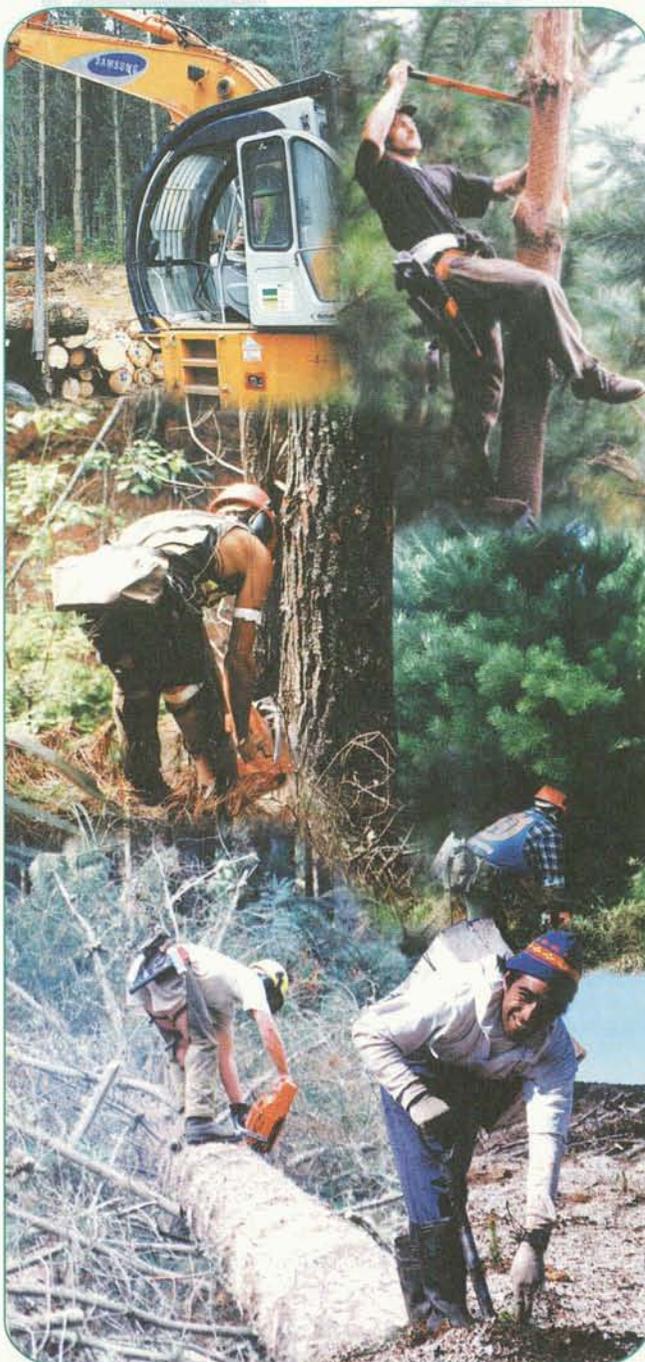


## **BACK TO BASICS: Better Ways to Manage your Back to Reduce Injury**

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### **Who Should Read This?**

Whether you are felling and delimiting, driving a loader, skidder or processor, or pruning and planting, you are placing strain on your back. Just by carrying out these jobs, you are already at a high risk of sustaining a back injury. Understanding how the back functions will allow you to minimise this risk through proper care and maintenance. If you can avoid a back injury, you have the capacity to enhance your working performance and sustain your current quality of life.

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## Why Worry About Back Injuries?

Many forest workers receive sprains and strains while carrying out their normal jobs in the forest, and when it comes to back strain, no-one is immune. But unlike a cut that heals or a break that bonds, back injuries can be with you for life. The peak injury rates show in the 30 to 50 year age group, but the risk starts accumulating much earlier. Since your spine does not finish growing until age 20-23 (the age of many of our forest workforce), you may not see the effects of a back injury until it is too late to take preventative actions, and the back problem is likely to remain with you for life.



## Who had the First Back Injury?

Back problems have been around since the earliest days of civilisation. A 3000 year old mummy was x-rayed in New Zealand and found to have marked degeneration of all the lumbar (lower back) vertebrae. Even sciatica was diagnosed by the ancient Egyptians about 5000 years ago.

## The Hard Facts on Backs

- Sitting with poor posture for extended periods is the number one cause of back troubles
- Drivers - including truck drivers - run the highest risk of back injury of any occupational group
- Workers in the production, transport and labourer occupational groupings are 230% more likely to suffer back strain than other occupational groups.
- Back claims cost ACC \$353 million in 1997 (\$38 million new claims and \$315 million ongoing claims)
- The majority of new back claims in 1997 were low back strains, 70% by number and 68% by cost.
- Ongoing back claims are nearly 2.5 times greater in number and approximately 3 times greater in cost than new injury claims.
- Once you have injured your back a first time, it is three times easier to injure it again.
- 80% of the world population have had a back injury or experienced back pain at some time in their life

(Facts courtesy Safeguard, May 1993, Ring, 1993, ACC, 1997, Dawes, 1998)

## The Spinal Building Blocks

The spine is made up of 24 bones (vertebrae) which are each designed for weight-bearing and shock absorbing. Each vertebrae is separated by a disc, which acts as a hydraulic shock-absorber between each of the vertebrae.

## The Disc

The disc is more oval in shape than round, and resembles the inner tube of a car tyre. It consists of an outer core of layers of elastic-like bands which resemble an onion when cut in half. This outer core is called the "annulus", which simply means circular fibres. The centre of the annulus is filled with a sac of jelly-like substance which is 88% water. This sac is called the "nucleus pulposus", or more descriptively, spongy centre.

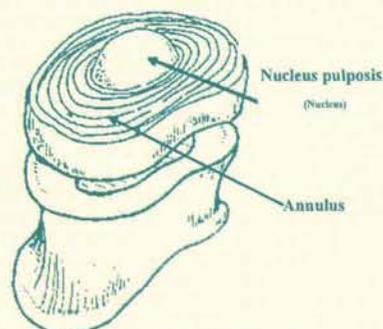


Figure 1 - The Disc

## Function of the disc

When a force is applied to the disc from any direction, the nucleus or inner sac does not move, but is simply squeezed so the jelly-like substance inside is pushed away from the pressure to where there will be less resistance. This changes the shape of the inner sac, and causes the elastic outer fibres to stretch to accommodate the change in pressure. If the spine bends forward, the fluid is squeezed backward. If the spine is compressed by jumping or bending, the nucleus becomes flatter and wider and the outer rings stretch to control it. The disc is constantly changing shape to deal with changes in pressures being applied through the usual range of daily movement.

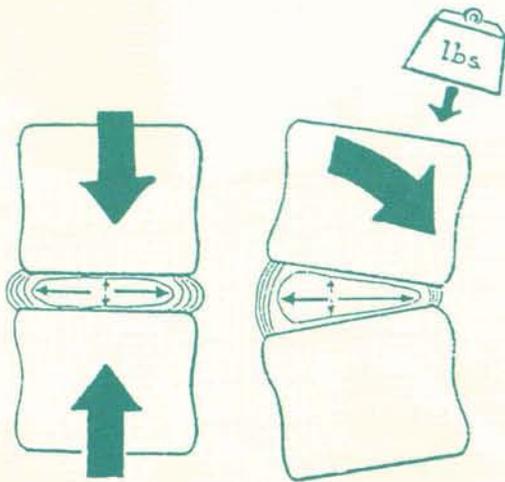


Figure 2 - How the disc reacts to pressure

## No Escaping Degeneration!

Toward the end of a normal life span, it is 100% likely that you will have at least some degree of disc degeneration. By "degeneration" we mean the normal "wear and tear" process. Everything wears out eventually, and the spine is no exception, even though you cannot see it happening. This normal wear and tear process is further accelerated by lifting and carrying. Imagine if someone gave you a 44kg sack of cement to carry around all day - would you last 5mins? This is what you are demanding of your spine every second you spend sitting or standing - the weight of your trunk (44 kg) that must be supported by your spine. The spine was not designed to function like a crane.

It is not only pressure caused by heavy loads, but more often wear and tear on the discs from repetitive harmful movements which causes injuries.

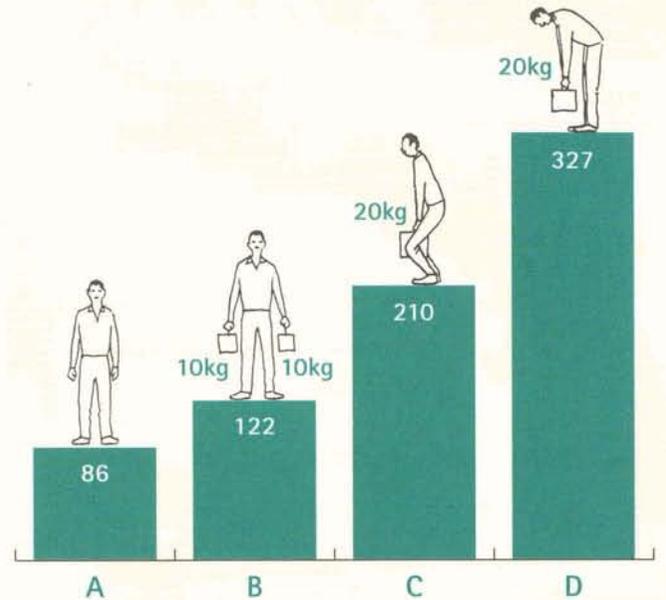


Figure 3 - Pressure on the disc when lifting the same load in different positions (in kg per unit of surface area)

Source: Nachemson and Elfstrom in ILO (1992)

High loads are bad for the back, lower loadings are better.

The body should be used as symmetrically as possible. Lifting in a twisted posture will increase the risks of injury to muscles and joints.

## Sitting and Vibration: Machine Operator Considerations

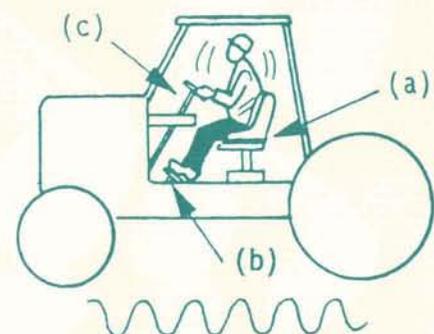


Figure 4 - Sources of whole-body vibration

Source: ILO, 1993

The human spine is perfectly developed for the normal standing posture, where it is strong, has good mobility and is well balanced. But when we sit down, the normal shape of the spine changes, and the discs become squashed and distorted as they attempt

to absorb the extra forces. Studies have shown that sitting places 40% more pressure on the spine than standing. Think about the amount of time spent seated while driving a machine. Then think about the vibration from the machine passing through the seat to your back.

Don't do heavy lifting straight after long periods of sitting or vibration. Your spine has become compressed, and you need to do some stretching or walking first.

## Vibration

Vibration is the transmission of mechanical energy from a source of oscillation, usually a machine. Machine operators are especially exposed to low-frequency whole-body vibration when working on rough terrain. The effects of vibration on man can vary from feeling slightly sick to severe physical injuries, and problems may start even after a short period of exposure. Many operators have been shown to suffer from pain in the lower back, the chest region, the neck, the stomach, and other parts of the body. The risk severity depends on the daily working time, terrain conditions, driving speed and machine design (ILO, 1993). Studies in Canada and Finland have shown that whole-body vibration exceeded exposure limits recommended by the International Labour Organisation (ILO, 1992).

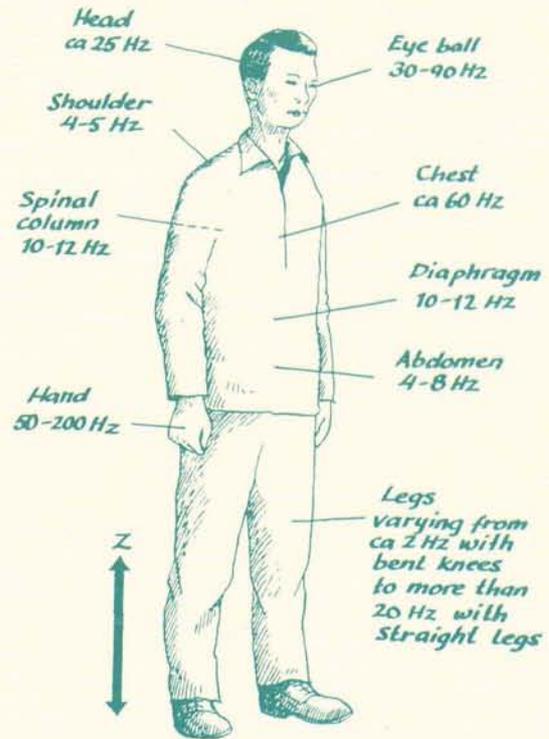


Figure 5 - Vibrations with different frequencies can resonance effects in different parts of the body. Source: ILO (1992)

In a workforce where many machine operators are young and the spine is still growing (up to around 23 years), the undeveloped spinal column is less capable of resisting vibration. This group of the workforce are therefore more at risk of sustaining a back injury. Vibration can speed up the rate that degeneration of the spine occurs, but the news is not all bad, and there are ways to minimise the effects.

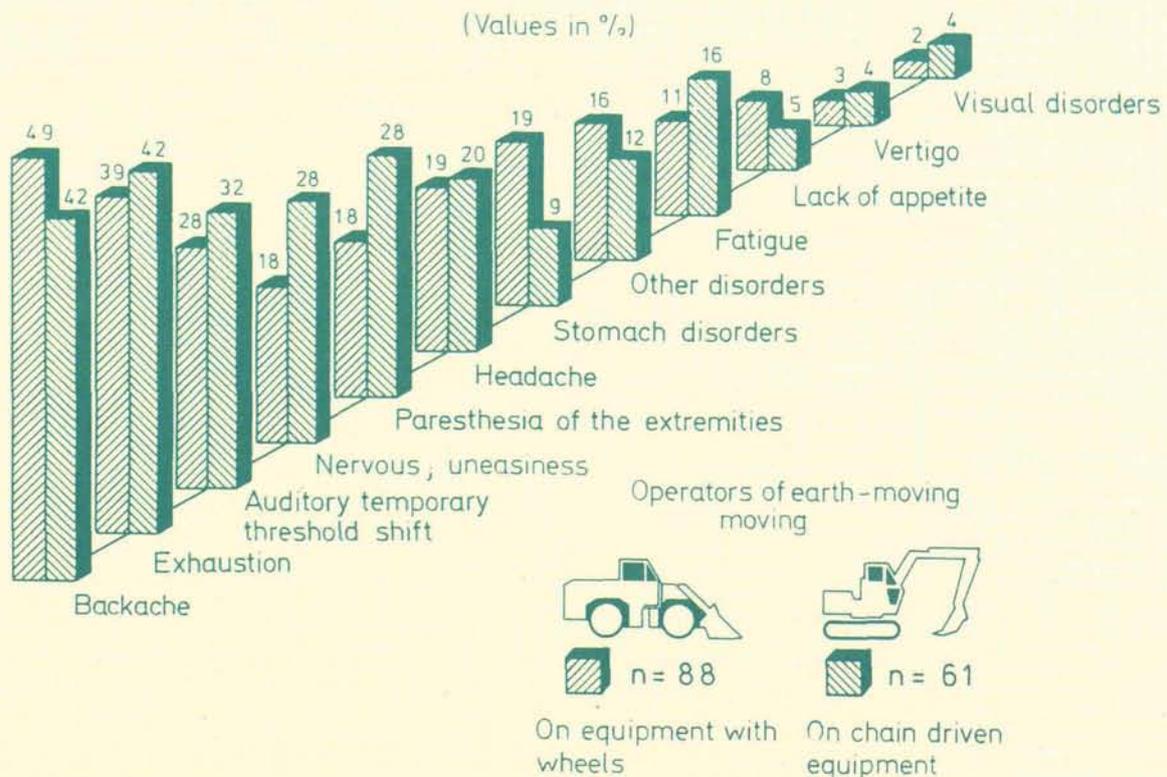
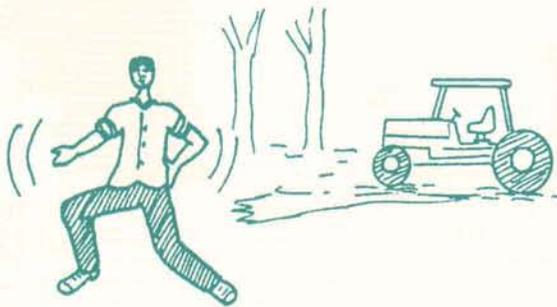


Figure 6 - Health problems reported by drivers Source: Dupuis and Zerlett, (1986)

# On the Job Tools for Back Care

The following solutions are designed to reduce the amount of time your back is exposed to vibration and/or spent in a sitting position.

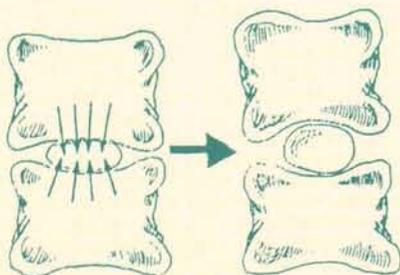
- **Short breaks** away from the vibration allow the spine time to recuperate, with many short breaks being better than a few long ones. You are also less likely to suffer from vibration-induced health problems (headaches, stomach complaints, etc) when short breaks are taken.



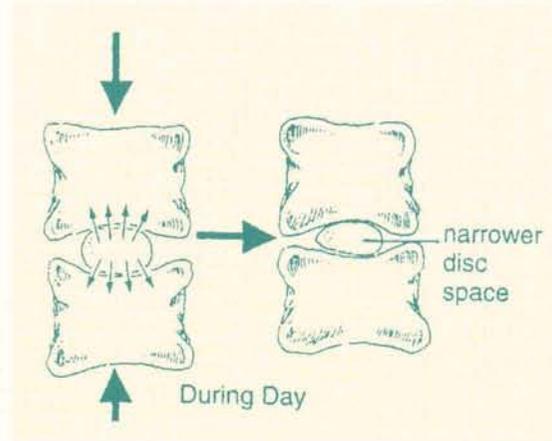
- **Job rotation** is another simple way to reduce the effects of vibration, so try to change tasks at regular intervals.
- Move **bigger loads at lower speeds** rather than smaller loads at higher speeds.
- **Leave the machine and stretch your back and legs** at least once per hour to reduce your exposure to vibration.
- Make sure you **change your posture frequently**, by standing and walking, or doing exercises when seated. This evens out the pressure on the discs.

## Repair and Maintenance for the Back

### Morning "Danger Zones"



During Sleep

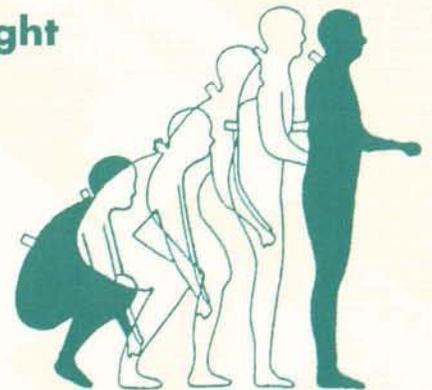


When you first climb out of bed in the morning the discs are very vulnerable to any increase in pressure, and are most susceptible to injury. This is because during sleep, there is minimal force being placed on the spine from gravity and body weight, and the disc has had an opportunity to regain its original size. With a fuller fluid content, there is less room for the disc fluids to move when under pressure, and tears are likely to develop in the outer rings of the discs. Make sure you take care when:

- Putting on your boots in the morning
- Cramming into the gang bus
- Driving out to the site
- Starting heavy physical work before a warm-up

**DANGER ZONE!!!!** Your back is most vulnerable to injury in the first 60 minutes after getting out of bed!

### Lift it Right



Make your leg muscles take the weight when lifting anything, they are stronger than your back muscles. Remember the words "Bend your knees and lift with your legs". When delimiting or cross-cutting, try to let the tree or log take the weight of the saw.

**Never bend and twist at the same time!!**

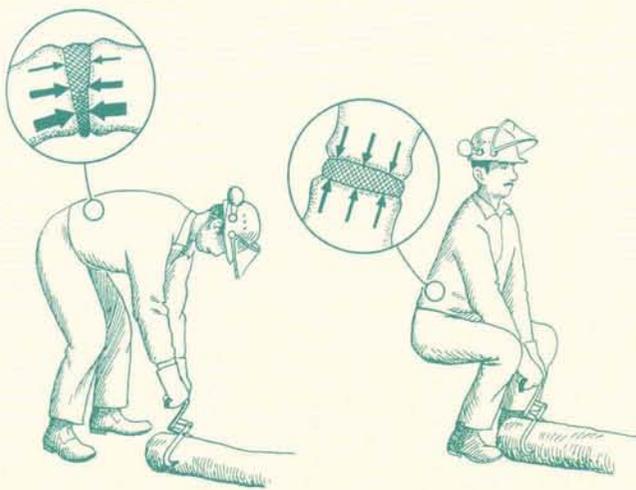


Figure 7: Lift it right:  
Straight back, Upright position, Knees bent, Feet a bit apart

Heavy lifting/pushing/pulling has a cumulative effect.  
Space the heavy work out and take breaks.

## Learn to relax

Your muscles get tight and tense if you are stressed, which can increase the amount of back pain you are feeling. You cannot always remove the causes of stress like work, relationships and money, but you can learn how to reduce their effects. Try doing things that make you feel calm. Learn to control your breathing and relax your muscles.

## Keeping Fit

Physical fitness is an important part of maintaining the spine's ability to cope with stress. Any sport that extends you and improves your stamina, mobility and strength is good. Swimming, walking, running, even sex is noted as a good functional activity for your back in any position! One thing to not do is to try touching your toes from either the lying or standing position with straight legs. Neither of these two exercises strengthen the abdomen, they just show you have loose hamstrings.

## Tighten up that stomach

The two muscle groups responsible for supporting the spine are the back and the abdominal muscles. Back muscles get exercise every day as they are used constantly simply to maintain posture. But abdominal muscles are often weak because they do not get this daily workout. Intra-abdominal pressure can reduce strain on the discs by as much as 40%. But to get that benefit, you need good abdominal muscles. Basically, the stronger your stomach muscles (abs!), the less pressure will have to be carried by the spine during hard physical work or heavy lifting.

**IMPORTANT ABS!** Abdominal muscles are the most important muscle group in the prevention of back injury.

## What can employers do?

Heavy industries and occupations like forestry have the highest reported incidence of back injuries in New Zealand and overseas. Make sure your employees know the best manual handling techniques from the start. New and young workers should have extra emphasis placed on training, as these are the group most at risk of an injury. Make it part of your induction.

Four main training approaches to prevent low back pain are:

- Strength and fitness training
- Lifting techniques
- Back schools
- Safety awareness programmes

(Dawes, 1998)

The more injuries that can be prevented, the fewer employers will have to manage and rehabilitate long-term claimants.

## Exercises

An exercise regime designed to strengthen your abdominal muscles will reduce the chances of you injuring your back. An example of a regime has been provided (from Ring, 1993).

## Acknowledgments

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# Suggested Exercises

Check with your doctor before accepting them as suitable for your back condition

1



### Sit Ups

Bend knees and curl up to a seated position. Lower back and repeat.



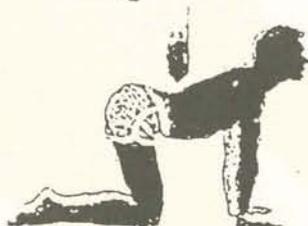
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### Hip Twister

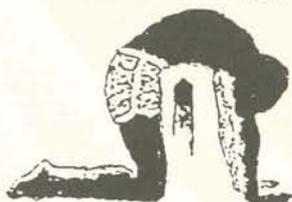
Supported from behind, bend knees to chest and rock to each side.

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### Hump and Hollow

On your hands and knees, relax your abdomen and let your back sag downward. Then hump your back. Repeat.

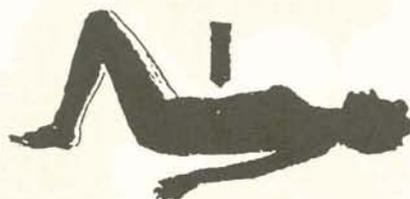


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### Pelvic Tilt

Lie on your back with your knees bent, feet flat on the floor and arms at your sides. Tighten your stomach muscles and flatten the small of your back against the floor without pushing down on the feet. Hold for five seconds, then slowly relax.



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### Peek Ups

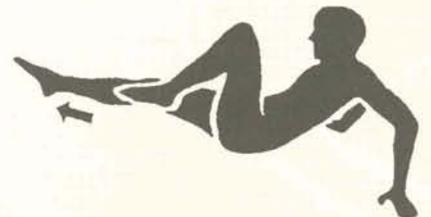
Lying on back, slowly curl head and shoulders forward to look at the feet. Hold 4-5 seconds and lower.



4

### Single Leg Extensions

Support from behind and alternate single leg extensions forward.



6



### Pike and Tuck

Supported from behind, bring knees to chest and extend both legs right to pike position. Tuck knees back to chest in centre and extend legs to other side.

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