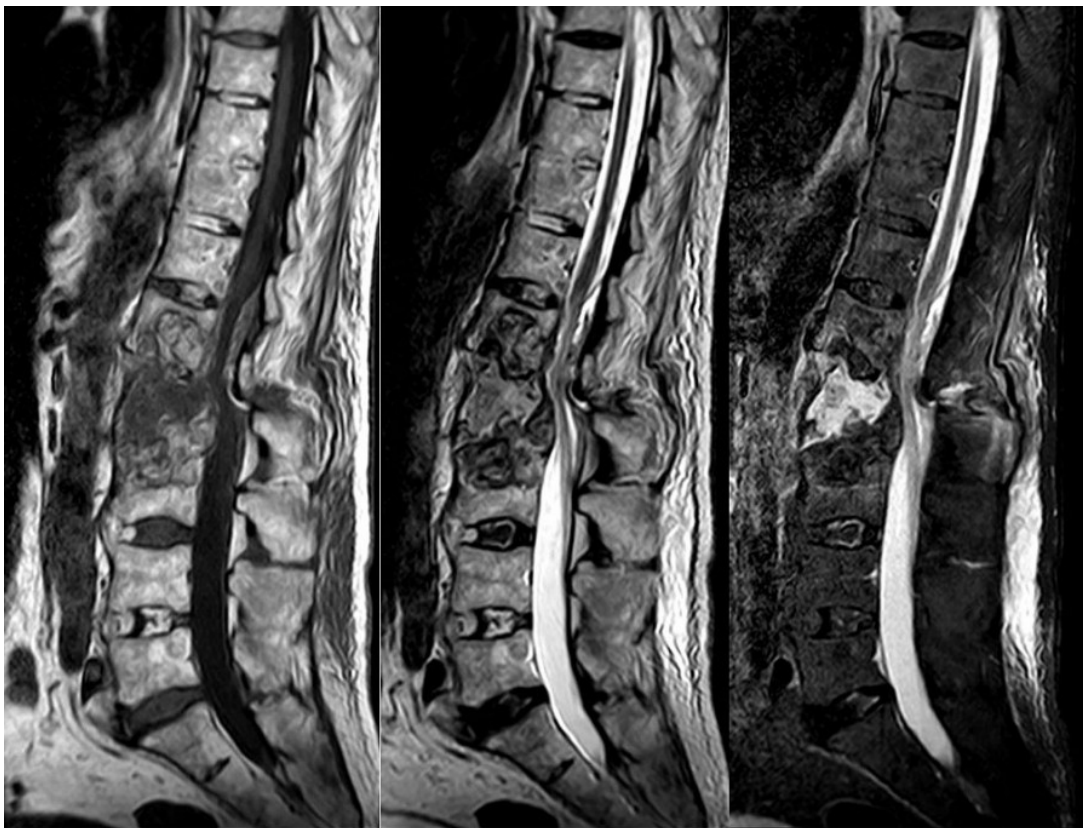


Ankylosing Spondylitis (Bechterew's Disease) — Symptoms and Classifications

[See online here](#)

Ankylosing spondylitis, formerly known as Bechterew's disease or Marie-Strümpell disease, is a type of inflammatory rheumatic disease which affects mostly the spine. In the end-stage of this disease, patients suffer from complete fusion and rigidity of the spine—the so-called "bamboo spine". Here, you will find all the relevant facts on ankylosing spondylitis (AS) that you need for your rheumatology exams.



Definitions

Spondyloarthropathies

Spondyloarthropathies are a group of overlapping inflammatory rheumatic disorders that affect mostly the spine. Patients usually present with back pain caused by the inflamed vertebral column.

Common characteristics of spondyloarthropathies are the involvement of the axial skeleton and of the entheses (the sites where tendons or ligaments insert into the bone).

They are also associated with the MHC class I antigen **HLA-B27**.

The entities grouped under spondyloarthropathies often include ankylosing spondylitis, reactive arthritis, psoriatic arthritis, enteropathic arthritis, juvenile-onset spondyloarthritis.

Based on clinical and radiological findings, spondyloarthropathies can be grouped in two classes:

- **Axial spondyloarthritis (including ankylosing spondylitis)**
- **Peripheral spondyloarthritis (affecting arms and legs)**

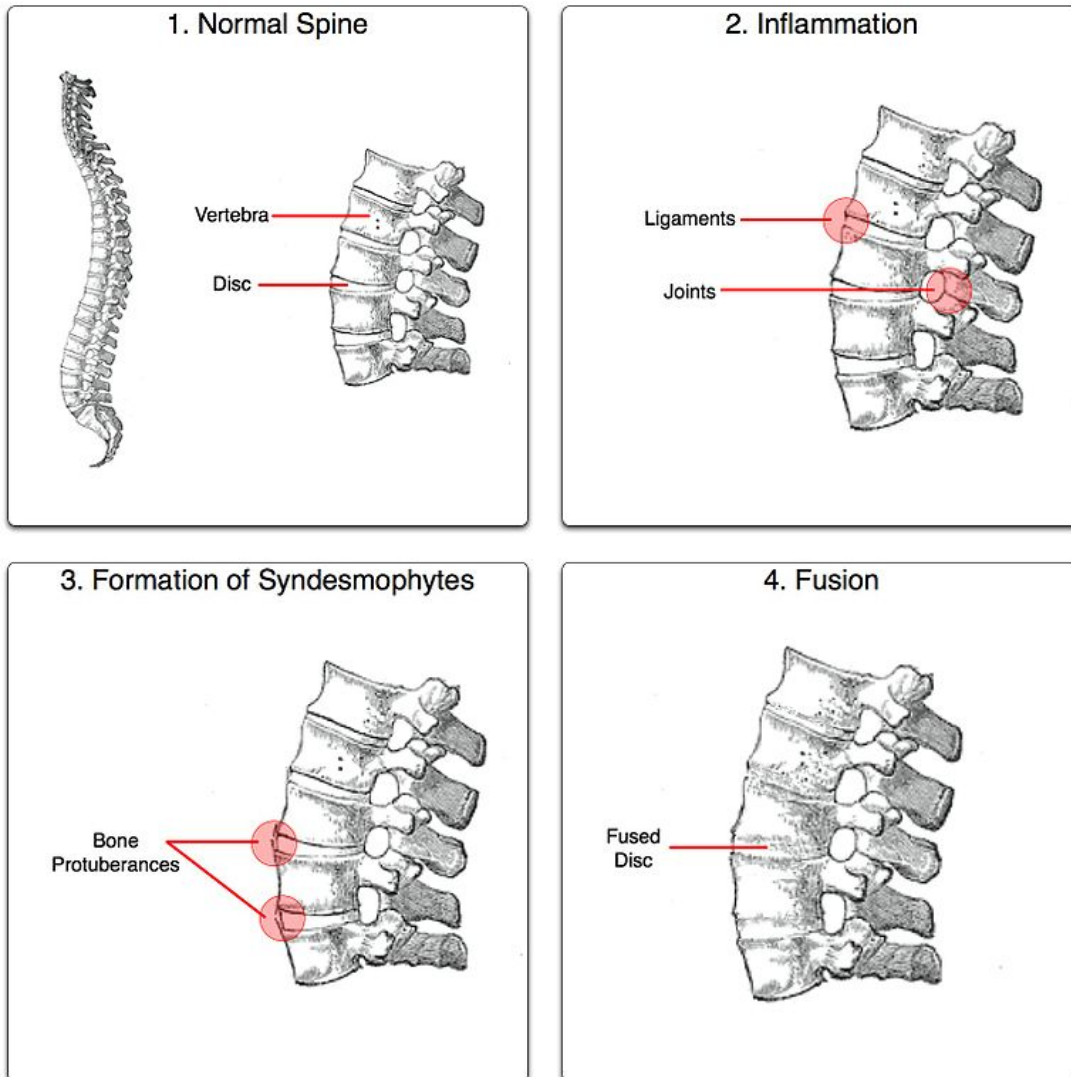


Image: "The ankylosis process, made by Senseiwa, with an image of the spine from Gray's Anatomy" by Senseiwa.
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Ankylosing Spondylitis (AS)

Ankylosing spondylitis is a type of chronic arthritis of the spine and the sacroiliac joints. When the disease progresses, it leads to a stiffening of the spine. Besides the axial skeleton, more peripheral joints may be affected as well.

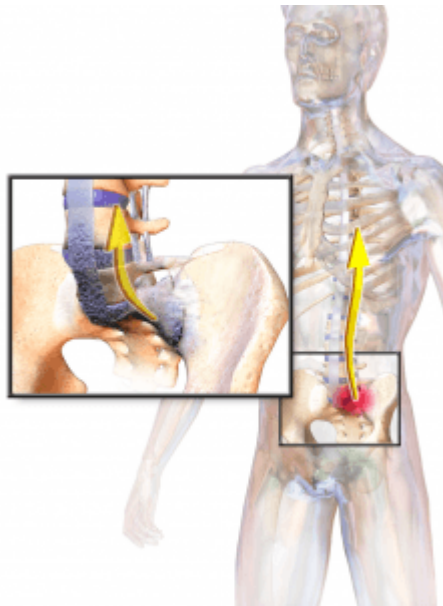


Image: "Ankylosing Spondylitis" by BruceBlaus.
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Terminology and Synonyms of Ankylosing Spondylitis

Ankylosing spondylitis (AS) = Bechterew's disease = Marie-Strümpell disease = rheumatoid spondylitis

In the English-speaking world, **ankylosing spondylitis (AS)** is nowadays the most commonly used term. The obsolete term Bechterew's disease (or Bekhterev) refers to the Russian neurologist Wladimir M. Bechterew; Marie-Strümpell disease refers to French neurologist Pierre Marie and his German colleague Adolph Strümpell.

Epidemiology of Ankylosing Spondylitis

The **incidence** of ankylosing spondylitis is highest in circumpolar arctic and subarctic regions and in Northern European countries with around 7 : 100,000 of the general population and it declines significantly when approaching the equator. Among many populations in the Southern hemisphere, AS is virtually absent.

According to the German research institute *Deutsches Rheuma Forschungs-Zentrum (DRFZ)*, the **gender ratio** of AS is approximately 3:1, with 62 % of patients being male and 37 % female.

The age of onset is usually some point between late adolescence and early adulthood: 90 % of patients experience the first manifestation of the disease between 15 and 40 years of age. The **peak of incidence** is **age 25**. Often, there 5 to 10 years may pass by between the first onset of symptoms and the final diagnosis. This delay of diagnosis is often due to an insufficient attention to the patient's medical history but also to the insidious development of the disease.

Prevalence of Ankylosing Spondylitis

The prevalence of AS fluctuates between 0.1 and 1.4 % and is strongly dependent on the presence of the human leukocyte antigen HLA-B27. 90 % of people with AS are **HLA-B27 positive**. This gene is located on chromosome 6p21.33.

Etiology of Ankylosing Spondylitis

Causes of the Development of Ankylosing Spondylitis

The etiology of ankylosing spondylitis is as of yet unclear. While there is a strong association between AS and **HLA-B27**, with about 95 % of AS patients expressing this gene; only 4 - 7 % of HLA-B27 carriers actually develop AS. Other genetic factors and external factors like bacteria most likely play a role here. Infections with Klebsiella, Salmonella, Shigella, Yersinia, and Chlamydia are suspected to contribute to the pathogenesis.

The detection of **tumor necrosis factor-alpha** (TNF- α) is of great importance with regard to the treatment of the affected joints.

Symptoms of Ankylosing Spondylitis

Symptoms of the Musculoskeletal System with Ankylosing Spondylitis

Note: The main symptom is a chronic back pain (> 12 weeks).

The inflammatory back pain can affect the entire spine. However, the pain mainly manifests in the **sacroiliac** region and in the inferior **thoracic** area. The pain is independent of position, typically occurs at night and in the morning hours, and improves with movement over the course of the day.

Increasing stiffness of the spine can be observed (especially **morning stiffness**), which results in changed body posture and statics:

- Vertical tilt of the pelvis
- Loss of lumbar lordosis
- Increased **thoracic kyphosis** and **cervical lordosis**
- Tendency to bend the hip and knee joints
- Lateral rotation of the scapula
- Hyperextension of the abdominal muscles with predominant abdominal breathing
- Atrophy and hyperextension of the lumbar muscles
- Hypotension of the gluteal and neck muscles and lack of movement of the spine while walking.

Bamboo spine: In the course of the disease, a so-called bamboo spine can develop: first the extension and then the flexion of the spine become impaired.

Further Symptoms of Ankylosing Spondylitis

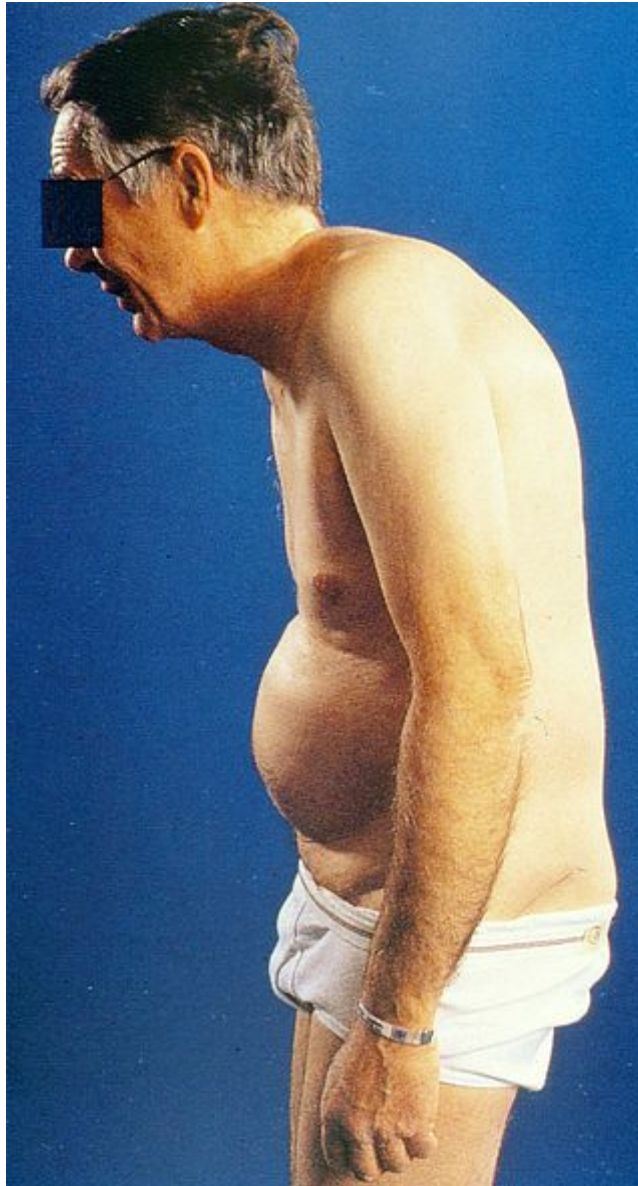


Image: "Ankylosing spondylitis: Rigid thoracic kyphosis with typical abdomen" by Mehlauge. License: [CC BY-SA 3.0](https://creativecommons.org/licenses/by-sa/3.0/)

Enthesiopathies: A typical symptom is a pain, stemming from inflammations in the areas where the tendons insert (entheses). It mainly occurs in the area of the Achilles tendon (**achillodynia**) and of the plantar fascia.

Peripheral involvement: In addition, AS patients can suffer under the involvement of peripheral joints. 50 % of patients show symptoms of **oligoarthritis** (e.g., of the knee, hand, or ankle joints).

Uveitis: Acute anterior uveitis occurs in about 25 % of patients, either as a single event or several times. Uveitis includes an acute inflammation of the uvea (vascular layer of the eyeball) and of the ciliary body. Acute anterior uveitis is therefore also referred to as **iritis** or **iridocyclitis**.

Affected patients often suffer from blurred vision and general visual impairments. The temporal connection between uveitis and arthritis activity is mostly accidental.

Cardiac complications: Cardiac complications are very rare. If they occur, then e.g. in the form of conduction disorders (AV blocks, left bundle branch block) and aortic insufficiency after aortitis. The frequency of cardiac involvement depends on the duration of the disease. The references in the literature deviate strongly.

Intestinal involvement: About 5—10 % of patients suffer from colitis or terminal ileitis. 50 % showed clinically silent intestinal inflammation in endoscopic studies.

Diagnosis of Ankylosing Spondylitis

Classification Criteria for Ankylosing Spondylitis

Currently, the most common classification criteria for ankylosing spondylitis are the modified **New York criteria**. These criteria require one of the two following conditions to be present: radiographic evidence of sacroiliitis and > 1 further criterion; or HLA-B27 positive and > 2 further criteria:

As per the 2009 ASAS Criteria for Classification of Axial Spondyloarthritis criteria (which is applicable for patients with back pain \geq 3 months and age of onset 45 years) for diagnosis of AS either of the two criteria “Sacroiliitis on Imaging Plus \geq 1 SpA Feature” or “HLA-B27 Plus \geq 2 Other SpA Features” is sufficient.

SpA Features are:

- Inflammatory back pain
- Arthritis
- Enthesitis (heel)
- Anterior uveitis
- Dactylitis
- Psoriasis
- Crohn’s disease or ulcerative colitis
- Good response to NSAIDs
- Family history of SpA
- HLA-B27
- Elevated CRP

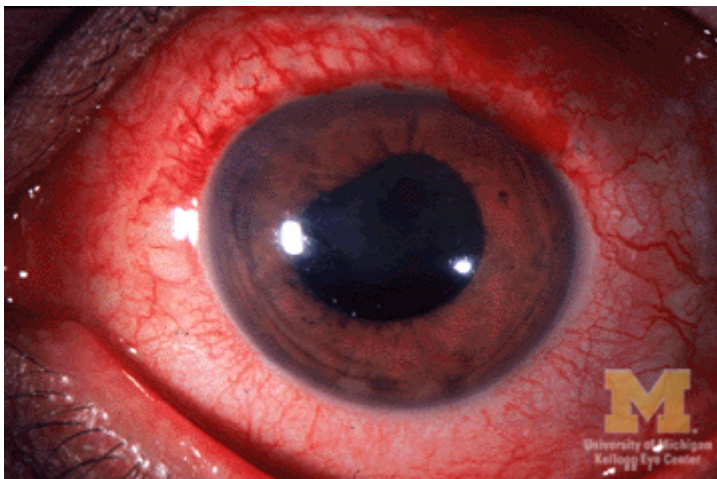


Image: “Anterior uveitis” by Jonathan Trobe. License: [CC BY 3.0](https://creativecommons.org/licenses/by/3.0/)

Clinical Presentation of Ankylosing Spondylitis

Different functional tests of the spine and the sacroiliac joints are used for diagnosis and follow-up examinations. BASDAI score is generally used clinically to measure the severity and plan the treatment.

| Joint | Examination |
|-------------------|--|
| Sacroiliac joints | Pressure pain threshold, Mennell sign |
| Lumbar spine | Reduced measure in Schober test |
| Thoracic spine | Reduced measure in Ott's test |
| Cervical spine | Distance between chin and sternum with flexed head > 2 cm (normal: 0 cm) |
| Rib joints | Limited chest expansion: < 4 cm with maximum inspiration and expiration (normal: > 4 cm) |

Source: H Renz-Polster, S. Krautzig (Hrsg.) (2013): Basislehrbuch Innere Medizin. Elsevier Verlag. P. 944, table 12.11.

Mennell Sign for Ankylosing Spondylitis

Retroflexion of the upper leg provokes pain in the sacroiliac joint.

Clinical Presentation of Ankylosing Spondylitis

Laboratory Results of Ankylosing Spondylitis

No laboratory test is diagnostic of AS. Laboratory tests show slightly increased inflammatory parameters (CRP, BGL ?) and the [rheumatoid factor](#) is negative. Imaging of Ankylosing Spondylitis

Imaging of Ankylosing Spondylitis

The most important pathological localizations of AS are the sacroiliac joints, the spine, and the hip joints. The best radiological method for imaging of the sacroiliac joints is magnetic resonance imaging (MRI). Typical findings in patients with an acute inflammation are **irregularities of the joint cavities** with **erosions** and **bone edema**. Active inflammation of the sacroiliac joints on MRI is considered equivalent to definite radiographic sacroiliitis.



[Image](#): "Bamboo spine in a patient with ankylosing spondylitis" by Stevenfruitsmaak. License: [CC BY-SA 3.0](#)

In early stages, bone scintigraphy shows symmetric pathological accumulations at the sacroiliac joints and parts of the spine.

The plain radiograph in a progressed stage shows ankylosis, sclerosis, and erosions. Important findings at the spine are syndesmophytes. Syndesmophytes are bony protrusions from the edge of one vertebra to the next and they appear primarily at the thoracolumbar junction.

In the final stage, the so-called **bamboo spine** becomes apparent, which is accompanied by a complete inability to move.

Differential Diagnoses of Ankylosing Spondylitis

With regard to differential diagnoses, it is mostly other spondylarthropathies that have to be considered, occurring with or after:

- Psoriasis arthritis
- Crohn's disease, ulcerative colitis
- Post-infectious genesis (reactive arthritis, Reiter's syndrome)

Furthermore, degenerative changes of the joints and the spine are possible differential diagnoses that can trigger similar symptoms.

Treatment of Ankylosing Spondylitis

Treatment of ankylosing spondylitis has significantly changed in the past decades. In the 1990s, the focus was mainly on **physical therapy** and balneotherapy. With the development of TNF- α inhibitors, a new therapeutic era of treatment of ankylosing spondylitis was introduced.

Note: Causal treatment of ankylosing spondylitis is as of yet not possible.

Treatment focuses on pain reduction and a decrease of inflammatory activity. The goal is to halt the deterioration of movement impairments and of the deformation of the spine.

Basic Treatment of Ankylosing Spondylitis

- **NSAIDs:** Non-steroidal anti-inflammatory drugs represent the most important substance group against the pain of inflammatory causes of the axial skeleton and are first line of therapy.
- **Local steroid administration:** Temporary, in case of extreme exacerbations.
- **Physical therapy for the spine:** Crucial for maintaining mobility! The patient must learn to perform exercises which aim at mobilization of the vertebral joints and muscle stability. Exercise to maintain posture and range of motion is a part of treatment at all stages of disease.
- **Balneotherapy:** Alleviates symptoms and improves of mobility.
- **Warmth and cold:** Warmth is good against the spine pain; cooling is recommended for peripheral arthritis.

Treatment with TNF- α Inhibitors

- If patients do not respond to the basic treatment, [TNF- \$\alpha\$ inhibitors](#) can be used. Studies have shown the efficacy of **infliximab, etanercept, adalimumab, golimumab** and certolizumab pegol. These substances mainly aim at reducing pain and fatigue and at improving mobility.
- Other symptoms of ankylosing spondylitis, like enthesitis, which are resistant to treatment with NSAIDs, and extra-articular manifestations respond well to

TNF- α inhibitors.

- Other agents being experimented in refractory patients include Secukinumab and tofacitinib.

Surgical Interventions for Ankylosing Spondylitis

If the disease is in a much-progressed state, surgical measures can be considered. While fusion of the spine through **spondylodesis** and **wedge osteotomy** cannot restore the original mobility, it does improve the quality of life for the patient. If the hip joints are affected, partial or complete prostheses may be considered.

Course of Disease and Prognosis for Ankylosing Spondylitis

The course of AS is variable and ranges from individual with mild stiffness and normal radiographs on one hand to the patient with a totally fused spine on the other. Some patients develop severe bilateral hip arthritis, severe peripheral arthritis and extra-articular manifestations.

For about 30 % of the patients, the severe functional impairments lead to psychosocial problems at work, in everyday life, and with recreational activities.

The complete clinical manifestation of ankylosing spondylitis comprises chronic pain and complete stiffening of the spine.

Unfavorable factors for the prognosis are:

- **Male** sex
- **Young** age of onset (< 25 years)
- **Early** peripheral arthritis (especially coxitis)

The use of TNF- α inhibitors has significantly improved these unfavorable prognostic factors.

Review Questions

Solutions can be found below the references.

1. Which of the following HLA antigens is typically expressed in patients with ankylosing spondylitis?

- A. HLA-B88
- B. HLA-B27
- C. HLA-B51
- D. HLA-DR3
- E. HLA-DR4

2. The first manifestation of ankylosing spondylitis occurs most frequently in the group of...

- A. ...boys at the age of 1 to 15.
- B. ...girls at the age of 1 to 15.
- C. ...men at the age of 15 to 40.
- D. ...women at the age of 15 to 40.

E. ...men at the age of 40 to 55.

3. The changed body posture of patients with ankylosing spondylitis is NOT characterized by...

- A. Vertical pelvic tilt
- B. Loss of lumbar lordosis
- C. Increased thoracic kyphosis and cervical lordosis
- D. Tendency to bend the hip and knee joints
- E. Medial rotation of the shoulders

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Correct answers: 1B, 2C, 3E

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Notes