among the most common causes of geriatric pain.¹ Annual physician office visits for low back pain per 1,000 popu-

lation are highest among patients age 45 to 65 and second highest for those over age 65.² In office-based primary care, low back pain is the third most common symptom reported by patients over age 75.³

In a survey of 3,000 Americans over age 65, one-fifth reported experiencing low back pain. In those who reported such pain, its intensity:

- interfered with daily activity in 40% and with sleep in 20%
- caused approximately 75% to seek medical attention
- resulted in hospital admission for approximately 25%.⁴

This two-part article will describe the primary care diagnosis and management of the most common presentations of low back pain in midlife and older patients. In part 1, we highlight the practical components of a focused history and physical exam and

discuss the role of imaging techniques in making a diagnosis. In part 2 (page 38), we review conservative, medical, and procedural approaches to the management of acute and chronic low back pain.

Presentation

Low back pain, defined as pain in the spine or muscles of the lower back, may present as acute pain or as an acute exacerbation of a chronic pain problem. Acute low back pain is self-limited, with 90% of affected individuals recovering in 3 weeks to 3 months.^{5,6} As with other stress-related conditions (eg, migraine), low back pain can become a chronic illness with frequent recurrences.

Low back pain can also be a manifestation of systemic disease. Malignancy—primarily from multiple myeloma and metastases of tumors of the breast, prostate, and lung—is the cause of low back pain in up to 7% of patients over age 50.⁷ These patients may report pain at night or at rest that had an insidious onset. A work-up to rule out malignancy is indicated for patients with previous history of cancer, weight loss, or pain persisting more than 1 month (with failure to improve with conservative therapy). This work-up includes complete blood count, erythrocyte sedimentation rate, and a bone scan with or without MRI.

Characterizing pain

The differential diagnosis of low back pain is broad and includes mechani-

Dr. Cohen is staff anesthesiologist and pain physician of the Arnold Pain Management Center, Beth Israel-Deaconess Medical Center, Boston. He is an instructor in anesthesiology, Harvard Medical School, and a member of the American Academy of Pain Medicine and American Pain Society.

Dr. Chopra is a practicing pain physician and anesthesiologist, Roger Williams Medical Center, Providence, RI.

Dr. Upshur is professor of family medicine and community health, University of Massachusetts Medical School; a health policy researcher; and licensed clinical psychologist.

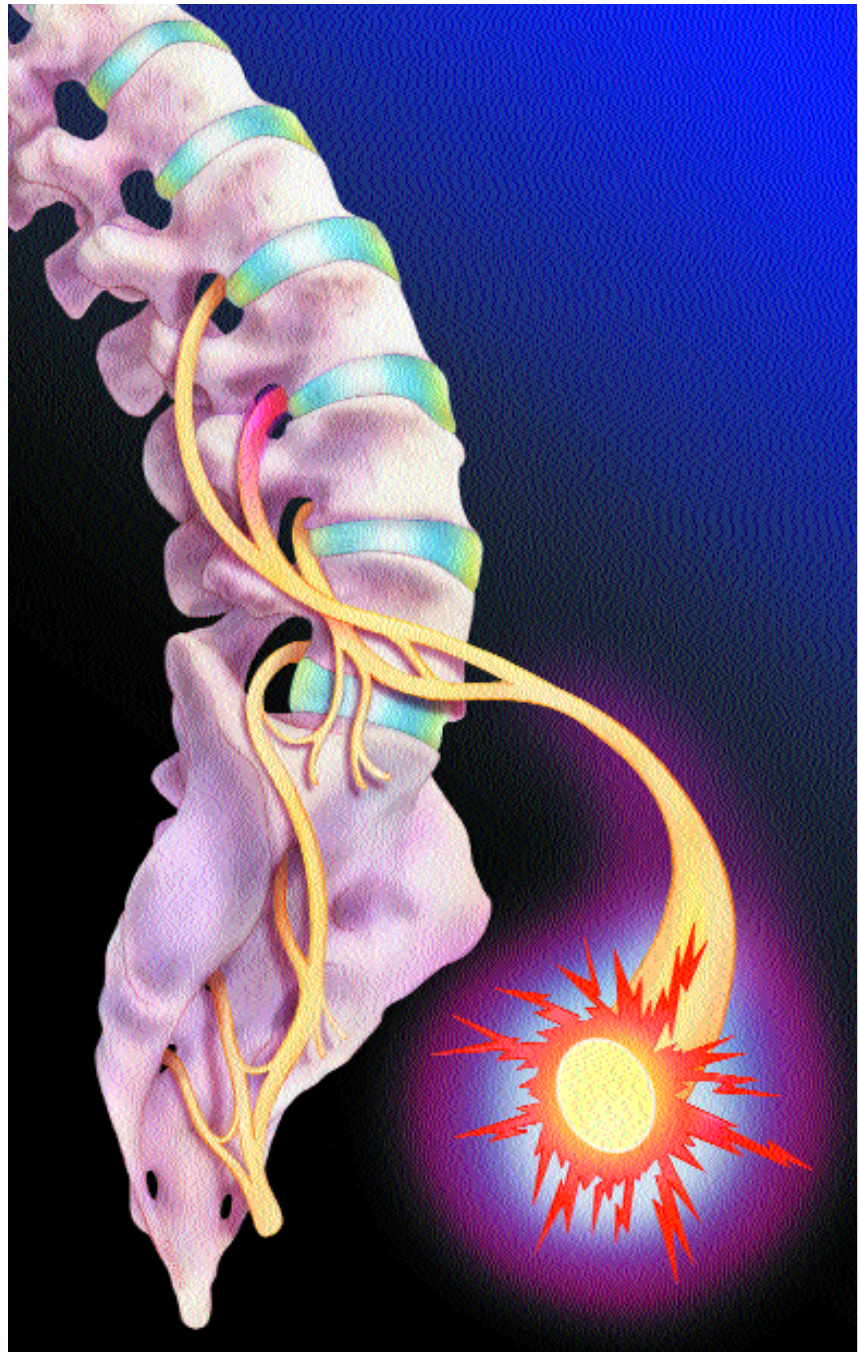
cal and nonmechanical spinal conditions as well as visceral disease (table).⁸ For the patient with complaints of low back pain, take time to perform a careful history.

Intensity. Ask patients to rate their pain on a scale of 0 to 10, with 0 being no pain and 10 the worst pain they could imagine. Using such a scale at each visit may be very helpful in monitoring pain progression, remission, and response to therapy. If patients describe different pain locations, note the intensity of each. Ask them to rate their pain that day and to describe how that compares with their usual pain range. Ask when they experience their worst and least pain.

Encourage patients who are unable to rate pain on a scale to describe how pain interferes with activities of daily living. Descriptions such as, "I can't stand at the sink to wash the dishes," "I can't walk without limping," or, "The pain keeps me awake at night," may provide important clues for how to approach medical management and to assess effectiveness of therapy.

Timing (onset, duration, pattern). Determine when the pain started and activities or injuries that could be related to the etiology. A patient who develops back pain shortly after moving furniture may present with radicular symptoms resulting from exacerbation or progression of previously subclinical spondylolisthesis or degenerative disk disease with spinal stenosis. Sudden onset of pain associated with forward flexion of the trunk suggests injury with mass effect, such as a herniated disk.

Clarify whether onset was insidious. Ask the patient to describe how the pain has changed with time (eg, progression versus improvement, exacerbations, and remissions). Because most cases of acute low back pain resolve quickly with conservative treatment, duration of more than 4 weeks warrants a more complete work-up, including ruling out of malignancy. Duration of more than 6 months defines chronic pain, which is frequently as-



Low back pain may present as acute pain or as an acute exacerbation of a chronic pain problem. The differential diagnosis is broad and includes mechanical and nonmechanical spinal conditions as well as visceral disease. Acute low back pain is self-limited, with 90% of affected individuals recovering within 3 weeks to 3 months.

Illustration for Geriatrics by Peg Gerrity

sociated with affective and behavioral components.

Distinguish constant from intermittent pain, particularly for patients who have both. For example, a patient with a vertebral body fracture may have a constant dull aching pain and

sudden sharp incident pain (ie, pain of relatively short duration and associated with movement or change of position). Treatment strategies for the constant and incident pain patterns may differ. Time of day can also suggest etiology, with night pain impli-

Low back pain, part 1

Table Differential diagnosis of low back pain in primary care

Mechanical low back or leg pain (97%)*

Idiopathic low back pain† (70%)
Includes myofascial pain syndrome (MFPS) and fibromyalgia (FM)
Degenerative processes of disks and facets, usually age-related (10%)
Herniated disk (4%)
Spinal stenosis* (3%)
Osteoporotic compression fracture* (4%)
Spondylolisthesis (2%)
Traumatic fracture (<1%)
Congenital disease (<1%)
Severe kyphosis
Severe scoliosis
Transitional vertebrae
Spondylolysis
Internal disk disruption or diskogenic pain
Presumed instability (angulation >10 degrees or vertebral displacement >4 mm on lateral flexion and extension radiograms)

Nonmechanical spinal conditions (about 1%)

Neoplasia (0.7%)
Multiple myeloma
Metastatic carcinoma
Lymphoma and leukemia
Spinal cord tumors
Retroperitoneal tumors
Primary vertebral tumors
Infection (0.01%)
Osteomyelitis
Septic diskitis
Paraspinal abscess
Epidural abscess
Shingles
Inflammatory arthritis (0.3%)
Ankylosing spondylitis
Psoriatic spondylitis
Reiter's syndrome
Inflammatory bowel disease
Scheuermann's disease (osteochondrosis)
Paget's disease of bone

Visceral disease (2%)

Disease of pelvic organs
Prostatitis
Endometriosis
Chronic PID
Renal disease
Nephrolithiasis
Pyelonephritis
Perinephric abscess
Aortic aneurysm
Gastrointestinal disease
Pancreatitis
Cholecystitis
Penetrating ulcer

* Figures in parentheses indicate estimated percentages of patients with these conditions among all adults with low back pain in primary care. Age-related conditions such as spinal stenosis and osteoporotic fractures will be more common among geriatric patients.

† Includes lumbar "strain" and "sprain," which are nonspecific terms with no pathoanatomic confirmation.

PID: Pelvic inflammatory disease

Source: Adapted with permission from Deyo RA, Weinstein JN. Primary care: Low back pain. *N Engl J Med* 2001; 344(5):363-70. Copyright © 2001, Massachusetts Medical Society. All rights reserved.

cating more ominous possibilities of tumor or infection. Timing can also suggest an etiology of overuse or poor body mechanics, making prevention of recurrences possible with education and retraining.

Location and pattern of radiation. The location and pattern of pain radiation may reveal the source. For example, right lower-lumbar back pain that radiates to the right lower extremity into the posterior leg and lateral foot into the lesser toe is consistent with a mass effect on the S1 root.

Associated factors. Ask the patient about factors that aggravate or relieve pain. A patient with facet syndrome (inflammation of lumbar facets or their associated nerves) may report pain that is worse with back extension or when stepping down off a curb, whereas a patient with spinal stenosis

may report improvement with back flexion and may say, "It's easier to walk when I lean on a shopping cart," or, "It hurts less when I sit." The patient with disk herniation may report worse pain when bending forward.

Back pain that is associated with fever, weight loss, incontinence, or loss of balance or strength could be ominous and calls for further work-up. Inquire whether the patient experiences associated abnormal sensations such as allodynia (nonpainful touching that initiates pain).

Clues from patient history

Low back pain in the presence of cardiac, cerebrovascular, or peripheral vascular diseases suggests the possibility of claudication (neurogenic versus vascular), a poststroke central pain syndrome, or expanding abdominal aortic an-

eurism. The patient with neurogenic claudication (as with claudication from peripheral vascular disease) complains of leg pain during walking. Leg pain caused by spinal stenosis may be less intense while walking uphill (because the spine is flexed) than when walking downhill (where spine extension may stretch nerves within the spinal canal). The patient with neurogenic claudication may also have strong peripheral pulses on exam.

Diabetes may cause pain directly (ie, peripheral neuropathy) or indirectly (changes in posture and gait related to alteration of proprioception and balance can lead to mechanical low back pain). Persisting endometriosis in a patient receiving estrogen replacement therapy (ERT) or osteoporosis in a patient who has not received ERT and had early onset of menarche should

also be considered possible causes of low back pain.

Pain behaviors. Severe or prolonged pain may be associated with depressive symptoms such as:

- loss of interest in social activities,
- excessive or insufficient sleep
- loss of interest or function in sexual activity
- weight gain or loss.

Note altered patterns of daily living, especially failure to maintain exercise routines or relationships. The patient's behavior may exhaust family members and friends, and appropriate psychological referral may be helpful.

Medication history. Document analgesic successes and failures, including which medications have been tried, doses, effects achieved, and side effects. Specifically include drugs from the different steps of the World Health Organization analgesic ladder as well as adjuvant medications, which are discussed in part 2 of this review.

Alternative interventions. Document the success or failure of alternative and complementary treatments such as acupuncture, chiropractic, massage, physical therapy, aquatic or other exercise therapy, hypnosis, orthotics, supportive braces, and the use of compounded or herbal remedies.

Physical examination

Perform a thorough yet gentle examination. Observe the patient standing and sitting in a chair. The shoulders and the pelvis should be aligned, and the soft tissue structures on either side of the spine should be symmetrical. Patients with herniated disks tend to list. A gentle lumbar lordosis is normal but may be lost in a case of paravertebral muscle spasm. An exaggerated lumbar lordosis may be due to weakened anterior abdominal wall muscles. Paraspinous muscle hypertrophy and spasm is common in chronic pain syndromes and prominent in myofascial pain syndrome (MFPS), which is characterized by hyperirritable trigger points in affected muscles.

Observe whether the patient walks

Palpation: Tenderness versus trigger points

The prevalence of fibromyalgia (FM) among patients with low back pain may be as high as 12% among patients age 37 to 67, although the rate of diagnosis of low back pain due to FM may be only 1% in primary care practice. A diagnostic difference between FM and myofascial pain syndrome (MFPS) is that patients with FM report tenderness and patients with MFPS report palpation-induced triggering of pain or spasm, with a pattern of response typical for each involved muscle group.

The tenderness reported with FM generally does not radiate and when present is distributed among at least 11 of 18 paired points. Points occurring in the back include the base of the skull, mid-trapezius, medial scapula, above the buttocks, and below the buttocks close to the edge of the thigh.

The diagnostic key to tenderness is the patient's report of discomfort on being touched. A positive report of tenderness can be obtained by an observant examiner with a minimal amount of palpating pressure. A "rough" examination may yield confusing results in FM or MFPS by exacerbating the pain to the point where pain is reported wherever the back is palpated. Although a sharp percussion may be necessary to elicit the pain of an infected kidney, gentle palpation may reveal the key regions requiring therapy for the patient with MFPS.

ROBERT I. COHEN, MD
 PRADEEP CHOPRA, MD
 CAROLE UPSHUR, EdD

with a stride that is shortened, asymmetrical (limp), or antalgic (accompanied by wincing or other associated pain behavior). Weakness and loss of proprioception and balance may be associated with a wide-based gait.

Palpation. The exam may reveal tenderness at discrete locations in cases involving infection, fracture, MFPS, and fibromyalgia (FM). The incidence of MFPS in older patients is unknown, although it is thought to be significant. The incidence of FM is 2% in the general population, 3.4% in women of all ages, and 7% in women age 60 to 79.⁹ Patients with MFPS often have pain in multiple locations, report that any movement of their back can exacerbate pain, and—key to the diagnosis—exhibit tender locations, called trigger points. Direct palpation of a trigger point initiates pain that radiates along "nonanatomic," sometimes pseudoradicular patterns.¹⁰

Palpate the spinous processes and the paraspinous muscles on either side, looking for tenderness and trigger points (see "Palpation: Tenderness versus trigger points").¹¹ Back pain that is

referred into the legs and can be reproduced during palpation is consistent with MFPS. While palpating the gluteal muscles, one may notice localized areas of tenderness resulting from muscle spasm (tender fibrofatty nodules).

A palpable "step-off" from one spinous process to the next may result from one vertebra slipping over another in spondylolisthesis. Most common are L5 slipping over S1 or L4 over L5 in patients with a history of sport injury or other trauma in their youth. Spondylolisthesis is often responsible for back pain where stretching of spinal roots results in pain radiating down the legs. Trigger points can be identified with very gentle palpation, but greater finger pressure should be delivered over the spinous processes to seek vertebral fracture.

Pain over the coccyx (coccydynia), which is common in older patients, is usually due to a fall. The best way to examine the coccyx is via a rectal examination. A tender and/or hyperflexed coccyx confirms the diagnosis. This condition may respond to injection of local anesthetic and a corti-

Low back pain, part 1

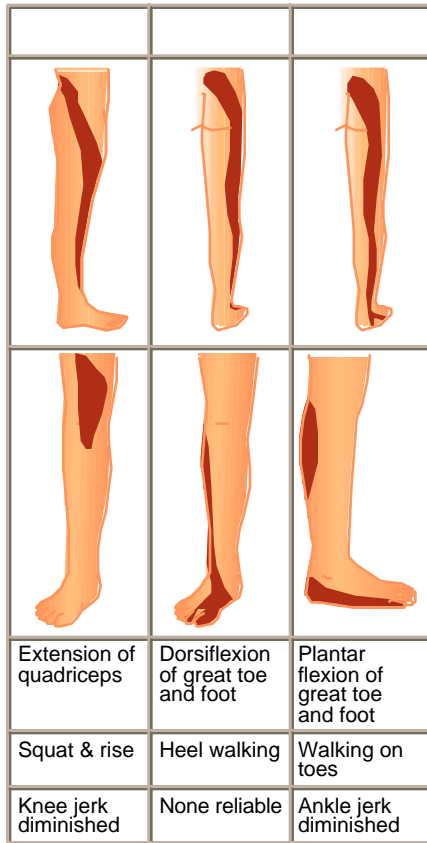


Figure. The most commonly occurring of the lumbar radiculopathies involve the roots at L4, L5, and S1.

Source: Reprinted with permission from Rosomoff HL, Rosomoff RS. Low back pain: Evaluation and management in the primary care setting. *Med Clin North Am* 1990; 83(3):643-62. Copyright © 1999 W.B. Saunders Company

corticosteroid. The injection can be made into the caudal canal (caudal epidural injection) or directly into or next to the intersacral ligaments. Pain on palpation of the sacrum could be due to sacroiliac (SI) joint disease or spontaneous osteoporotic fracture of the sacrum, which can mimic many other causes of low back pain.

The sciatic nerve, another common source of pain, is relatively easy to locate. Have the patient flex the hip, then palpate the midpoint between the ischial tuberosity and the greater trochanter. Tenderness at this location overlying the sciatic notch that reproduces the patient's pain into the lower extremity can result from a herniated disk or a space-occupying lesion impinging the nerve proximally or from distal impingement by a piriformis muscle spasm.

Sciatic or lumbosacral radicular pain typically extends further down the leg with hip flexion.

When the patient experiences pain, lower the leg slightly, and attempt to reproduce the pain by dorsiflexion of the foot to stretch the sciatic nerve. If the patient does not experience pain with dorsiflexion, the pain may be caused by tight hamstrings. If the SLR and foot dorsiflexion tests are positive, the patient may be able to localize the source of his pain by reporting into which dermatome the pain radiates.

The crossed SLR—in which the patient lies supine and the contralateral leg is raised—may be a more specific but less sensitive test. Complaint of pain radiating into the ipsilateral (involved) leg is further evidence of a space-occupying lesion, such as a herniated disk in the lumbar area.

An anatomic variant in which the sciatic nerve pierces the piriformis muscle (piriformis syndrome) may increase the risk for sciatic pain. The small pear-shaped piriformis muscle may be palpated externally beneath a relaxed gluteus or, more readily, during rectal examination. Diagnosis can be confirmed when pain and spasm resolve with local anesthetic injection. Addition of a depo-steroid may prolong the effectiveness of this treatment.

SLR exam. A straight leg raise (SLR) examination determines how high the leg of a supine patient can be raised from the exam table without pain. Discomfort varies among individuals, but the normal angle measures approximately 80 degrees. Range of movement limited by tightness or pain only in the posterior thigh may be

Patrick's test. Patrick's test is used to detect pathology in the hip or SI joint. Position the supine patient with the knee and hip flexed and the heel placed over the contralateral leg just below the knee. Stabilize the contralateral pelvis by placing your hand over the anterior superior iliac spine and use your other hand to press downward on the flexed knee, gently but firmly forcing the hip into external rotation. Pain in the SI joint region on external hip rotation can suggest SI joint arthropathy, but it can also result from overcompensation and positioning when the true cause is elsewhere in the lower back. Pain radiating into the groin suggests hip joint pathology.

Flexion. To test low back flexion, ask the patient to stand and bend forward as far as possible without pain and try to touch the toes (knees straight, without bouncing). Measure inches from fingertips to floor or, if the patient is inflexible, inches to the knees. Pain limiting forward flexion suggests lumbar disk disease.

Extension. To test extension, stand beside the standing patient and rest the palm of one hand on the lower back near the posterior iliac spine, with your fingers extended toward the midline. Ask the patient to cautiously bend backward as far as possible or until pain is experienced, using your hand as a fulcrum for the motion. During this maneuver, note the extent to which the paraspinal muscles jerk in spasm. Limitation in extension is consistent with spinal stenosis and facet syndrome.

Facet-loading tests. A facet-loading test can be done by asking the patient to bend to each side while you observe if lateral flexion is limited by pain. For a more specific facet loading test, ask the patient to rotate the upper body then extend the lumbar spine. To test the left lumbar facet joints, ask the patient to rotate the right shoulder anterior and left shoulder posterior and then repeat the low back extension test. Test for right lumbar facet disease by rotating the left shoulder anterior and

right shoulder posterior. Stabilize the pelvis by placing one hand on the patient's iliac crest while you use your other hand to guide the opposite shoulder.

Neurologic exam. Begin the neurologic exam by observing how the patient walks into the room. A shortened, wide-based, or uneven (limping) stride suggests loss of strength, proprioception, and balance. CNS examination should be directed toward areas where the physical exam is of greatest help in the diagnosis of low back pain, mindful that the most commonly occurring of the lumbar radiculopathies involve the roots at L4, L5, and S1 (figure):¹²

- Difficulty assuming or rising from a partial squat position (or difficulty sitting or rising from a chair) may suggest quadriceps weakness due to L4 pathology. Knee jerk may be reduced on reflex testing, and there may be loss of sensation in the skin overlying the medial calf.

- The patient with L5 pathology may have difficulty heel walking, and dorsiflexion of the foot and/or great toe may be decreased compared with the contralateral side. Sensation is typically diminished in the dermatome extending to the medial foot and great toe. There is no reflex commonly used to test this root.

- Difficulty walking on the toes on the affected side or weakness in great toe or plantar flexion suggests S1 as the affected level, with decreased sensation expected along the lateral aspect of the foot. A diminished ankle jerk may also be elicited on reflex testing.


Imaging

In radiography of older patients, degenerative disk changes are age-related and often asymptomatic, so this finding is rarely helpful in diagnosing low back pain. The aging disk loses hydration, becomes prone to tearing, and bulges outwards. CT can rapidly and accurately detect disk bulging, herniation, calcification, vertebral endplate sclerosis, and fracture, but it is inferior to MRI for soft tissue study.¹³

MRI has superior contrast discrimination that facilitates the evaluation of internal disk structure. Studies with MRI show disk dehydration, narrowing, and bulging that are frequently present by the fifth decade in asymptomatic individuals. MRI or a bone scan followed by MRI is recommended for patients with a clinical finding that raises suspicion of spinal malignancy and an elevated ESR (> 50 mm/hr) or positive x-ray.¹⁴ Consider MRI without delay for patients with a history of cancer.

Conclusion

Although serious spine pathology is more common in older patients than in younger populations, routine radiographic and laboratory evaluation is not indicated in all patients who present with low back pain. In a retrospective study of 68,000 conventional lumbar sacral spine examinations, clinically unsuspected malignancy was found in 1 of 2,500 examinations of patients age 20 to 50.¹⁵

A recent review⁸ funded by the Agency for Healthcare Research and Quality (which previously published an excellent practice guideline for management of low back pain¹⁶) suggests initial conservative management, with specific exceptions that are discussed in part 2 of this article (page 38). 

References

1. Bressler HB, Keyes WJ, Rochon PA, Bradley E. The prevalence of low back pain in the elderly. *Spine* 1999; 24:1813-9.
2. Hart LG, Deyo RA, Cherkin DC. Physician office visits for low back pain. *Spine* 1995; 20:11-9.
3. Koch K, Smith MC. Office-based ambulatory care for patients 75 years old and over. National Ambulatory Medical Care Survey, 1980 and 1981. National Center for Health Statistics, no. 110. DHHS pub. no. PHS 85-1250. Hyattsville, MD: Public Health Research Service, 1985; 110:1-14.
4. Lavsky-Shulan M, Wallace RB, Kohout FJ, Lemke JH, Morris MC, Smith IM. Prevalence and functional correlates of low back pain in the elderly: The Iowa 65+ Rural Health Study. *J Am Geriatr Soc* 1985; 33(1):23-8.

5. Coste J, Delecoeuillerie G, Cohen de Lara A, Le Parc JM, Paolaggi JB. Clinical course and prognostic factors in acute low back pain: An inception cohort study in primary care practice. *BMJ* 1994; 308(6928):577-80.
6. Carey TS, Garrett JM, Jackman AM. Beyond the good prognosis. Examination of an inception cohort of patients with chronic low back pain. *Spine* 2000; 25(1):115-20.
7. Fernbach J, Langer F, Gross AE. The significance of low back pain in older adults. *CMAJ* 1976; 115:898.
8. Deyo RA, Weinstein JN. Primary care: Low back pain. *N Engl J Med* 2001; 344(5):363-70.
9. Wolfe F, Ross K, Anderson J, Russell IJ, Hebert L. The prevalence and characteristics of fibromyalgia in the general population. *Arthritis Rheum* 1995; 38:19-28.
10. Simons DG, Travell JG. Myofascial pain and dysfunction: The trigger point manual (2nd ed). Baltimore: Lippincott, Williams & Wilkins, 1998.
11. Borenstein D. Prevalence and treatment outcome of primary and secondary fibromyalgia in patients with spinal pain. *Spine* 1995; 20(7):796-800.
12. Rosomoff HL, Rosomoff RS. Low back pain: Evaluation and management in the primary care setting. *Med Clin North Am* 1990; 83(3):643-62.
13. Jarvik JG, Deyo RA. Imaging of lumbar intervertebral disk degeneration and aging, excluding disk herniations. *Radiol Clin North Am* 2000; 38(6): 1255-66.
14. Joines JD, McNutt RA, Carey TS, Deyo RA, Rouhani R. Finding cancer in primary care outpatients with low back pain: A comparison of diagnostic strategies. *J Gen Intern Med* 2001; 16(1):14-23.
15. Nachemson AL. The lumbar spine. An orthopedic challenge. *Spine* 1976; 1:59.
16. Bigos S, Bowyer O, Braen G, et al. Acute low back problems in adults. Clinical practice guideline. Agency for Health Care Policy and Research, Quick Reference Guide, no 14. Washington, DC: U.S. Department of Health and Human Services, 1994 (AHCPR pub no. 95-0643).

The authors thank James Hammel for editorial assistance in proofreading this manuscript.