

The Ergonomics of Lumbar Support

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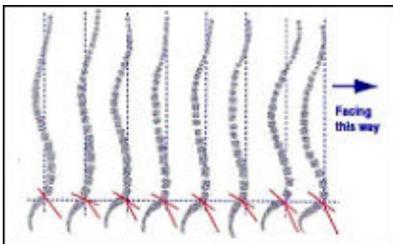
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Due to size, height, weight and seating preferences amongst individuals, infinitely adjustable lumbar support is required to properly accommodate everyone. Schukra lumbar systems are available in 2-way (in/out) manual and power 2-way and 4-way (in/out, up/down) models, all of which provide infinite adjustability throughout the complete range of movement. Improving seated posture and lumbar support makes driving more comfortable.

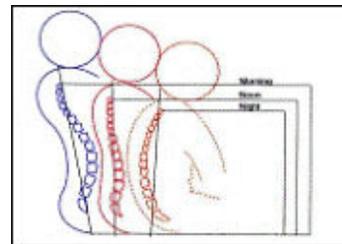
Our Changing Spine

Even Healthy Spinal Columns are as different as human faces...

Every Spinal column starts with a different curvature....



Even Healthy Spinal Columns are constantly changing in Curvature...



The changes in one spinal column throughout the day without lordotic support...

Schukra lumbar systems support the lower back and help keep the "S" shape of our spinal column.

Doctors and scientists agree that the curvature of our spine varies throughout the day and eight types of spinal column are found among healthy young people. From morning to night, the curvature of the spine changes. Without proper support, the natural "S" shape of our spinal column straightens and then becomes "C" shaped resulting in a slouched appearance (poor posture) and leading to lower back pain, upper back tension and added stress to the neck and shoulder areas of our back.

Proper Lumbar Support – The Three-Fold Effect

The basis of all lumbar support systems is to achieve correct seating position. To attain optimum seating position, the lumbar seating system must provide support to the pelvis, lumbar vertebrae and upper body. The support of these areas is commonly referred to as the "Three-Fold Effect." Effective support of these areas will enable lasting seating comfort after the initial adjustment.



1. Support of the Pelvis (to prevent it from rotating backwards)
2. Support of Lumbar Vertebrae
3. Vertical Support of Upper Body

Ergonomic Benefits of Lumbar Support

Lumbar support systems are designed to assist you in achieving an anatomically correct seating posture. Incorrect seating posture can lead to lower back pain that can lead to driving discomfort, reduced concentration and reduced driving safety.

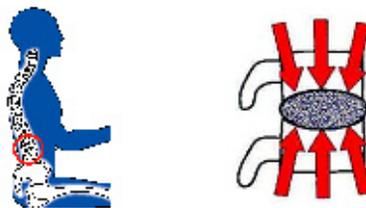
The Problem:



Lack of a Lumbar Support Causes:

- Increased muscle activation
- Increased tension on ligaments
- Increased pressure on the discs
- Decreased comfort

The Solution:



Proper Lumbar Support Provides:

- Decreased muscle activation
- Decreased tension on ligaments
- Decreased pressure on the discs
- Increased comfort

Proper lumbar support and direct heat are among the most recommended long-term chiropractic care therapy and preventive measures for lower back injuries. These can be installed in combination in virtually any automotive seat, using our genuine OEM adjustable lumbar support systems and universal automotive seat heaters.

Make driving more comfortable for your customers...

just like the automakers do in their premium level models!

Creating the Perfect Fit: New Car Seat Design Oh, My Aching Back! Lumbar Support and Head Restraints

By Dale Buss [reprinted from Edmunds.com]

Because your back plays such an important part in how you feel no matter where you are, making a seat comfortable in terms of back support remains the highest aim of vehicle seat designers.

But it's getting more difficult for car seat designers to ease everyone's back in the cockpit. Larger bodies are more difficult to fit properly. And as we age, our spines curve more, meaning that auto companies have to pay special attention these days to the aging baby boomer demographic.

"There are seven different theories about what causes lower back pain," said Terry O'Bannon, a principal designer for seat supplier Lear. "But the main thing we focus on in seat design is reducing postural muscle activation. If you're having to hold yourself up when you sit down, then the muscles are continually having to work. And you get fatigue and joint pain."

Paying Attention to Lumbar Support

Lumbar support is crucial to this effort. Overall, the auto industry is acknowledging its importance by generally, and gradually, increasing the frequency of lumbar-support systems in seats and their provision as standard equipment, Edmunds.com research shows.

For 2007 model-year vehicles, 78 percent offer driver or driver/passenger lumbar support as standard or optional, a significant rise from 71 percent of models that did so for the 2004 model year, according to Edmunds.com research.

This model year, 29 percent of models offer driver-only lumbar support on a standard basis, the research found, up from a comparable figure of 26 percent for the 2004 model year. Meanwhile, 45 percent of models for the 2007 model year offer driver/passenger lumbar support as standard or optional, up from 43 percent in 2004.

Yet the consensus of the seat-design community is that, in general, import brands are making lumbar supports more widespread, or more often standard, while the domestic Big Three are more likely to be "decontenting" the vehicle of lumbar supports in cost-cutting moves.

"We see our Asian customers generally increasing the use," said Barry Jones, president of Leggett & Platt Automotive Group North America, a Windsor, Ontario-based operation that relies on lumbar supports for more than half of its revenues. "And we see our North American customers maintaining where they're at or slightly decreasing."

Sometimes, carmakers chip away at costs by removing lumbar supports from the front passenger seat while leaving them on the driver side. "From driver to passenger side, it's a constant battle on the front row," said Mike Grajek, General Motors' lead engineer for human vehicle integration. For the sake of costs and profit margins, automakers neither want to "give away" lumbar supports compared with competitors, nor make them glaringly absent.

Overall, car seat designers acknowledge the growing importance of lumbar support to consumers. "When you have lumbar support and the following [model] year that support is taken out for some reason, the seat sees a dramatic decrease in comfort," said Don Bernhardt, Lear's vice president of seat engineering. And consumers know it right away."

How Lumbar Supports Work

Usually, lumbar-support systems in seats are built mechanically around a metal plate that has a surface of as much as a square foot,

sometimes resembles a rib cage and weighs a pound or two. Other systems are pneumatic, meaning a bag is inflated. Typically, lumbar supports can be manually or electronically activated to extend into the seat cover and gently push the support into the lumbar areas of the lower back.

A number of variables can determine how effective a lumbar-support system is in practice, including the materials used, how well the system is integrated with the rest of the seat and whether adjustments move only in and out or also up and down.

"Consumers want the flexibility of adjustable lumbar," said Steve Nunez, supervisor of seat-comfort attribute development for Ford. "There are so many different sizes and shapes of customers that we can't find the single optimal spot for lumbar support. And people are aging and have different back ailments and conditions. Adjustable lumbar allow us to find the sweet spot to offer them the most relief and give them the best posture."

Head Restraint Rule Complicating Seatbacks

The latest challenge facing seat designers is a new federal whiplash-prevention standard; it requires both front and rear headrests to be higher and closer to the backs of people's heads, similar to those mandated by the European Union. So beginning in September 2009, U.S. automakers will have to phase in head restraints that lock once they're in position and aren't removable — including those on rear seats that tilt or fold for loading purposes. Vehicle seat designers must choose between placing "passive" restraints closer to occupants' heads or designing "active" mechanisms that instantaneously move restraints forward to support the head if a vehicle crashes.

But consumers have demonstrated that they will tend to resist, by whatever means necessary, having restraints moved closer to their heads. "The occupant gets a pressure feeling," said Michael Sweers, general manager of engineering design for Toyota Motor Engineering & Manufacturing North America. "It doesn't affect their comfort, but it's like being in a tight space and you feel like it's touching you."

Many consumers, research predicts, will simply recline their seatbacks more. This maneuver, of course, tends to offset the back and lumbar support that has been built into these seats and makes it more difficult for designers to make the seats comfortable and supportive of the back. Automakers and seat suppliers are responding in part by adding more foam in upper seatbacks so they are more upright and the neck-to-torso angle is more comfortable, said Ford's Nunez.

Still, certain types of drivers probably are predicted to resist the most. Boomers are less accepting of the closer head restraints than younger drivers, the companies say. Women, out of concern for their hairstyles, are more disconcerted by closer restraints than men are. The shortest drivers will have the biggest problems because they must keep the seat high and the backrest extremely vertical.

And in the American West, automakers expect complaints from drivers who prefer wearing cowboy hats to putting up with a head restraint: Now, they'll have to take off their 10-gallons before they sit down.

Add the new head-restraint standard to the list of reasons why designing seatbacks [and cushions, and bolsters] is still as much an art as a science. And it will be as long as drivers are, well, human.

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Driving and Back Care By Alan Hedge, PhD, Prof. Ergonomics Cornell University Ithaca, NY [reprinted from spineuniverse.com]

Every day, almost 90% of journeys and 92% of miles traveled are made in cars or ground transportation (buses, trucks). For almost 180 millions of us, driving is the primary means of transportation, for journeys to and from work, to the store, and for pleasure. On average, men drive 44 miles and women drive 34 miles each day. We Americans love our cars. For some Americans, driving a motorized road vehicle is also their job: truck drivers, bus drivers, ambulance and fire trucks, police, taxis etc.

Modern car and truck designs have come a long way in their design over the past 20 years, with better styling, better features, better fuel efficiency and better comfort. But is there any evidence that driving and the design of modern car, bus or truck seats might play a role in causing some of the back injuries that plague Americans each year?

Why is driving different to ordinary sitting?

If your car isn't moving, then sitting in a driving seat probably isn't much different to sitting in a padded chair, but as soon as the vehicle starts moving things change. Unlike regular sitting, while a vehicle is in motion the body is subject to different forces: to accelerations and decelerations, to lateral swaying from side to side, and to whole-body up and down vibrations. Also, when driving the feet are actively being used, the right foot on the gas (accelerator) pedal, the left on the brake, and in a stick-shift also on the clutch. When the feet are active they cannot be used to support and stabilize the lower body as normally happens when they are placed on the floor during normal sitting in a chair. There is evidence that the combination of these factors, coupled with the design of the car seat itself, can increase the chance of back problems for some people.

Is driving associated with back problems?

Laboratory research has studied the effects of whole-body vibration when a person is sitting in a car seat. The lumbar spine has a natural resonant frequency of 4-5 Hz, and results show that this natural frequency can be excited by laboratory simulated vehicle driving, and this can lead to high spinal loadings in the lower back, and this in turn could result in greater postural discomfort and an increased risk of low back pain and injury.

A number of research studies have investigated possible associations between driving and back problems, and generally these studies have found significant results.

A recent comparison of drivers in the USA and in Sweden found that in each country 50% of those questioned reported low back pain. Analysis of the possible reasons for this revealed that long-term vibration exposure from driving was among the highest risk factors for neck, back and low back problems. Another recent Swedish study of over 1,000 salespeople found significantly increased risks of neck and low back pain among those who drove long distances and spent a long time each day in their car.

Gender appears to play a significant role in the likelihood of developing driving-related back problems. A survey of over 7000 Parisians found that even though the incidence and severity of low back pain was higher in women, driving was only associated with back problems in men. The importance of driving as a risk factor increased with driving time, and was especially significant for men who drove 4 hours or more each day.

A survey of over 1400 urban transit drivers showed that difficulties with the ability to correctly adjust the driving seat have significant effects on the prevalence of low back problems.

However, it seems that driving need not always increase the risk of back problems. A survey of over 100 members of the Royal Canadian Mounted Police found no statistically significant

associations between driving a patrol car and the likelihood of experiencing back pain, which was comparable for drivers and other police officers.

Is there an ideal car seat design?

Based on a detailed analysis of information from peer-reviewed scientific journals and texts, automotive engineering reports, and the National Library of Medicine a series of requirements for the optimal car seat design have been developed. Ideally, the optimal car seat should have:

1. adjustable seat back incline (100 deg from horiz is optimal)
2. changeable seat bottom depth (from seat back to front edge)
3. adjustable seat height
4. adjustable seat bottom incline
5. seat bottom cushion with firm (dense) foam
6. adjustable lumbar support (horizontal & vertical)
7. depth pulsating lumbar support, to reduce static load
8. adjustable bilateral arm rests
9. adjustable head restraint with lordosis pad
10. seat shock absorbers to dampen frequencies between 1- 20 Hz
11. front-back seat travel allow diff size drivers to reach the pedals
12. seat back damped to reduce torso rebound in rear impacts.

What to look for when you buy your next car.

It's likely that most cars on the market today won't have all of the features listed above that are desirable in the optimal car seat, but some will have more than others, so choose wisely. Pay particular attention to the following 5 guidelines that should help you to protect your back when you drive.

- 1) **Car seat comfort** - when you sit in the car seat and you have adjusted this to fit your body as best you can does it feel comfortable. If not, then the car seat will probably cause you back discomfort problems if you drive for any length of time. Bounce up and down in the seat to see how it accommodates vibration. Take the car on a test drive.
 - 2) **Car seat adjustments** - can you adjust all of the features of the car seat that you want to adjust? At a minimum you should be able to adjust:
 - a. Seat distance to accommodate different leg lengths
 - b. Seat height to accommodate different leg lengths
 - c. Backrest angle to sit in either an upright or reclined position
- Then you should look for other useful adjustments:**
- d. Seat tilt to angle the front of the seat up or down so that this doesn't press against the back of your knees
 - e. Lumbar cushion support for the lower back. Look for a car seat that provides you with good low back support that can be adjusted for depth (often the seat has an inflatable cushion) and preferably for height as well.
 - f. Headrest for neck support
 - g. Arm rests that are wide, cushioned and comfortable, and preferably height adjustable.

3) **Change your posture** - remember to move your posture from time to time. Wait until driving conditions are suitable to allow you to wriggle in the seat to alleviate postural fatigue.

4) **Take breaks** - driving is tiring work and to avoid driver fatigue and minimize postural discomfort it is good take to fairly frequent rest breaks that allow you to stand up and move around.

5) **Seat accessories** - you can choose a variety of car seat accessories that may improve seat comfort for you, from fleece covers to soften the seat to bead backrests to provide for some kind of back massage while you drive. Choose whatever you find adds to your driving comfort. ...