

4. Have a Warm Green Winter Without Breaking the Bank !

How Well Are Our Bodies Equipped To Deal With The Rigours Of Winter?

Humans have learned to survive the cold through ingenious inventions that provide warm shelters and state of the art clothing—allowing us to play and work safely and comfortably in sub-zero conditions. However, many of these inventions have been at the expense of the natural environment.

If we were to take away these inventions such as oil burning furnaces, electricity, polypropylene clothing, clothes dryers, etc, many people would have difficulty knowing how to survive. Understanding how our bodies can generate heat naturally and how to conserve it will help us to enjoy the rigours of winter more while saving the earth's natural resources.

It's All In The Balance

The basics of staying warm and comfortable while being active in the outdoors is to keep your body's temperature in balance. The way to do this is to:

- 1) minimize heat loss by understanding the ways the body can lose heat, wearing clothing properly, and learning practical heat saving methods; and to
- 2) maximize heat gain through food, and exercise.

However, in circumstances such as when you are cross-country skiing or while performing some other demanding physical activity, be careful not to get overheated. In these cases you will need to release some of that body heat so that when your activity stops, you don't become too cold. The best way to release body heat to prevent overheating and sweating is to remove layers of your clothing as your temperature rises.

The key to staying comfortable outdoors is to monitor your body's reactions to the situation to ensure that you are not becoming too hot or too cold.

Body Heat Facts

Blood Circulation

Bodies do not work as well when they are too hot or too cold. The ideal body temperature is 37 degrees Celsius. Circulating blood spreads warmth throughout the body. As the body cools off, it automatically decreases circulation to the extremities such as the hands and feet. The body will try to keep the temperature of the vital organs (brain heart, liver, kidneys, etc.) at 37 degrees. To warm the extremities, you need to heat up the core of your body and minimize heat loss. The head, neck armpits and groin are the major areas of heat loss because the blood flow in those areas is close to the skin. When the surface of the skin becomes cold, the blood vessels near the surface get smaller to keep the blood deeper within your body warm and to keep your blood from getting too cold.

Shivering

Shivering is a sign that you are cold. This is one of the body's defence system against hypothermia where small muscles contract involuntarily just below the skin.

Goose bumps

These are a natural reaction to cold that humans used to find useful to keep warm—back in the days when we were hairier beasts. Goose bumps raise the hair on our bodies to trap warm air around our bodies— much the same as any animal does to keep its body warm.

Case in point

If you are shivering and/or have goose bumps your body is telling you that you are losing too much heat and/or not gaining enough. Assessing the situation and reacting accordingly is important to ensuring that you become warm. Perhaps it is due to the snow that is blowing down your neck. In this case, for example, to stop the shivering and the goose bumps, you wouldn't want to start exercising to warm your body's core, instead you would zip up and close the gaps around your neck to keep the snow out.



Minimizing Heat Loss

Whether you are planning to go for a walk around the block or go winter camping for a week, understanding and preventing heat loss is very important. To stay warm you need to understand the ways your body can lose heat. Proper clothing is key in preventing heat loss. Although clothing doesn't make you warm, it does trap the heat our bodies generate and insulates it from the cold outside. There are also practical methods that will help you to minimize heat loss.

Ways the body can lose heat

Heat travels from warm objects to cooler objects (i.e. the ground, air, water, rocks) through conduction, convection, radiation, respiration and evaporation.

For example, if you touch a hot object, your hand will get warmer as the warmth from the object travels to your hand. If you touch a cool object, your hand cools as it transfers heat to the object. The greater the difference in temperature between the objects, the faster the heat will travel from the warm to the cool object.

Note that these same principles apply to maximizing heat gain as well.

The following principles are key to the movement of heat and to minimizing heat loss:

Conduction

Heat is taken away from your body when it has come in direct contact with a colder object such as the ground, ice or water. The colder the object, the faster the loss of heat. If your body gets wet, it will lose heat much faster than when it is dry, because water conducts heat 28 times faster than air. To prevent heat loss through conduction, keep your body protected through layers of clothing, and insulating barriers such as a vapour barrier in the case of water, and styrofoam, evergreen boughs or even snow (which acts as an insulator) to keep you from coming in direct contact with colder objects.

Convection

The body loses heat when it comes in direct contact with air that is cooler than the body such as the wind. The warmth from the body

will heat the air around it. The stronger the wind, the faster the air around the body is replaced and the more heat is lost from the body. Depending on your situation, one way to protect your body is with a wind barrier you can wear such as plastic or nylon which protects your insulating layers like wool or down from the elements. Another way is with shelters such as a building, a rock face or cliff, and trees or shrubs.

Radiation

The body loses heat just by existing in a cool environment. It does not have to contact cold objects or wind. Contact with cold objects will increase heat loss through conduction and convection. Keeping body heat from spreading to surrounding elements can be prevented through various insulating barriers. The colder the surrounding temperature the more insulation we need. The outside layer will be the same temperature as the temperature closest to it; similarly with the layer next to our bodies. The temperature of each layer will decrease as each layer moves closer to the one outside also, the colour of your clothing will help to either attract or repel heat: e.g. white clothing will repel the sunlight and dark clothing will attract it.

Respiration

The body loses heat when we breathe in cold air. The body heats this air before exhaling it. Heat loss in this way can be considerable in cold weather because most people breathe 16–20 times a minute more when exercising. To minimize this loss, a hood is good way to trap the warmth from your breath around your face. Scarfs around your mouth and nose will help to warm the incoming air. The best way to avoid losing heat through your breath is to breathe through your nose. Watch for moisture build-up created by the moisture in your breath.

Evaporation

Heat is transferred through moisture which conducts heat about 28 times faster than air. If the body becomes wet, your body naturally tries to evaporate the moisture on your skin by using body heat to heat the water on the skin and turning it into water vapour. This action causes the body to become cooler. Therefore, in the summer, sweating helps to cool the body. However, in cooler climates becoming wet will cool the body when you don't want it to. The best prevention of heat loss by evaporation is to stay dry. Sweating



too much is one way to get wet. Taking off excess clothing if you are too hot during strenuous activity and putting it back on as your activity level decreases helps to minimize this risk.

Clothing

The key to making the most of your clothing is to understand its insulating value, moisture retention characteristics, and vapour and wind barrier capabilities. Once you know the value of the material, the trick is getting the most from your clothes by wearing them properly to minimize heat loss and maximize heat gain. Some of the fabrics mentioned below are very expensive but with proper preparation, good planning and management of your exercise level to prevent you from excess perspiration, the clothes you may have at hand can work just as well.

Insulating values of clothing

Air is the best insulator. The warmth value of clothing is directly dependent upon how much dead air (air that is not moving) can be trapped within its fibres. So the more fibres in your clothing the more air molecules can be attached to them. The smaller and more dense the fibres, the greater the resistance to air movement within the cloth and subsequently, the warmer one will be. At one time experts thought that the thicker materials were the best insulators. However, although down is a great insulator, for example, Thinsulate™ is a better insulator (twice as good) in terms of volume because it has more fibres per square centimetre.

Materials with a high insulating value are:

- down
- Polarguard
- Hollofil II
- Thinsulate™
- Dacron
- wool

Moisture retention characteristics

Remembering that moisture against the skin is not a good thing if you want to be warm and understanding what kinds of clothing materials repel or absorb moisture will help you to make the best use of the clothing you

have at hand. The warmth value of materials is dependent upon how much moisture is repelled (hydrophobic), retained (hydrophilic) and whether it is wicked away.

Hydrophobic

Most synthetic materials, like polyesters, and some natural materials such as wool are hydrophobic. The warmth value of some hydrophobic fabrics when soaking wet can remain as high as 80 per cent.

Examples of hydrophobic materials:

- polyester
- wool
- acrylic
- Hollofil II
- polyester mesh underwear
- silk
- Dacron
- Thinsulate
- Polarguard
- 'fleece'

Hydrophilic

Materials that are hydrophilic (absorb moisture), such as cotton, although comfortable when dry, have little or no insulating value when wet.

Examples of hydrophilic materials:

- cotton
- down

Wicking

Another characteristic to be aware of is a material's wicking tendency (moving moisture away from the body). This characteristic is important especially for materials worn next to the skin because you want perspiration to be drawn away from the skin.

Examples of wicking materials:

- wool
- polyesters
- silk
- acrylic



Vapour and wind barrier materials

No matter how much potential a fabric has for trapping dead air, if it is exposed to the wind it will not be able to do so. To protect the insulating values of your clothing, and maintaining its warmth value, it is important to protect them with wind resistant and waterproof materials. Other materials that are water resistant and will allow vapour to escape are good to minimize the water build-up that often occurs while wearing waterproof rain gear.

Wind barriers (but not waterproof)

Clothing that provide a good wind barrier are those materials with very closely woven fibres.

Examples are:

- taffeta nylon
- 60/40 cloth
- rip stop
- cotton duck
- leather

Waterproof materials

- oilskins
- PVC
- urethane coated nylon
- Sealcoat
- rubber

Water resistant materials

These materials are effective in keeping moisture out, while letting water vapour escape examples include:

- Climate
- Hellytech
- Gortex
- waxed (treated) leather

Getting the most out of your clothes

Wearing your clothes properly is just as important as using the proper materials for the situation. Knowing when to wear a hat, how to keep your feet warm, which is better; mittens or gloves, how to layer, what colour clothes to wear, how many you should wear, and which ones are the least expensive with respect to the environment are all key in the art of being Winter Green warm.

Hats

The old adage “put on a hat to warm your feet” reminds us that by keeping the vital

organs like the brain warm, the appendages of the body may also benefit. Because your body concentrates on keeping your body’s vital organs, like your brain, heart and lungs warm in cold weather, the extremities will become cold if these organs are not kept warm. By keeping your body sufficiently warm more warmth will circulate to your feet and hands. But wearing the proper foot and hand coverings are also key— wet hands and feet are very difficult to keep warm and contribute to making the rest of the body colder.

Footwear

Your feet stay warmer in loose boots because your blood can circulate around your feet more freely. Wear boots that have lots of room, a pair of extra socks to insulate your feet (still having room to wiggle your toes), and a hat, and your feet should be toasty warm— as long as you have enough clothes on the rest of you. Sometimes it is a challenge to keep your feet warm, especially if they become wet. Carrying plastic bags with you could prove to save your feet. Put each foot into a plastic bag, then put on a pair of dry socks, then put plastic bags over the socks and then into your boots. This will help to keep your feet toasty (although perhaps a bit clammy) even in the leakiest of boots. Of course, make sure the bags don’t have holes in them! Also be sure you can still wiggle your toes under all this cover.

Mittens vs gloves

Mittens are better than gloves for keeping your hands warm. Wearing a pair of waterproof mittens over a thin pair of knitted ones is best. Compared to gloves, mittens will keep your hands and fingers warmer because your fingers have each other to keep warm and gloves will not trap as much air as mittens.

Layering

Wearing many layers of loose clothing is better than one or two tight layers to insulate you from the cold. Layers of woolen and/or down clothing over a layer next to the skin of a wicking material such as polyester or acrylic is a good choice, topped off with a wind or waterproof material such as nylon or rubber to keep the critical warm air trapped underneath to keep you comfortable. All of these fabrics are inexpensive and very effective at keeping you warm.

Coloured clothing



Colour can have a profound effect on the warmth value of your clothing especially on a sunny day. Dark clothing will absorb radiant heat from the sun while bright clothing will reflect it. Also, dark clothing will dry faster in the sun or near a campfire.

Take extra clothes

Staying comfortable outside in the winter can be achieved by having extra changes of clothing. Wearing many layers for long winter outings is a good idea. If you find you are getting too hot, be sure to remove a layer or two as needed to avoid sweating. Make sure you have a good waterproof place (like a knapsack) to keep the layers of clothing you may need to remove while exerting yourself so you can put them back on when you stop.

Inexpensive Clothing

Acquiring winter clothing and equipment can be an expensive venture. Knowing the inexpensive materials you need to keep warm (described previously) and knowing where to find them will help you to have a cozy winter outdoors. Some of the affordable places which not only save in the pocket book, but promote waste reduction and re-use are:

- second hand stores;
- clothing banks/drives;
- hand me downs from your neighbours, friends and relatives.

Read about a Dress a Champion—A story about knocking down road blocks to participation and how one community helped to outfit inner city children through an event that turned into a regular thing.

Encourage your community or office to be Winter Green by hosting a used winter clothing/equipment swap or sale at the office, or community hall to help outfit families for toasty winter outings. Any leftovers can be donated to the local clothing bank.

With respect to the environment

Using clothing made of natural fibres such as wool, unbleached organically-grown cotton (ensuring that it stays dry), silk, leather, and down, when worn properly can be just as effective at keeping you warm as synthetic fibres are, and they are made from renewable resources.

The Get Winter Active Guide has dressing tips too.

Methods to minimize heat loss

- zip up your coat
- do up your buttons
- pull up your hood and collar
- wear a snug hat
- avoid exposing bare skin to the wind:
- tuck your pants into your socks
- tuck your shirt into your pants
- tie all drawstrings
- stay dry
- don't sweat
- don't cross streams
- avoid sitting on wet or cold objects
- stay out of rain or snow
- find shelter under an overhang, around trees, by a building

Maximizing Heat Gain

Just knowing that our bodies generate heat through many means including eating, exercise, and through taking advantage of outside sources, following the principles of heat movement, will help to keep you warm in cold weather.

Eating

Eating adds fuel to the fire that your body uses to keep warm and to generate energy. Two of the ways that your body uses food: one is for energy and the other is for warmth. The trick is to balance the types of food you eat to achieve the maximum energy and the maximum warmth you need for the activity you are performing.

Foods for energy

For the best source of quick energy, eat carbohydrates. Fats will fuel your activity over the longer term (beyond 20 minutes). When consuming carbohydrates (sugar) try to eat foods with complex carbohydrates e.g. fruit, granola bars and stay away from the simple carbohydrates you find in candy.

Food for warmth

Heat is released within the body as food is broken down and absorbed into the bloodstream. This heat raises your core tempera-



ture—a good outcome when playing and/or sleeping in the winter environment. The breakdown of protein releases the most heat, followed by fats and then carbohydrates. For example, when winter camping, a good feed of protein (e.g. tuna) before bed could raise your basic metabolism by as much as 20% and last for up to 12 hours—a definite benefit.

It's all in the balance

You have probably noticed that the best sources of energy (carbohydrates and fat) are not your best foods to elevate core temperature (protein). Eating fats and carbohydrates during the day while being physically active and protein at night prior to bed would provide you with a balanced diet that would meet the needs of energy and heat on any given day. Elevating your fat intake during winter exercise will provide you with a good source of both energy and heat.

Liquids

Drinking hot liquids is a great way to heat up a cold person because it takes less energy to heat up the food/liquid ingested and therefore less heat is lost expending energy to heat up the food. Cool liquids are good to keep you from sweating too much when you are exerting yourself.

Tip: To keep water from freezing, turn water bottles upside down and bury them in the snow. Snow insulates the liquid and slows down the freezing process. If your water bottle does freeze, the cold will freeze the surface first, but you will still be able to open the cap!

Smoking and alcohol

Ingesting these substances is not good if you want to stay warm over the longer term. They cause an increased blood flow to the skin which in turn causes an initial feeling of warmth. But because the blood is at the surface of your skin, it cools quickly. This cool blood will circulate to the vital organs and ultimately cool your body.

Exercise

Physical activity is another way to stay warm. Exercise, under normal circumstances helps to heat up your body's core.

Isotonic exercise

This is the kind of exercise performed when we run or walk. In this type of exercise, about 20 percent of stored energy is used to make the muscles contract. The rest is released as heat when the exercise is being performed. As long as the person is fit, and has a good supply of carbohydrates and fat, this is a good way to warm your body. On the other hand, for people who are cold and tired or cannot physically perform strenuous tasks in the cold—this type of exercise can lead to further cold and fatigue and eventual hypothermia. Also, when your body is exposed excessively to the elements you will need a good wind/vapour barrier such as nylon, or another tightly woven fabric that will protect you. Therefore, if you find yourself in a dangerous situation where you must stay warm, jumping up and down in the wind, cold or rain could prove to do more harm than good, over the longer term.

Isometric exercise

This kind of exercise involves muscles contracting against each other or an immovable force as we do when we contract the muscles of the arm against each other (i.e. contracting the biceps and the triceps at the same time does not result in movement of the arm because one is working against the other). This is performed without movement so all of the energy goes into the production of heat thus adding warmth to the body. Because you don't need to move to perform this type of exercise, you can remain in a confined space—limiting exposure to the elements.

Food For Thought

For those interested in learning more about survival techniques in extreme circumstances. At the moment this part of the page is in progress, but to give you a taste of what you can expect, read on . .



Mechanics of survival

The mechanics of survival include a positive mental attitude and some basic principles:

Minimizing heat loss through:

- shelter
- clothing
- vapour barrier insulation
- excretion
- HELP
- huddle

Maximizing heat gain through:

- solar
- exercise
- specific dynamic action of food
- heat sources (fire, etc.)

A few basic principles . . .

Help

In dangerous situations use the HELP or the Heat Escape Lessening Position: tuck your legs up to the chest and wrap your arms around them to keep the core of your body warm, decrease any exposure of the skin and minimize the contact that your groin and armpit areas to the elements. Performing simple exercises by flexing the muscles is quite effective in keeping the body warm. This is a great way to warm up your hands and feet in a confined area. Keep wiggling those toes and fingers!

Vapour barrier insulation

A vapour barrier such as plastic works much the same way as a SCUBA divers wet suit. The water trapped between the wet suit and the divers body is warmed by the diver's body heat. In this same manner, wrapping yourself in plastic in a sleeping bag will help to keep you warm by allowing the perspiration you generate to be warmed by your body heat and not come in contact with your clothing.

Do you have some winter green survival tips you would like to share with us?

Please send them to info@goforgreen.ca

