



AMERICAN CHIROPRACTIC COLLEGE OF RADIOLOGY

ACCR GUIDELINES FOR DIAGNOSTIC FULL SPINE RADIOGRAPHY

The ACCR guidelines address issues common to clinical practice. They are not rules, but guidelines that attempt to define the principles of practice that should generally produce high quality radiologic care. Adherence to the ACCR Guidelines will not assure a successful outcome in every clinical situation. The Guidelines are not intended to establish a legal standard of care or conduct, and deviation from one of these guidelines does not, in and of itself, indicate or imply that such practice is below acceptable level of care. The ultimate judgment regarding any specific procedure or course of conduct must be made by the chiropractic physician/doctor of chiropractic in light of all circumstances presented by the individual clinical setting. The ACCR guidelines are a consensus of procedures and conduct taught in CCE accredited chiropractic institutions and the practice of radiology by professional members of the ACCR.

Other guidelines have addressed the topic of full spine radiography^{1,2,3,4}

A. General Guidelines

Full spine 14x36" radiography:

1. is a proven and useful specialty procedure for evaluation of the spine in select circumstances^{5,6,7,8,9}
2. is best utilized, in most circumstances, for the assessment of scoliosis in individuals under the age of 20.
3. requires the use of compensating filtration at the tube, so as to reduce radiation to the thinner body parts *before* it reaches the patient^{5,6,7,10,11,12,13,14,15,16,17,35}
 - a. Either metallic wedge or progressive lead-containing acrylic filters are appropriate.
 - b. Split or gradient intensifying screens should not be utilized, nor should any paper or other materials be placed inside the cassette to impede the fluorescence from the intensifying screens, since these measures compensate for differing body density *after* the radiation has passed through the patient.
 - c. Large differentials between maximum abdomen and minimum neck measurements may exceed the capacity of even the best filters to compensate adequately for the differing densities included in the field of view, in which case sectional projections are preferred.
4. As with any radiographic study, diagnostic image quality of full spine 14x36" radiographs is vital.
 - a. Diagnostic quality is defined as ensuring that a radiograph demonstrates sufficient density, contrast, and definition to rule out radiologically-detectable pathology^{18,19,20,21,22,47}
 - b. While various sources^{23,24,25,26,27,28,29} have discussed spinography and biomechanical analysis, there is little data³⁰ at the present time to support the contention that the use of these analytical systems promotes improved patient outcomes. More formal peer-reviewed literature is needed to support the use of full spine radiography for biomechanical analysis in adult patients³¹; however, the use of full spine radiography may be indicated in certain circumstances for adult patients if there is clinical justification in all three spinal regions and if the patient's body habitus allows a good quality image.
 - c. The use of full spine radiography is not acceptable under the following circumstances:
 - 1) as a routine procedure for biomechanical analysis^{7,31,32,33}
 - 2) when excellent image quality cannot be attained for any reason; eg:

- i) inadequate generator/tube capacity
- ii) other equipment limitations
- iii) large discrepancy between upper chest and abdomen measurements
- iv) large body size of the patient, usually interpreted to mean in excess of 28cm⁴⁷ (larger capacity generators may allow slightly larger sizes, if the discrepancy between upper chest and abdomen is not great)
- v) excessive thoracic kyphosis or excessive lumbar lordosis in adult patients
- vi) physical instability of the patient.

B. Initial vs Serial Studies

Recommendations for technical production of full spine radiographs differ between (1) **initial** and (2) **serial/follow-up** studies.

1. For an initial study:
 - a. A wider field of view is often advisable in order to visualize the ribcage in order to rule out rib abnormalities that may accompany scoliosis⁵.
 - b. A wider field of view is often advisable in order to visualize the pelvis and evaluate for pelvic tilt⁵, which may be useful in classification of scoliosis type and in treatment planning; however, the primary beam should be limited so as to exclude the orbits and so as not to exceed the lateral margins of the patient's body and the inferior margin of the pelvis.
 - c. A wider field of view allows for better visualization of Risser's sign⁵ (development of iliac crest secondary apophyses, which represents stage of bone growth).
 - d. Female gonad shielding partially obscures visualization of the sacrum and sacroiliac joints⁵.
 - e. Breast shielding partially obscures visualization of ribs⁵.
 - f. Moderate film/screen speed (400) provides greater radiographic definition (detail) as opposed to higher film/screen speeds and may be preferred for initial diagnostic accuracy.

2. For serial/follow-up studies, the primary diagnostic goal is usually to reevaluate scoliotic curve progression, and the above-mentioned diagnostic questions have usually been answered by the initial study. Multiple serial studies may be required in some circumstances. For these two reasons, the concern for radiation protection rises in importance^{5,6,34,35,36,37,38,39,40,41} being facilitated by a limited field of view^{7,13,35}, breast and gonad shielding^{5,7,11,13,15,35,42}, PA positioning^{5,7,11,16,35,42,43,44,45,46} and faster film/screen speeds^{7,11,13,15,16}.

C. Technical Parameters for INITIAL full spine studies

Full spine radiography is best confined to frontal projections^{7,47}.

1. PA positioning is preferred for scoliosis evaluation on individuals under 20, in order to reduce breast and gonad radiation dose. Even for initial studies, PA positioning is important in facilitating more accurate comparison of curve measurement with subsequent serial PA studies⁴⁸.
2. For those limited circumstances in which full spine radiography may be used on an isolated basis for adult patients (as opposed to repetitive serial scoliosis evaluations for adolescents), AP or PA positioning may be used.
3. The full spine projection may be produced with the patient's mouth open or closed.
4. For an **initial study**, the production of a frontal full spine projection requires an accompanying frontal cervical projection, either an AP open mouth or a AP tilt-up lower cervical, to complement the view that was not included on the 14x36" projection.

5. For an **initial study**, the production of a frontal full spine projection requires accompanying **sectional** lateral projections of the cervical, thoracic, and lumbar regions of the spine

- a. The convexity of the curve should be placed nearest the film in order to reduce projectional distortion.
- b. Custom tube tilt lateral projections may be required to view clinically significant regions
- c. AP or oblique spot projections may be required to adequately view clinically significant regions.

film size: 14x36", collimated to include ribs and width of pelvis (initial study only), with limitation of the primary beam so as to exclude the orbits and so as not to exceed the lateral margins of the patient's body and the inferior margin of the pelvis.

SID: 72" or 84"7

film/screen speed: at least 400

filtration: selective/wedge filtration at the tube

gonad shielding: yes for males, no for females* (initial study only)

breast shielding: no*

*PA positioning significantly reduces both gonad and breast dose

Standard Exam:

1. frontal view, PA recommended, 14x36", mouth open or closed
2. separate **sectional** cervical, thoracic, and lumbar projections, convexity of curves nearest the film. Lateral thoracic and lateral lumbar projections should be collimated as tightly as possible to reduce radiation dose and improve image quality via reducing scatter.
3. separate frontal cervical view to complement the view not included on the 14x36" film

Optional Views:

1. lateral 14x36" full spine projection (not usually recommended)⁴⁹.
2. left and right lateral bending projections to assess flexibility of curve(s).
3. spot frontal, lateral, oblique, or tube-tilt views of regions of special clinical interest; eg, AP thoracic projection (convexity nearest film) to more accurately assess any thoracic hemivertebrae or congenital unsegmented bars.

D. Technical Parameters for **SERIAL/FOLLOW-UP full spine studies**

Serial full spine radiography for scoliosis evaluation on patients under the age of 20 should utilize PA positioning.

1. the PA full spine projection may be produced with the patient's mouth open or closed.
2. for **serial/follow-up studies**, a single 14x36" PA projection *alone* may be appropriate in certain circumstances
3. a narrower field of view (as compared to initial studies) is indicated for all follow-up/serial studies

film size: 14x36", tightly collimated to the spine (to include the curves)

SID: 72" or 84"7

film/screen speed: greater than 400; 800 or 1200 recommended

filtration: selective/wedge filtration at the tube

gonad shielding: yes for males, yes for females

breast shielding: yes

Standard Exam:

1. frontal view PA, 14x36", mouth open or closed

Optional Views:

1. sectional custom tube-tilt lateral projections of regions of clinical interest
2. spot views of regions of special clinical interest
3. left and right lateral bending projections to re-assess flexibility of curve(s) (not usually required after the initial study)
4. lateral 14x36" full spine projection (not usually recommended).

Adopted at the ACCR Workshop in Minneapolis, MN 2005

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