

# 三點不漏，遠離山難 山難事件預防篇

## Mountain Accident Prevention

### 3 DOs for Saving Yourself in a Mountain Accident



消防署辦理合歡山救難訓練，林政翰協助指導使用大輪胎擔架搬運患者下山 / 林政翰提供  
A picture taken during the mountain rescue training courses at Mt. Hehuan. Lin offered guidance on how to use a big tire stretcher to carry the injured down the mountain. / Photo provided by Zheng-han Lin

美國有一種地鼠，從地洞探出頭時，倘若天上正有猛禽盤旋，會不由自主大叫一聲。叫這一聲，讓牠曝露行蹤引來殺機，同時卻提供示警保全眾多同伴的性命。叫或不叫，出自天性。正是擁有這種遇險大叫的基因，讓地鼠這物種在演化洪流中適者生存。

2009年成功攀登聖母峰的黃致豪，分析自己熱愛登山的理由認為跟地鼠相同，都是基於——演化。自古以來，總有人類不顧危險挑戰新世界，進而幸運發現豐美的水草，他相信，自己身上就傳承了那樣的冒險基因。

沒錯，正是他身上的冒險基因，讓人類勇敢踏出遠古非洲，進化到今天的文明。但同時，正是這種冒險基因，讓許多人走出遮風擋雨舒適文明的家，攀上充滿未知的山林，然後……有些再也沒回家。

#### 爬過聖母峰 擔憂更多

「開開心心出門，平平安安回家。」是台灣人的祝福語中，最不陌生的一句話。如此平凡而簡單的話語，絕對是所有出遊人士心中最深切的期盼，卻難免有些遺憾，會在不經意中發生。

迷途、墜崖、蜂螫、高山症發作、失溫凍斃……這些或是傷或是亡的山難紀錄，一筆筆地記載於國家公園的山難統計資料中，搜救人員無不希望相關於這些紀錄的紙能越薄越好，然而一樁樁的意外，卻還是持續發生於看似溫和寧靜的山林裡。也難怪，黃致豪在攀登聖母峰後憂心地說：「我現在好怕。」他怕自己和隊友創下的超高成功率產生誤導，倘若許多登山客誤以為簡單，準備不

In the U.S., a species of shrewmouse would instinctively cry out upon the sight of a hovering raptor. The cry will probably get the mouse itself killed, but it serves as a warning signal to keep fellow shrew mice safe. Whether to cry under danger or not depends on an animal's nature instincts. And it is this vigilant gene that enables the mouse to survive during the lengthy course of evolution.

Jyh-how Huang, who successfully climbed to the top of Mt. Everest in 2009, believed that just like the shrewmouse, his deep love for mountain climbing derived from his gene. Down the ages, many challenge takers disregarded risks and eventually succeeded, and he is convinced that the same adventurous gene can also be found in him.

True, that risk-taking gene explains why mankind has evolved from the ancient times to the civilized present. But it is also this very same gene that prompts many people to leave all the comfort behind and take the unknown path. And some never, ever, returned.....

#### Success in Mt. Everest Brings Worries

“Go out happily and return home safely” is often said and heard among Taiwanese people. Simple and easy as it seems, it is definitely the most sincere wishes of those who travel away from home. Still, sometimes unexpected things happen.

Getting lost, falling off a cliff, getting a bee sting, the attack of the mountain sickness, being freezed to death the casualties were recorded at the national park mountain accident data bank. Rescuers hope they will never need to record such mishaps at all but still, accidents take place in the seemingly calm and tranquil mountains. No wonder

足的情況下明年貿然挑戰，後果不堪設想。

然而，登山就真的這麼危險？山難，竟是無可避免？當然不是，黃致豪說：「準備不夠，登玉山也很危險；準備得好，登聖母峰也可以很安全。」米亞桑戶外中心負責人、致力於推廣登山安全教育的林政翰更直接，他說大家總以為登山很危險，其實「安全的不得了！登山發生山難，比在平地發生車禍還難。」

說這話的人學生時代親身經歷了兩次山難。一次在帳篷內煮水泡茶，誤將油當水倒入鍋中，煮出大火燒掉帳篷跟自己的眉毛。一次為了找水迷路，最後在濃霧中窩身箭竹林，僅靠地圖當棉被撐過漫長黑夜。天明起身，卻發現帳篷近在眼前。

兩次登山意外，沒有阻擋林政翰對山林的熱愛，反而種下研究登山安全的興趣。曾在加拿大接受完整登山課程訓練的他，目前是美國野外急救教育機構唯一的亞洲教練。他說，山難有很多種類，其中最常見的是迷路、墜崖，占了近七成。至於如何避免山難？「很簡單，水喝夠、食物吃飽、保暖確實做好，就行了。」

就行了？沒錯，三點不漏，遠離山難！問題在於這三點太基本，一般人容易忽略。

事實上，山難的主要原因，林政翰認為不是山難分類中的迷路、墜崖，而是身體脫水或飢餓。是身體脫水或飢餓導致判斷力下降、肌肉效能降低，最後才造成迷路、墜崖。

Huang showed his concern after having climbed Mt. Everest, because the high success rate he and his team achieved could be misleading and could lead to disastrous results for reckless mountain climbers who simply believed the task was easy.

But is mountain climbing that dangerous? Are accidents inevitable? Huang said it all depends on the level of preparedness. Zheng-han Lin, the executive officer of Miasan Center and a promoter of safe mountaineering practices, is more straightforward. He said that mountain climbing is perceived as dangerous, but the truth is quite the opposite, and mountain accidents are much rarer than car crashes.

Lin himself experienced two mountain accidents: he once mistook oil for water and poured it into the pot and burned down his tent and, his eyebrows. Another time he got lost while searching for water in a foggy bamboo bushes. He woke up the next day only to find the tent right in front of him.

But Lin was undeterred. Instead, he embarked on research on the safety of mountaineering. Having received thorough training, Lin is currently the only Asian coach in the Wilderness Medical Associates. He said getting lost and falling off a cliff, which account for 70% of all mountain accidents, are the most common mishaps, which can be prevented simply by drinking enough, eating enough, and keeping warm.

Is that all? Exactly. These are the 3 DOs to prevent mountain accidents, but the problem is that they are so basic that people tend to ignore them.

In fact, accidents happened because climbers are dehydrated and hungry, which causes poor judgment and low muscle tone, which in turn lead to their getting lost and falling off a cliff.

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除了吃飽喝足，保暖也是很重要的 / 林政翰提供  
Keeping warm is also important in addition to drinking and eating enough./  
Photo provided by Zheng-han Lin

飢餓容易引發山難比較容易理解。肚子餓，肌肉就無力，另一方面血糖降低也讓人昏昏欲睡、判斷力下降。要注意的是，登山飲食和平地不同。平地生活習慣吃三餐，用餐後每每造成身體血糖急速上升，捱到下一餐進食前血糖又嚴重偏低，兩者都導致判斷力下降。為了安全，專業登山會將中餐打散為行動糧。也就是每走三、五十分鐘就休息，一休息就少量進食，維持血糖在進食後小幅上升，達到小幅下降時又開始進食，永遠保持判斷力在相當水準。

### 口渴不喝水，比想像中危險

至於喝水，更是預防山難的關鍵。這些年的帶隊經驗，林政翰注意到台灣登山客普遍缺乏補充水分的安全意識。登山一直處於運動狀態，相對於平地高山又較乾燥，如果維持平日飲水量，一定不足。必須很有意識地補充水分，才能預防脫水。

脫水造成的危險超乎想像。林政翰解釋，當脫水程度達到3至4%，肌肉表現會降到八成以下，同時判斷力也不自覺下降，導致容易迷路、墜崖。而感覺口渴時，其實已達到1至2%的脫水程度，至少需補充500至1000cc水分。如果口渴了卻不喝水，時間一久口渴感覺會消失，讓人不覺得需要補充水分，脫水情形更加嚴重。

人體每小時只能吸收一公升水分，想預防脫水，不能間隔長時間再猛灌幾大瓶水；必須有意識地，每三、五十分鐘就補充水分。水分補充是否足夠，可以從尿液顏色與尿量判斷，尿色透明到微黃且尿量多就屬正常。喝水時要搭配少量進食，拼命灌水卻不進食，可能導致血液鈉含量過低造成水中毒。

Hunger-induced accidents are easy to understand. When you're hungry, your muscle goes weak and blood sugar level drops, causing dizziness and degraded judgment. It is worth noting that diet on the mountain should be different from that on flat ground. On flat ground, we normally eat three meals, which cause the blood sugar level to soar after each meal and tumble before each meal, both of which affecting judgment. For mountaineering safety, lunch is subdivided into storage food, which is consumed every 30-50 minutes, so as to maintain a stable blood sugar level.

### Danger Comes with Thirst

Drinking water is key to accident prevention. Taiwanese climbers tend to overlook the importance of replenishing water. Mountaineering is a constant exercise and mountains are drier than flat grounds, hence you must drink more water to avoid dehydration.

The danger caused by dehydration is greater than you believe. When your dehydration level reaches 3~4% your muscle performance drops under 80% and judgment will also decline, increasing the danger of getting lost and falling off a cliff. When you feel thirsty, your dehydration level has already reached 1~2% and you'd need 500~ 1000 cc of water. Over time, unquenched thirst would only aggravate dehydration.

Human body can only absorb 1 liter of water each hour. To avoid dehydration, you must replenish water every 30-50 minutes. Your urine color and volume indicate if your water intake is enough: transparent to yellowish urine and lots of it means normal. Also some food intake is necessary or else the amount of sodium in blood could drop and cause water intoxication.

那麼，登山途中，如何確保每天都遇到足量水源？林政翰表示，台灣八成登山人口，幾乎集中在一成的黃金路線，例如玉山、雪山、奇萊山、嘉明湖。這些黃金路線的營地、水源都很固定，登山前查妥即可，要擔心的反倒是沒養成補充水分的習慣。

身體所需的飲水量，白天走路約需1.5至2公升，晚上另需1.5至2公升。當預估明後天路線缺乏水源，今天離開水源地就要背負6至8公升水。回想起大學時代參加雪山大會師，為了4天行程背負14公升水上山，林政翰說：「現在黃金路線設施完善，連續兩天缺水就很少見了。」

### 預防山難需注意保暖

林政翰特別強調腿部的保暖。他發現台灣登山客很注重上半身及頭部保暖，卻常忽略下半身，特別是夏天常穿得太單薄。人體器官都在軀幹，上半身寒冷容易察覺，下半身寒冷則後知後覺。事實上腿部保暖不足，體溫會從腿部流失，連帶讓上半身感覺寒冷，於是得拼命加上衣加外套。倘若下半身保暖能做好，上半身就可以更輕盈，行動更方便自如。

頭部保暖方面，必須留意全天候都得持續戴帽，包括夜間睡眠。大腦需維持在36.5度的正常體溫才能最佳運作，山區夜間動輒十幾度甚至零下，倘若不戴帽，環境溫度越低，頭部體溫流失越嚴重。此時身體為維持頭部體溫，就得從其他部位運來體熱，造成身體額外負擔。

至於衣著，小心不要穿著棉T恤及牛仔褲登山。這兩項台灣民眾休閒常見穿著，吸濕力強，但吸水後不容易脫乾，亦即流了汗不容易乾，一旦登山弄濕，不知消耗多少體熱才能烘乾，有害保暖。林政翰笑說：「登山界戲稱棉質衣服是死人在穿的。」

So, as we climb mountains, how do we make sure there is plenty of water every day?

Lin said 80% of the Taiwanese climbers flock to popular places such as Yushan, Syue Mountain, Mt. Qilai and Jiaming Lake, where the camp sites and water sources are stable. It is the climbers' water drinking habits that should be a concern.

Our body needs 1.5~2 liters of water during the day and night respectively. If there won't be any access to water in the next two days, you should carry 6~8 liters of water along. Lin once carried 14 liters of water for a 4-day journey, but he said as nowadays things are different and convenient amenities are all provided in popular routes.

### The Third Tip: Keeping Warm

Lin stressed the importance of keeping your legs warm. He said most Taiwanese climbers focus on keeping their upper bodies and heads warm instead of their legs, and wear too little in summer. Thus body heat may start losing from the legs and in turn force you to put more clothes on. If you could keep your lower body warm, you could wear fewer clothes on top and can become suppler.

To keep your head warm, you must wear a hat all the time. Our brains function well when our body temperature stays at 36.5 °C. The temperature on mountains at night could easily plunge below 0 °C, and without a hat the temperature of the head could quickly drop. Hence heat has to be transported from other parts of the body to keep the head warm, thus causing extra burden on the body.

As for the clothing, cotton T-shirts and jeans are not suitable apparel for mountain climbing. Though both are common and absorbent clothing, they are not easily dried once they get wet. Lin said jokingly, "we joke that if you want to get yourself killed in mountains, just wear cotton clothes."



2002至2005年，美國山區救難協會派員指導南投、花蓮山區救難隊，林政翰協助翻譯 / 林政翰提供  
The U.S. Mountain Rescue Association sent coach to train the Nantou and Hualien Mountain Rescue Squads from 2002 to 2005, during which Lin was the interpreter./ Photo provided by Zheng-han Lin

### 三點不漏：Think, Observe, Plan

三點不漏，遠離山難！倘若準備不足碰上山難，又該如何自救？

「STOP and hug a tree！」林政翰說。

STOP 指的是 Stop-Think-Observe-Plan，停—想—觀察—計畫；Hug a tree 就是抱住一棵樹。以迷路為例，林政翰解釋，當你完全分不清東西南北，搞不清身在何處，就是迷路。這時候先 Stop，深呼吸十口氣，不要驚慌。驚慌是身處野外最大威脅，人一驚慌就會奔跑，可能更嚴重迷失方位，甚至絆倒受傷。

鎮定後接著 Think，為什麼迷路？什麼時候開始迷路？有沒有辦法回到原地？如果沒辦法，就 Observe。仔細觀察周遭環境，避開落石區，避開水邊，以防溪水暴漲，或水聲蓋住搜救人員的呼喊。接下來進行 Plan，包括保暖計畫、糧食計畫、飲水計畫，盡可能將資源分配到最多天數，延長生命等待救援。

「抱住一棵樹」，則是因為大樹可以提供安全感。林政翰指出，兩人或多人隊伍迷路幾乎沒有死亡案例，原因就在可以彼此扶持營造安全感。當人獨自迷路，缺少同伴支持，心態上就容易喪失求生意志。大樹久立天地之間，溫暖厚實不動如山，彷彿長者可以撫慰慌張無助的心靈。

是的，林木無語，但林木有情，大山，亦如是。雖說山林死亡事件薄讓登山蒙上陰影，但想想，多少人因登山而發生山難？不多。多少人因登山而獲得健康？不少。山難，可以終結於周全準備，敬山就能樂山。

### 高山個人裝備表 Mountaineering Checklist

登山裝備的攜帶及使用，如何做到裝備減量又能兼顧安全可是一門學問，帶對裝備可降低山難危險。

The use and carrying of mountaineering equipment is a discipline. Doing it the right and the light way can effectively minimize the chances of mountain accidents.

品名 Item	數量 Quantity	品名 Item	數量 Quantity
大背包、大背包套 Large backpack and large backpack cover	各 1 只 One respectively	地圖、指北針與高度計 map, compass and altimeter	1 組 One set
小背包 small backpack	1 個 one	急救包(醫藥盒) first aid kit	1 個 one
登山鞋(含綁腿)、拖鞋 mountaineering boots (including leg wrappings) and slippers	各 1 雙 one pair each	求生盒 survival kit	1 個 one
內、外襪 foot covers and socks	各 2 雙 two respectively	瑞士刀或山刀 Swiss Army Knife or mountain knife	各 1 把 One respectively
睡袋、露宿袋、睡墊 sleeping bag, bivy and sleeping pad	各 1 個 one respectively	外帳(含若干細繩) tent and strings	1 頂 One set
排汗內衣褲(一套為備用) sports underwear (one for backup)	2 套 2 sets	頭燈(含備用燈泡, 電池) head light (including light bulbs and batteries)	1 組 One set
長袖外衣褲(一套為備用) long-sleeved out clothing (one for backup)	2 套 2 sets	盥洗用具 Toiletries	1 組 One set
風衣、帽子、頭套 windbreaker, hat and hood	各 1 one respectively	個人餐具、衛生紙 cutlery and toilet paper	1 組 One set
保暖衣物 extra clothes	2 套 2 pieces	生火工具 fire-making tools	1 組 One set
兩截式雨衣 2-piece raincoat	1 套 One set	大垃圾袋(可墊在大背包裡層) garbage bag (stored in the big backpack)	2 個 two
水袋及保溫瓶 water bag and thermos	各 1 one respectively	棉製工作手套 cotton gloves	2 雙 2 pairs
個人行動糧食 food	適量 moderate	筆記本、筆 note pad and pen	各 1 one respectively

### 3DOs：Think, Observe, Plan

How can you save yourself when encountering a mountain accident without enough preparation?

“STOP and hug a tree!” answered Lin.

STOP stands for Stop-Think-Observe-Plan. For instance, when you cannot identify directions and don't know where you are, you are lost. If that happens, you should STOP, take a deep breath, and don't panic. Panicking is your biggest enemy when you are in the wild. And when you panic, you may scamper, and then you could completely miss your way or even get hurt.

Next, THINK how and when you got lost and see if you could return to the original path. If not, OBSERVE your surroundings and stay away from the falling rocks area and the waterside, for the water may suddenly rise, or the splash may drown your shouts for help. Then PLAN to maximize the use of your available resources like food, water and clothing and wait to be rescued.

“You should hug a tree for it provides you with a sense of security.” said Lin. When a duo or a group gets lost, almost no one gets killed because they can support each other. When you are alone, you may easily lose your will to live. Trees are everlasting and steady, just like an elder who can soothe your helplessness.

Forests and trees are silent but they could feel, and so is the mountain. It may be true that the accident record book has cast a shadow on mountain climbing, but the reality is that when climbing mountains, few people lose their lives but quite a lot gaining better health from it — so long as you are fully prepared. So just show the mountains your due respect and climbing can be easy and enjoyable.



野外維生訓練，林政翰示範垃圾袋保溫法 / 林政翰提供  
During a training on surviving in the wild, Lin demonstrated how to keep warm with a garbage bag./ Photo provided by Zheng-han Lin



林政翰於合歡山區教授消防署進階山區救難課程 / 林政翰提供  
Lin offered staff of the National Fire Agency advanced mountain rescue training courses at Mt. Hehuan./ Photo provided by Zheng-han Lin

### 有此一說

#### 關於頭部保暖，黃致豪經驗分享 What Huang Has to Say About Keeping Your Head Warm

我登山很少戴帽子。台灣登山者喜歡把自己包得像肉粽一樣，導致穿太多流很多汗，衣服溼掉就容易失溫。事實上，身體因過熱造成的體力消耗，比過冷造成的多很多。當身體核心過熱，血液會集中到核心幫助降溫，導致四肢無力，比起寒冷發抖所消耗的體力更加嚴重。

I seldom wear a hat when climbing mountains. Taiwanese climbers like to put on lots of clothes, but they end up sweating too much, causing the body temperature to fall. In fact, the energy loss caused by an overheated body is much greater than a cold body. When the body is too hot, the blood flows to it and weakens the limbs, a more serious thing than energy loss due to shivering.

行進中的頭部保暖要適度，注意防風就好。在台灣登山行進時，我戴頭巾或遮陽帽，從沒戴過毛帽，但，風大時會用 gore-tex 雨衣的帽子擋風。攀登聖母峰，我在第三營以下都是戴頭巾，防止頭髮亂飛兼防風。第三營以上才開始戴有保暖防風效果的帽子，但不是「毛」帽，毛帽很多是不防風的。

Keep your head warm on the go and guard against heavy winds. I always wear a kerchief or a hat. When it gets gusty I put on the hood of my gore-tex raincoat. When I climbed Mt. Everest, I first wore a kerchief to brace against gusts, and then I changed into a windproof and cold-proof hat, but not a fleece hat, because it is not windproof.

夜間休息的頭部保暖，即使在聖母峰我也沒戴毛帽睡覺。戴毛帽睡覺有壓迫感，會影響血液循環，進而影響睡眠品質。現在很多木乃伊型睡袋，包覆性很好，睡覺時用睡袋把頭包起來就能保暖，不需加戴毛帽。

I didn't even wear a fleece hat at night when I was on Mt. Everest, for it gives me a sense of pressure and affects blood circulation and quality of sleep. There are a lot of mummy sleeping bags that offer full protection so that you won't need a fleece hat to keep warm when you sleep.

### 林政翰先生簡介 Profile of Mr. Zheng-han Lin

米亞桑戶外中心負責人，致力於推廣登山安全教育。是美國野外急救教育機構 Wilderness Medical Associates (WMA) 唯一的亞洲教練，以及美加地區戶外領隊必備資格 Wilderness First Responder (WFR 72hrs) 合格授課教練。

The executive officer of Miasan Center and an ardent promoter of safe mountaineering practices, Lin is the only Asian coach in the Wilderness Medical Associates and a certified coach on Wilderness First Responder (WFR 72hrs) in the U.S. and Canada.



### 黃致豪先生簡介 Profile of Mr. Jyh-how Huang, Ph.D.

知名登山家。美國科羅拉多州立大學攻讀資訊科學博士、返國後致力於研究山難搜救系統的無線感應技術。2009年在攀登七頂峰期間，創下獨攀南美洲第一高峰阿空加瓜山的紀錄，也是台灣七頂峰遠征隊成軍三年來完整紀錄探險經過的攝影師。

Noted Mountaineer. He had his PhD of Computer Science from University of Colorado at Boulder. After returning to Taiwan, he has devoted to the wireless sensor technology in the mountain rescue system. During the mountaineering expeditions of the seven summits, he set the record of solo climbing Cerro Aconcagua, the highest in South America. He is also the cameraman in the expedition team and has fully recorded all their expeditions.

