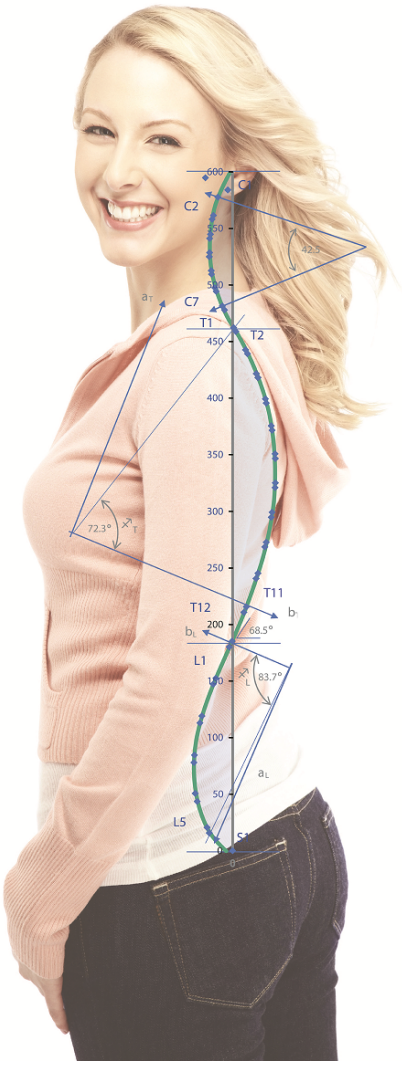
KANADY
CHIROPRACTIC

X-RAY Report of Findings



Prepared for : Jess Quick

Evaluation Date : 2/26/2020

Date X-Ray Taken: 2/26/2020

PostureRay®
Exacting X-Ray Analysis

Prepared by:
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Welcome

You have chosen to be a patient at an office that utilizes posture and x-ray to evaluate your spinal alignment. While a postural analysis can provide a knowledge of gross postural/spinal abnormalities (your outside alignment), only a radiographic evaluation can provide the details of your spine's alignment and condition (your inside alignment). Your spinal alignment, any possible spinal arthritis, and disc disease (S.A.D.D.) are both conditions of interest to your doctor. With the knowledge from analyzing your spinal x-rays, your health care provider can determine a beginning clinical impression (diagnosis from any abnormalities found on your x-rays) and determine an initial program of corrective care.

What is Normal for the Spine?

Your doctor performs several levels of analyses on your spinal x-rays. First, an overall evaluation of your alignment in front-to-back radiographic views and your side radiographic views is performed. In the Front view, your spine should be straight or vertically aligned with gravity. In the Side view, your spine should have four natural curves. These four curves should be a convex forward curve in the neck (termed lordosis), a concave curve in the rib cage area (termed thoracic kyphosis), another convex forward curve in the low back (termed lumbar lordosis), and a concave curve in your sacrum-tailbone area. Figure 1 illustrates this alignment.

Figure 1.

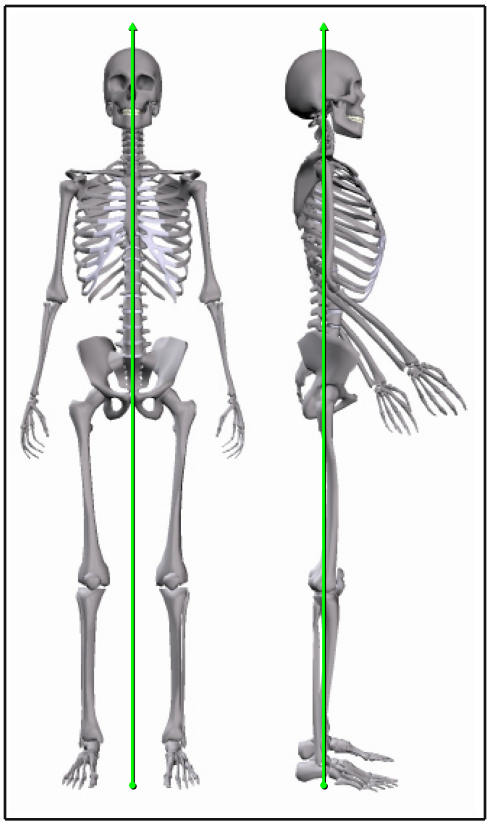


Figure 1.

Normal spinal alignment is depicted in both the front and Side views. In the front view, the center of mass of the skull, thorax, and pelvis are in a vertical line which falls between mid-stance. The spinal column is vertically aligned with respect to gravity. In the side view, the center of mass of the skull, thorax, and pelvis are in vertical alignment over the ankle. The cervical spine is lordotic, the thoracic spine is kyphotic, and the lumbar spine is lordotic.

For a second evaluation, your doctor looks for any obvious spinal ligament damage by observing individual spinal vertebra for any left or right misalignments in the front view and any forward or backward misalignments in the side view. Figure 2 illustrates cases of spinal ligament damage.

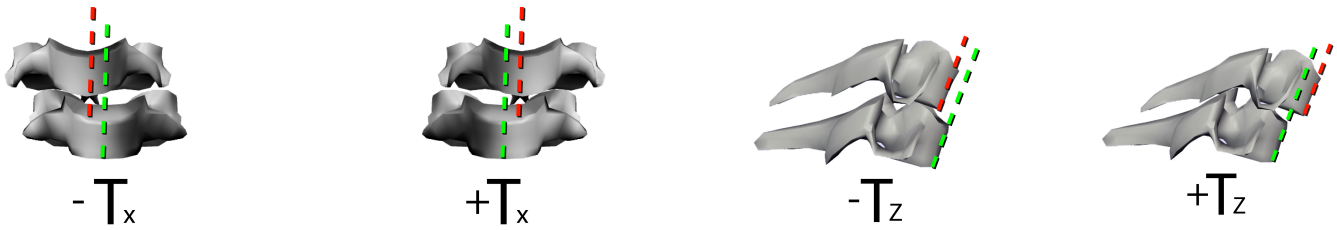
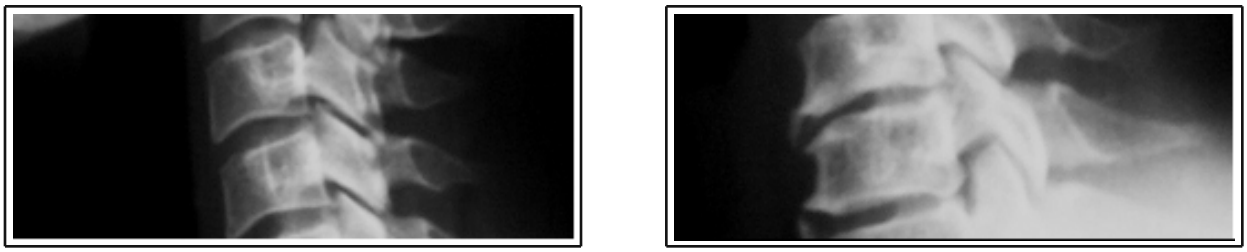


Figure 2. Ligament damage is present when a spinal vertebra does not align properly with either the vertebra immediately above it or immediately below it. In the 1st and 2nd picture, abnormal alignment of a vertebra translating left and right, signifying spinal ligament damage, is illustrated for the front view. In the 3rd picture, in the side view, backward slippage of the top vertebra is depicted. In the 4th picture, in the side view, forward slippage is shown.

For a third evaluation of your spinal x-rays, your doctor checks each vertebra for normal contour and density. This evaluation determines the state of any possible spinal arthritis and disc disease (S.A.D.D.) that you may have. Figure 3 provides an example of this analysis.



For a fourth evaluation of your spinal x-rays, your doctor checks the spacing between each pair of vertebrae. This spacing is where the spinal discs lie. Any narrowing of the normal spacing indicates disc injury and disc disease. Figure 4 presents an example of disc narrowing and disease.

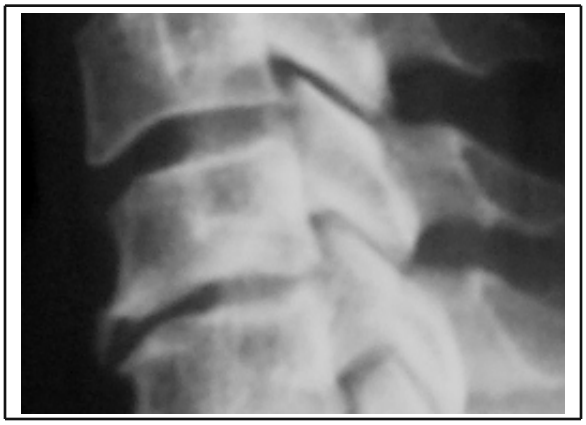


Figure 4. Between the top and middle vertebrae, a normal disc spacing is seen. However, between the middle and lower vertebrae, the disc space is narrowed. This indicates that the disc has been injured and is losing its water content. While disc disease can have several causes, generally, it is a result of abnormal stress (pressures) applied to the disc from abnormal spinal alignment.

For a fifth evaluation of your spinal x-rays, your doctor determines the alignment of each spinal region (neck, rib cage, and low back) compared to the region immediately below by comparing each region to a vertical line in both the front view and side view. The following vertebrae should be vertically aligned with each other: C1 (first neck vertebra), T1 (first rib cage vertebra), T12 (last rib cage vertebra at the level of your kidneys), and S1 (first vertebra in your sacrum). Figure 5 illustrates this alignment for the three separate spinal regions, neck, rib cage, and low back.

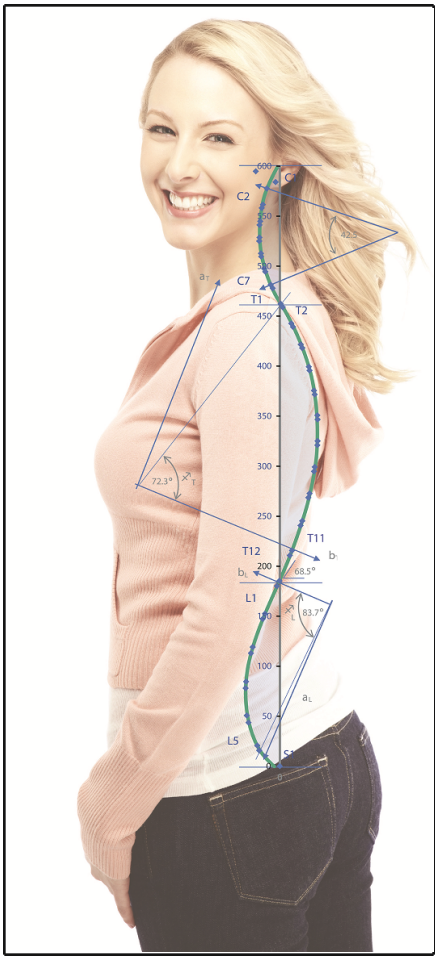
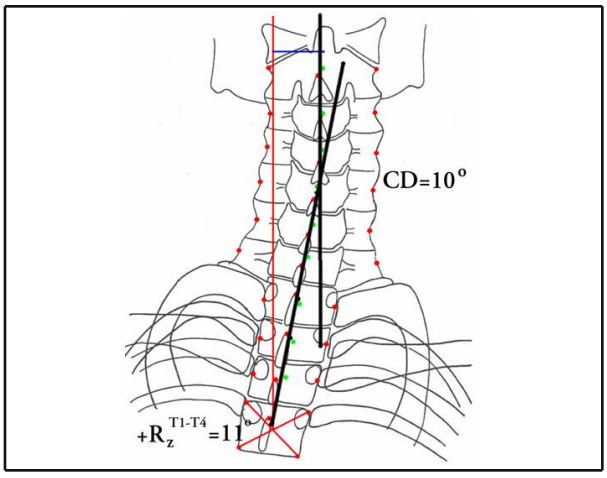


Figure 5.
Normal spinal balance from the side is when a vertical line will pass through C1, T1, T12, and S1. This can be observed all at once on a full-spine side view x-ray or for individual regions on smaller x-ray views, termed sectional x-rays. The figure to the left shows only the posterior points of each vertebra. If we look at the side view cervical (neck), C1 is aligned with T1 (thick vertical black line), with a forward convex curve termed cervical lordosis. If we just look at the side view of rib cage (thoracic), T1 is aligned with T12 and there is the presence of a concave curvature (termed thoracic kyphosis). If we look at the side view lumbar (low back), T12 is aligned with S1, with a forward convex curve termed lumbar lordosis.

For a sixth evaluation, your doctor measures any displacements of the individual spinal vertebra and/or spinal regions. These measurements are in degrees for any angular or turning (rotational) displacements and in millimeters for any sliding or shifting (translational) displacements. Figures 6 and 7 illustrate these measurements.



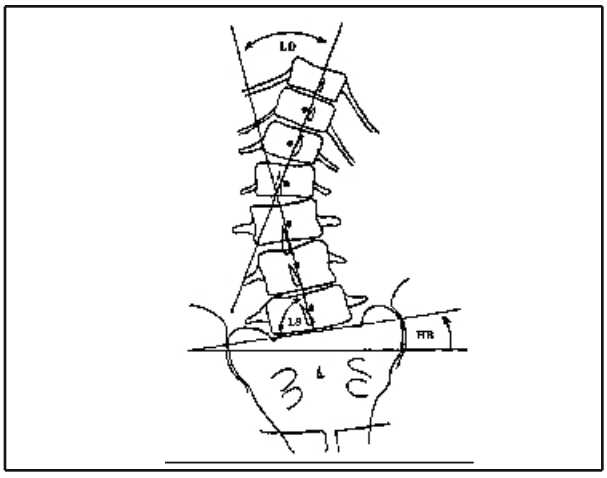


Figure 6. In the front x-ray views, lines are drawn through the centers of mass of each spinal vertebra to measure your abnormal spinal alignment. In A, an example of an analysis of abnormal spinal alignment of the neck in the front view is provided, and in B, an example of an analysis of abnormal spinal alignment of the low back is shown.

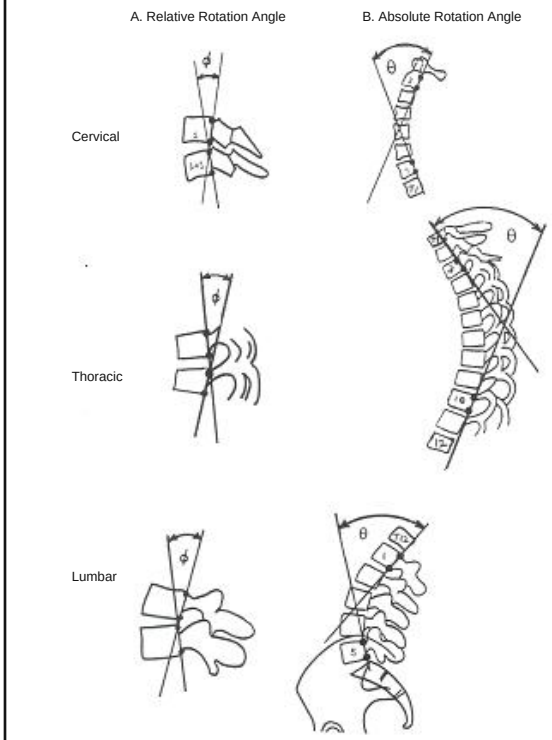


Figure 7.

In the side view, lines are drawn on the back part of each spinal vertebra. These lines are termed “Posterior Tangents”. When measuring angles between adjacent posterior tangents, the angles are termed Relative Rotation Angles (RRA). When angles are formed by posterior tangents on the top and bottom vertebrae in any spinal region, these angles are termed Absolute Rotation Angles (ARA). There are precise normal values published in the scientific literature for each spinal RRA and each spinal ARA. Your alignment will be compared to these published normal values.

What Are the Risks of X-ray Exposure?

While we must constantly work towards the reduction of health risks in all endeavors, we may be led to accept a minimal level as normal. While there is no data indicating diagnostic radiology has a present risk, any radiation dose must be compared to the benefits of useful information gained. The necessity for appropriate treatment selection is indeed an acceptable trade-off when put into perspective. The need for x-ray imaging is especially clear when one considers that radiographic (x-ray) imaging is the only valid method for determining abnormal spinal alignment and the presence of any spinal degeneration. However, since 1990, there has been a growing knowledge base that suggests medical x-rays may have health benefits. While an actual benefit from radiation exposure may seem outrageous, there is much scientific evidence for this phenomenon. This phenomenon/field of study is termed Radiation Hormesis.[12-27,29-48]

Radiation Hormesis is the stimulatory or beneficial effect of low doses of ionizing radiation. This topic is in direct conflict with the “Linear No-Threshold Hypothesis” (LNT), which has been assumed to be true for more than 50 years. This LNT model comes from estimating the risks at lower doses of radiation, in the absence of data, by extrapolating in a linear model from the extremely large doses of radiation from atomic bombs dropped on Japan in the 1940s.

This LNT model has been used to set limits of radiation exposure by all official and governmental associations around the world.[17] Recently in 2003, Kauffman12 reiterated that authors critical of exposure from diagnostic radiation always use the LNT model. This use of the LNT model includes the recent 2005 report by the USA National Research Council.[28] This report stated, “there will be some risk, even at low doses (100 mSv or less), although the risk is small” and “there is no direct evidence of increased risk of non-cancer diseases at low doses.”[28] This 2005 report ignored and contradicted an earlier 2003 review by Kant et al.[29]

For a comparison of exposures, USA citizens are exposed to an average annual natural background radiation level of 3 mSv, while exposure from a chest x-ray is approximately 0.1 mSv and exposure from a whole body computerized tomography (CT) scan is approximately 10 mSv.[28] Also it is noted that 10mSv = 1,000mrem, which equates to about 46 cervical series or 8 lumbar series. Thus, the x-ray views taken to evaluate your spine in this office constitute a very small exposure compared to a CT scan or even annual background radiation from your natural environment.

Thus, it is obvious that the extremely small health risks (and maybe even some health benefits), associated with the x-ray exposure, needed to determine the state of health of your spine in this Report, are small indeed compared to the knowledge gained from this information.

From your radiographic examination at our office, we have determined the state of degeneration of your spine, and have determined the exact displacements of your spine. This knowledge not only gives us a working Clinical Impression/diagnosis of your spinal condition, but also determines the type of treatment that is needed to improve your spinal health condition.

We hope that you appreciate our thoroughness in examining and diagnosing your spinal health problems. In the next few pages, for each x-ray view obtained, we will present a normal view on the left hand side to compare to your x-ray on the right hand side. A table of values of normal measurements and your abnormal alignment will be provided on a Summary page after the x-ray photographs.

This Analysis Has Been Researched

We are proud to state that the normal spinal alignment presented in this report is the result of many research projects on spinal alignment in normal subjects.[1-6] Normal values for all spinal angles and distances, utilized in this report, have been reported in the most prestigious journals in the Index Medicus literature.[1-6] Your abnormal spinal displacements (subluxations) will be compared to these normals.

These measurements of spinal displacements, utilized here, are mathematical utilizing geometric methods. This geometric line drawing analysis has been shown to be very reliable (repeatable) and valid (accurate).[7-11]

Clinical Impression/Diagnosis

A Clinical Impression (Diagnosis) of your condition is derived from a variety of sources, including the consultation and discussion of your health history with your doctor, any orthopedic and/or neurological examinations, range of motion examination, postural examination, and the radiographic examination.

For recordkeeping purposes, the Clinical Impression is reduced to numerical codes, which have been agreed upon world wide. These International Classification of Diseases codes are termed “ICD” codes, are given to healthcare providers in code books, and are lists of specific agreed upon numbers followed by brief descriptions. These numbered ICD codes make for easy communication of your health problems, when given to any third party payers or state government entities, i.e., insurance companies, Workers Compensation, lawyers, courts, State Boards, etc.

Generally, a patient can trace his/her present condition back to a past injury, which is termed mode of onset. Using ICD codes, your doctor has reduced your condition to 5 different categories: (1) mode of onset of condition (accidents, falls, etc), (2) global postural displacements, (3) regional and/or segmental spinal displacements, (4) unchangeable complicating factors (ligament damage, spinal fractures, osteoarthritis, etc), and (5) disease syndromes (headaches, neck pain, arm pain, mid back pain, low back pain, leg pain, sciatica, etc.).

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X-RAY Report of Findings — **Side View of Your Neck (Lateral Cervical View)**

The normal healthy curvature of a neck from the side.

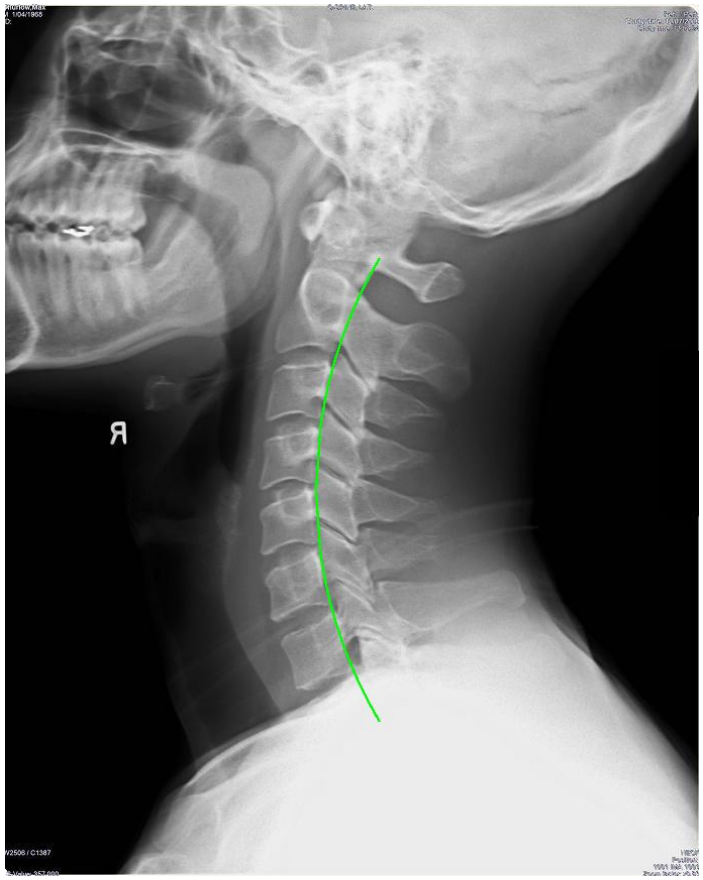
The green curved line represents the normal, healthy position for your neck.

No spinal arthritis is apparent and healthy disc spaces are visualized.

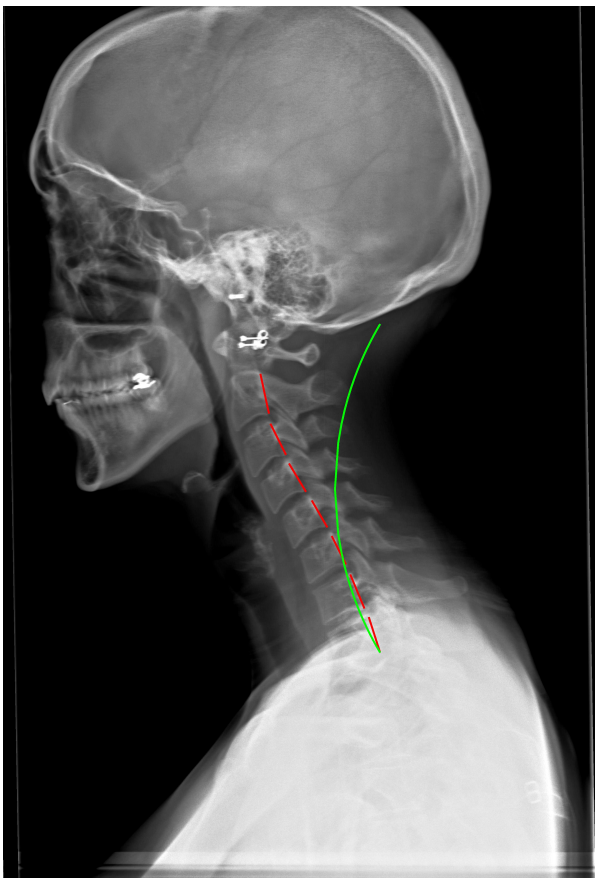
Your neck position from the side.

This green line represents the normal, healthy position for your neck.

This red line represents where your neck is currently positioned.



Front



Back Front Back

Notes about your condition:

Your head is positioned 51.4 mm forward. Your neck curve measures -10.6º and should be -42.0º (a negative sign indicates lordosis or normal curve direction). This represents a 74.8% reduction in your curve compared to the normal neck curve.

The abnormal position of your neck puts increased pressure on your spinal discs, muscles, bones, and nerves. Research has shown that abnormal neck curve positions are associated with early spinal arthritis and disc diseases (S.A.D.D.).

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X-RAY Report of Findings

Front View of Your Cervical/Thoracic (AP Nasium)

The normal healthy position of the neck from the front.

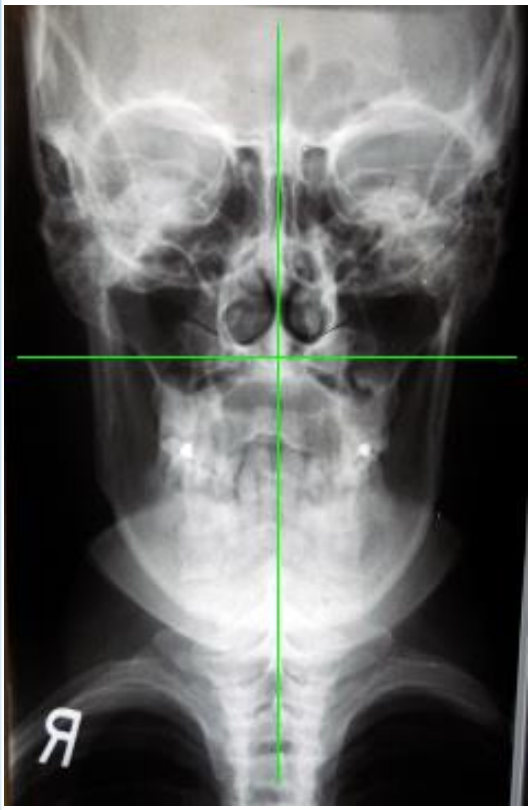
The horizontal line represents the normal atlas position. The vertical line is a plumb line, also indicating normal vertical spinal alignment.

No arthritis is apparent and healthy joint spaces are visualized.

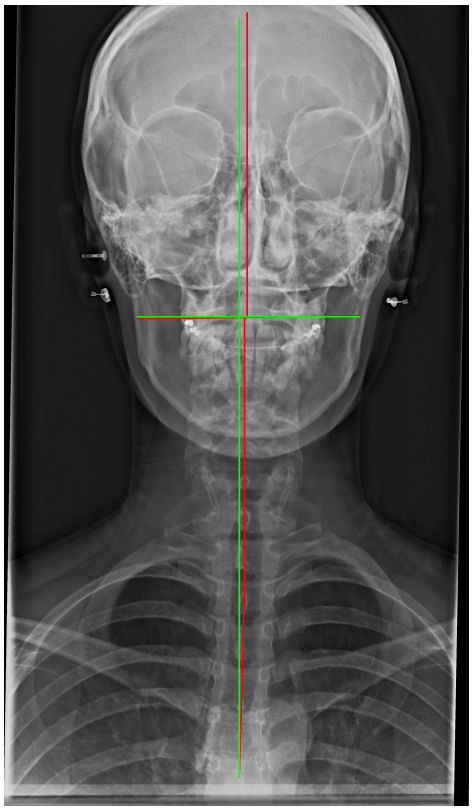
Your neck position from the front.

The green line indicates the normal position for your spine.

The red line indicates the abnormal current position for your spine.



Right Left



Right Left

Notes about your condition:

This neck x-ray is a specific for doctors to evaluate the integrity of your upper neck. When misalignments in this region occur, the effects can be full body. Doctors use angles to measure the alignment of this region. An offset of 0 degrees (90 degrees) is considered plumb and ideal. Your spine demonstrates that the left side of your Atlas is shifted -1.3 mm right off of the Axis (C2), and on the right side is shifted 0.8 mm to the left of the Axis.

Concerning the angular findings of atlas relative to the skull, your spine denotes an upper angle measurement of 0.7 degrees to the left and a lower angle of 0.7 degrees to the right. Ideal alignment in this region of the upper cervical region should approximate 0 degrees of offset of the upper angle and lower angle - meaning the skull sits perpendicular to the Atlas bone. The spine is translated (listed) from plumb by 5.3 mm to the left. Of importance, is that your spine has a mid neck cervico-dorsal angle of 0.7 degrees to the right.

This abnormal position of your neck puts increased pressure on your spinal discs, muscles, bones, and nerves. This condition may lead to early spinal arthritis and disc disease (S.A.D.D.).

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X-RAY Report of Findings — **Side View of Your Mid Back (Lateral Thoracic Spine)**

The normal healthy position of a mid back from the side.

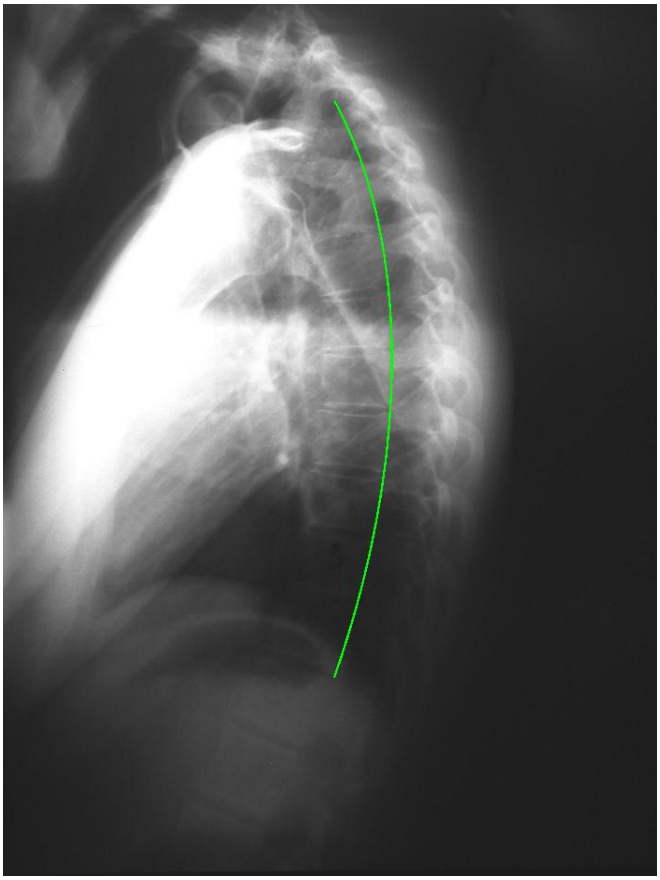
The green curved line represents the normal, healthy position for your ribcage.

No spinal arthritis is apparent and healthy disc spaces are visualized.

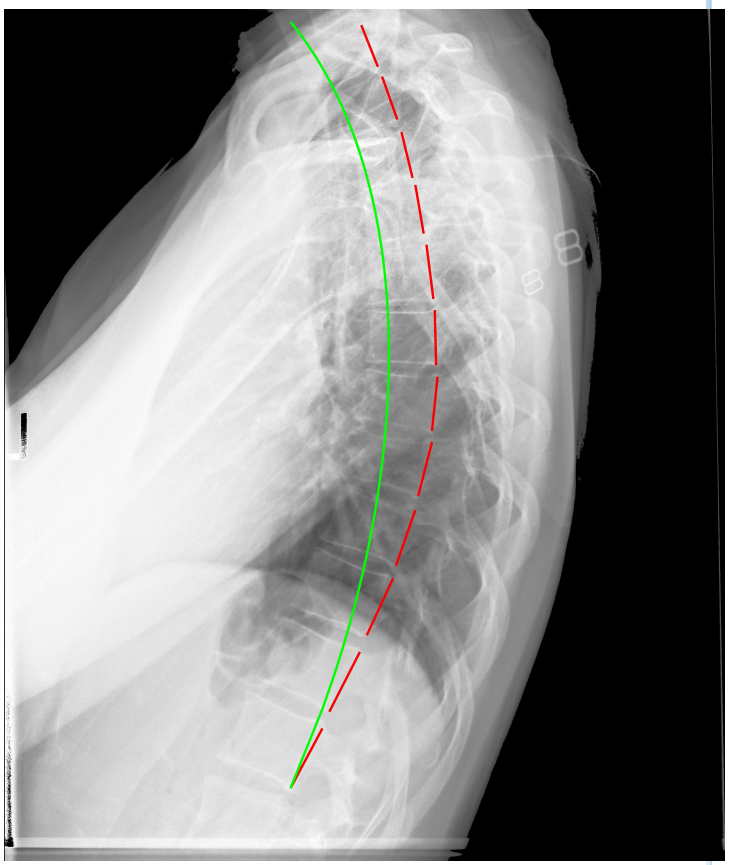
Your mid back position from the side.

This green line represents the normal, healthy position for your mid back curve .

This red line represents where your mid back curve is currently positioned.



Front Back



Front Back

Notes about your condition:

Your spinal curve is positioned 44.4 mm backward. Your thoracic spine curve measures 49.9º and should be 44º. This represents a 13.5% increase in your curve compared to the normal thoracic spine curve.

The abnormal position of your Lateral Thoracic curvature puts increased pressure on your spinal discs, muscles, bones, and nerves. Research has shown that abnormal Full Spine curvatures are associated with early spinal arthritis and disc diseases (S.A.D.D.).

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X-RAY Report of Findings — **Front View of Your Thoracic**

The normal healthy position of a mid back from the front.

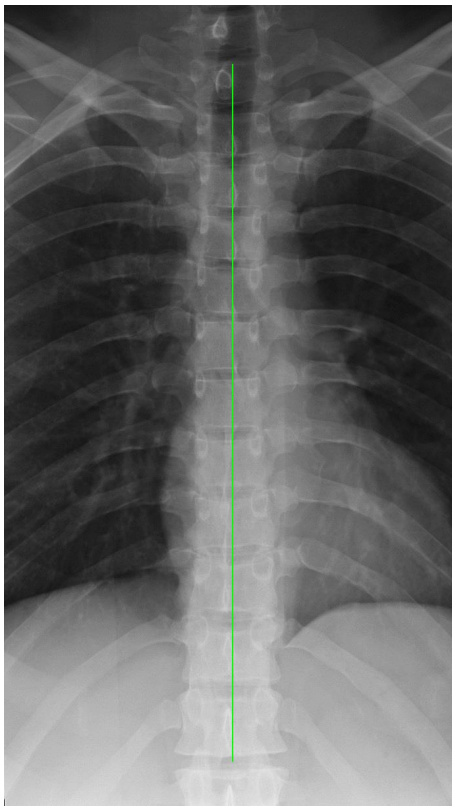
The green line represents the normal, healthy position for your ribcage.

No arthritis and healthy joint spaces are visualized.

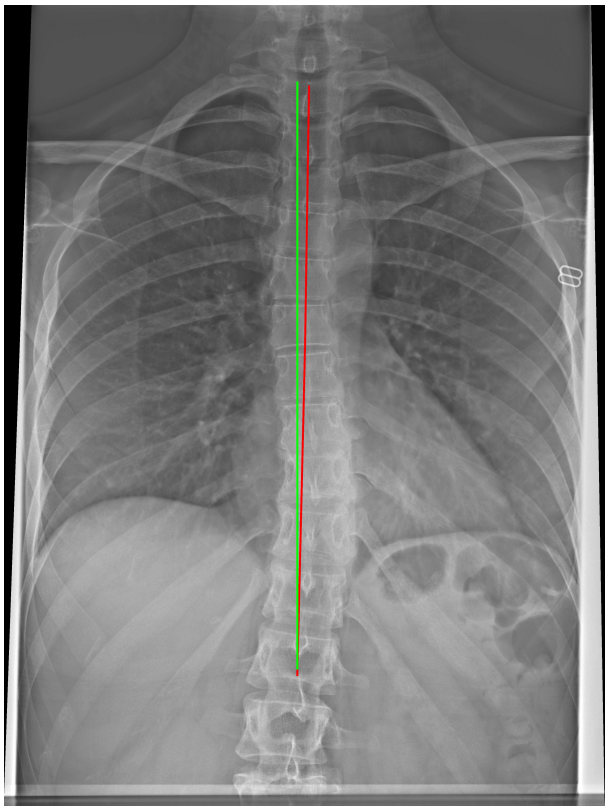
Your mid back position from the front.

This green line represents the normal, healthy position for your Thoracic spine.

This red line represents where your Thoracic spine is positioned.



Right Left



Right Left

Notes about your condition:

Your thoracic spine has one curve. For section T1-T12 apex T6, your mid back is shifted 6.0 mm to the left and you have a mid low back tilt angle of 0.2º.

This abnormal position of your mid back puts increased pressure on your spinal discs, muscles, bones, and nerves. This condition may lead to early spinal arthritis and disc disease (S.A.D.D.).

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X-RAY Report of Findings — Side View of Your Low Back (Lateral Lumbar View)

The normal healthy curvature of a low back from the side.

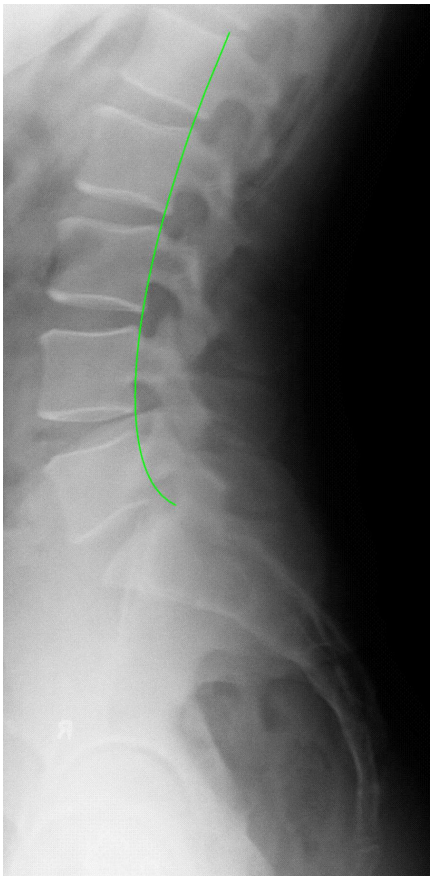
The green curved line represents the normal, healthy position for low back curve.

No spinal arthritis is apparent and healthy disc spaces are visualized.

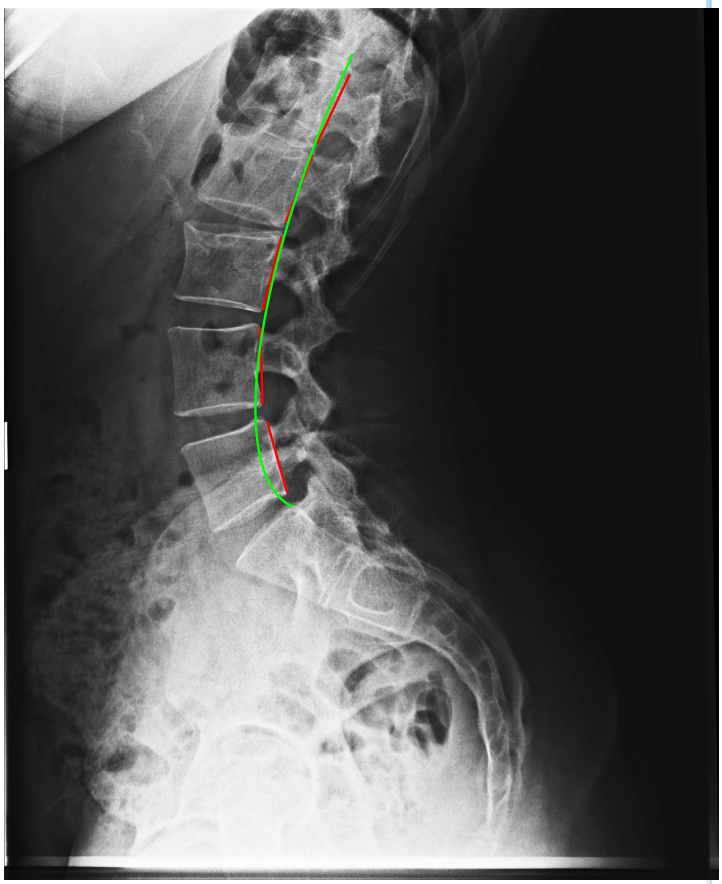
Your low back position from the side.

This green line represents the normal, healthy position for your low back curve.

This red line represents where your low back curve is currently positioned.



Front Back



Front Back

Notes about your condition:

Your rib cage is positioned 1.4 mm backward relative to your pelvis. Your low back curve measures -40.8º and should be -40º (a negative sign indicates lordosis or normal curve direction). This represents a 2.0% increase in your curve compared to the normal low back curve.

The abnormal position of your low back puts increased pressure on your spinal discs, muscles, bones, and nerves. Research has shown that abnormal low back curve positions are associated with early spinal arthritis and disc diseases (S.A.D.D.).

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X-RAY Report of Findings

Front View of Your Low Back (AP Modified Ferguson View)

The normal healthy position of a low back from the front.

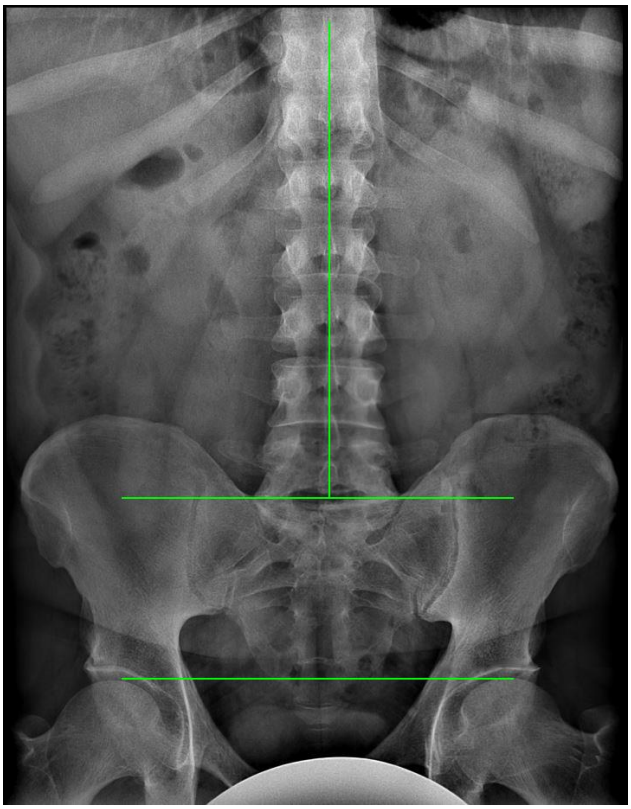
The green line represents the normal, healthy position for your low back.

No arthritis and healthy joint spaces are visualized.

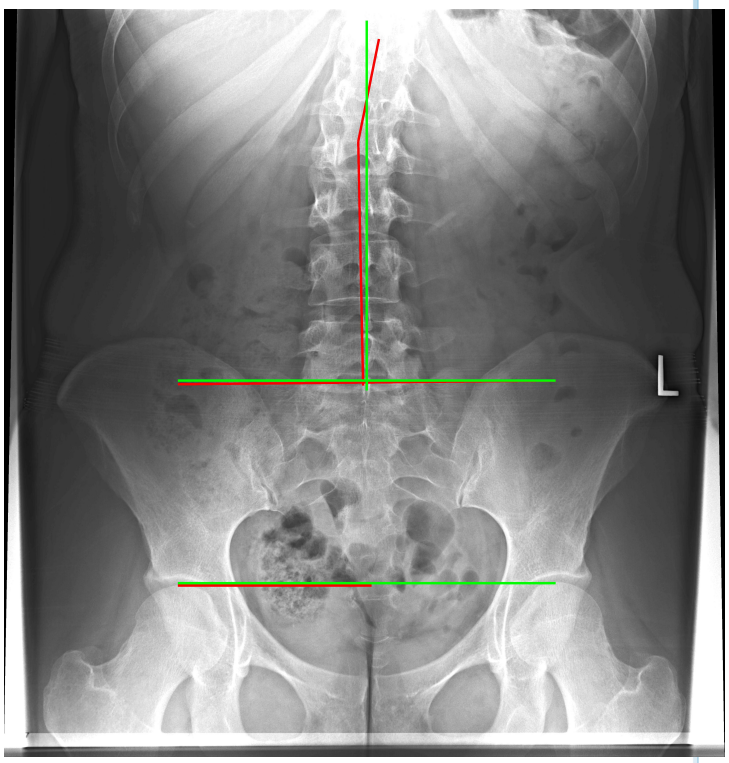
Your low back position from the front.

This green line represents the normal, healthy position for your low back.

This red line represents where your low back is currently positioned.



Right Left



Right Left

Notes about your condition:

The right side of your pelvis is low by 1.6mm relative to true horizontal. In addition, your leg bone height is short on the right side by 1.1mm.

Your low back is shifted 7.0mm to the left, you have a mid low back tilt angle of 11.2º and a lower tilt of 0.5º.

This abnormal position of your low back puts increased pressure on your spinal discs, muscles, bones, and nerves. This condition may lead to premature spinal arthritis and disc disease (S.A.D.D.).

X-RAY Report of Findings — Summary

By looking at your x-ray views compared to the normal views in the preceding photographs, you get a visual idea of what is wrong with your spinal alignment, which Healthcare Practitioners term vertebral subluxations.

However, a visual image does not provide the details of your misalignments. Therefore, we have provided the following Table, which has normal values for the lateral x-ray views for segmental and global alignment compared to your segmental and global alignment. These sagittal (lateral view) values were determined using a geometric analysis of the positions of your vertebrae on each x-ray view.

Cervical Spinal Level

Segments Analyzed	RRA Normal Values	RRA Patient Values	Difference From Normal	Segmental Translations *
C1 to Horizontal	-29.0º	-8.2º	71.7%	
C2-C3	-10.0º	-14.5º	45.0%	-2.5 mm
C3-C4	-8.0º	-4.4º	45.0%	-1.5 mm
C4-C5	-8.0º	0.9º	111.2%	-0.1 mm
C5-C6	-8.0º	3.5º	143.8%	-0.6 mm
C6-C7	-8.0º	3.9º	148.8%	-0.5 mm
C7-T1	-8.0º	4.9º	161.2%	0.3 mm

Global Analysis	Normal Values	Patient Values	Difference From Normal
ARA C2-C7	-42º	-10.6º	74.8%
Translation C2-C7	0 mm	51.4 mm	51.4 mm

RRA = Relative Rotational Angle of Measurement

ARA = Absolute Rotational Angle of Measurement

* Values in Red Exceed Established Normal

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Anterior/Posterior Nasium Level

Global Analysis	Normal Values	Patient Values	Difference From Normal
CDA C2-T6 (T2 apex)	0º	0.7º	0.7º
Left C1-C2 "overhang"	0 mm	-1.3 mm	1.3 mm
Right C1-C2 "overhang"	0 mm	0.8 mm	0.8 mm
C2 Spinous Rotation	0º	0.8º	0.8º
Upper Angle	0º	0.7º left (89.3º)	0.7º
Lower Angle	0º	0.7º right (89.3º)	0.7º
Translation C2-T6	0 mm	5.3 mm	5.3 mm

CDA: Cervico-dorsal Angle (measure of the mid cervical angle)

Thoracic Spinal Level

Segments Analyzed	RRA Normal Values	RRA Patient Values	Difference From Normal	Segmental Translations *
T1-T2	-1.0º	2.3º	330.0%	0.2 mm
T2-T3	4.0º	5.9º	47.5%	-0.1 mm
T3-T4	5.0º	3.9º	22.0%	0.5 mm
T4-T5	6.0º	2.4º	60.0%	0.5 mm
T5-T6	5.0º	5.9º	18.0%	0.6 mm
T6-T7	6.0º	7.3º	21.7%	1.2 mm
T7-T8	6.0º	8.5º	41.7%	0.9 mm
T8-T9	4.0º	4.9º	22.5%	0.8 mm
T9-T10	3.0º	5.6º	86.7%	1.1 mm
T10-T11	3.0º	2.2º	26.7%	0.0 mm
T11-T12	3.0º	1.0º	66.7%	0.5 mm

Global Analysis	Normal Values	Patient Values	Difference From Normal
ARA T1-T12	44.0º	49.9º	13.4%
ARA T2-T11	42.0º	46.6º	11.0%
ARA T3-T10	37.0º	38.5º	4.1%
Translation T1-T12	0.0 mm	-44.4 mm	44.4 mm

RRA = Relative Rotational Angle of Measurement
ARA = Absolute Rotational Angle of Measurement
* Values in Red Exceed Established Normal

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Anterior/Posterior Thoracic Level

Global Analysis	Normal Values	Patient Values	Difference From Normal
Mid-Thoracic Angle T1-T12	0º	0.2º	0.2º
Transl. at Apex T1-T12 (apex T6)	0 mm	3.7 mm	3.7 mm
Translation T1-T12	0 mm	6.0 mm	6.0 mm

Lumbar Spinal Level

Segments Analyzed	RRA Normal Values	RRA Patient Values	Difference From Normal	Segmental Translations *
T12-L1	-1º	-3.5º	250.0%	0.4 mm
L1-L2	-5º	-3.1º	38.0%	-0.2 mm
L2-L3	-6º	-8.0º	33.3%	-1.0 mm
L3-L4	-9º	-16.2º	80.0%	-1.8 mm
L4-L5	-19º	-13.5º	28.9%	-0.7 mm
L5-S1	-33º	-39.4º	19.4%	-3.2 mm
Sacral Base Angle	40º	46.4º	16.0%	n/a

Global Analysis	Normal Values	Patient Values	Difference From Normal
ARA L1-L5	-40º	-40.8º	2.0%
Translation T12-S1	0 mm	-1.4 mm	1.4 mm
Pelvic Tilt	50º	61.6º	23.2%
Pelvic Incidence	56º	55.3º	1.3% WNL
CBP PTPIA	67º	68.6º	2.4% WNL

RRA = Relative Rotational Angle of Measurement

ARA = Absolute Rotational Angle of Measurement

* Values in Red Exceed Established Normal

Anterior/Posterior Lumbar Summary (Modified Ferguson)

Global Analysis	Normal Values	Patient Values	Difference From Normal
Leg Bone Unleveling*	0 mm	right 1.1 mm	1.1 mm
Spine Base (Sacrum) Unleveling*	0 mm	right -1.6 mm	1.6 mm
Spine Base (Sacrum) Tilt	0º	0.5º	0.5º
Lumbo-Sacral Angle T12-L5 (L2 apex)	90º	-89.0º	1.0º
Lumbar-Dorsal Angle T12-L5	0º	-11.2º	11.2º
Translation T12-S1	0 mm	7.0 mm	7.0 mm

* Accounting for magnification

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