

## ■ 依頼原稿

### 登山における歩行ペースの心拍数管理

最初の歩行ペースが、快適な歩きを決める

山を快適に歩くためには、登山口から 30～60 分間、特別に抑えたペースで歩くのである。それは運動時の筋血流を最大に保証するためである。登山は持久運動である。一定強度の運動中の血流の血流負債が少なく、最大血流が高いほど持久性が高い<sup>1)</sup>からである。そして運動時の血流量は最大筋力（MVC）33%時の筋酸素摂取量（筋血流と同期）が最も大きく<sup>2)</sup>、それ以上の筋強度では筋の張力圧で血流は減る。そして登山道上り斜面の歩行で働く主要な筋、大腿直筋、腓腹筋、ヒラメ筋では、筋の収縮期に 50～54%MVC で筋血流は停止する<sup>1)</sup>ことが報告されている。

そのため登山者のウォーミングアップを成功させるためには、最初の 30 分間での主観的運動強度（RPE）

「楽だ」時の各自の心拍数をベースにすることが最も重要である。そして概ね 30 分間で 5 拍程度心拍強度を上げて歩くのである。33% MVC 前後のペースを土台にすることが RPE レベルも心拍数レベルも時間の経過でウォームアップを進めることに役立つのである。それが快適に歩けることの、また歩行時間の短縮にもつながっている理由であろう。このように心拍数管理実験データを推察している。

## ■ 翻訳者のみによる翻訳

※本サービスではこの時点での翻訳結果の提供は行っておりません。

### Managing walking pace heart rate when mountain-climbing

A comfortable gait is determined by initial walking pace

One should walk at especially subdued pace for the first 30 to 60 minutes after the trailhead in order to walk up a mountain trail comfortably. This ensures maximum muscular blood flowing during exercise. Mountain climbing is an endurance sport as there is little blood flow debt incurred when exercising constantly and the higher one's maximum blood flow, the higher one's endurance<sup>1)</sup>. Blood flow volume during exercise has the most muscle oxygen uptake (in-sync with muscular blood flow) when maximal voluntary isometric contraction (MVC) is at 33%. At a higher intensity, tensile pressure in the muscles causes blood flow to decrease. It has been reported that muscular blood flow stops in the systolic phase at 50% to 54% MVC in the rectus femoris muscle, gastrocnemius muscle and soleus muscle, which are the principle muscles used when walking diagonally up a mountain trail.

Therefore, the most important point of a successful warm-up for mountain-climbers is using their individual heart rate when at a "light" Rating of Perceived Exertion (RPE) during the initial 30 minutes of walking as a base. After this, they should raise their heart rate intensity by about 5 beats per 30 minutes of walking. Keeping a basic pace of approximately 33% MVC leads to both a comfortable gait and reduced walking time because of increased RPE level and heart rate level over time. This hypothesis is based upon experimental data regarding heart rate management.

## ■ 翻訳者 + クロスチェッカーによる翻訳結果 (スピード翻訳)

### **Managing walking pace heart rate when mountain-climbing**

A comfortable gait is determined by initial walking pace

One should walk at an especially subdued pace for the first 30 to 60 minutes after the trailhead in order to walk up a mountain trail comfortably. This ensures maximum muscle blood flow during exercise. Mountain climbing is an endurance sport as there is little blood flow debt incurred when exercising at a constant intensity and the higher one's maximum blood flow, the higher one's endurance <sup>1)</sup>. Blood flow during exercise provides the most muscle oxygen uptake (in-sync with muscle blood flow) when maximal voluntary isometric contraction (MVC) is at 33% <sup>2)</sup>. At a higher intensity, tensile pressure in the muscles causes blood flow to decrease. It has been reported that muscle blood flow stops in the systolic phase at 50% to 54% MVC in the rectus femoris, gastrocnemius and soleus muscles, which are the principle muscles used when walking diagonally up a mountain trail.

Therefore, the most important point of a successful warm-up for mountain-climbers is using their individual heart rate when at a "light" Rating of Perceived Exertion (RPE) during the initial 30 minutes of walking as a base. After this, they should raise their heart rate intensity by about 5 beats per 30 minutes of walking. Keeping a basic pace of approximately 33% MVC leads to both a comfortable gait and reduced walking time because it encourages a gradual increase in RPE and heart rate. This hypothesis is based upon experimental data regarding heart rate management.

## ※ご参考 - 修正ポイント

クロスチェッカーが加えた修正・変更を分かりやすくご紹介します。なお、お客様への納品の際には、修正・変更履歴は残してありません。

### Managing walking pace heart rate when mountain-climbing

A comfortable gait is determined by initial walking pace

One should walk at an especially subdued pace for the first 30 to 60 minutes after the trailhead in order to walk up a mountain trail comfortably. This ensures maximum <sup>①</sup>museularmuscle blood <sup>②</sup>flowingflow during exercise. Mountain climbing is an endurance sport as there is little blood flow debt incurred when exercising <sup>③</sup>at a constant intensity ~~eonstantly~~ and the higher one's maximum blood flow, the higher one's endurance <sup>①</sup>. Blood flow ~~volume~~ during exercise ~~has~~ provides the most muscle oxygen uptake (in-sync with <sup>④</sup>museularmuscle blood flow) when maximal voluntary isometric contraction (MVC) is at 33% <sup>②</sup>. At a higher intensity, tensile pressure in the muscles causes blood flow to decrease. It has been reported that museularmuscle blood flow stops in the systolic phase at 50% to 54% MVC in the rectus femoris ~~muscle~~, gastrocnemius ~~muscle~~ and soleus muscles, which are the principle muscles used when walking diagonally up a mountain trail.

Therefore, the most important point of a successful warm-up for mountain-climbers is using their individual heart rate when at a "light" Rating of Perceived Exertion (RPE) during the initial 30 minutes of walking as a base. After this, they should raise their heart rate intensity by about 5 beats per 30 minutes of walking. Keeping a basic pace of approximately 33% MVC leads to both a comfortable gait and reduced walking time because <sup>⑤</sup>it encourages of increased a gradual increase in RPE ~~level~~ and heart rate ~~level over time~~. This hypothesis is based upon experimental data regarding heart rate management.

クロスチェッカーが赤部分を修正しています。

- ①元原稿に基づき、クロスチェッカーが専門用語を修正しました。
- ②明確さを考慮して用語を修正しました。
- ③誤訳を修正しました。
- ④クロスチェッカーが抜けていた数字を補足しました。
- ⑤フレーズ単位での訳抜けをクロスチェッカーが補足しました。

### **Maintenance of heart rate during mountain climbing**

The initial walking pace determines the comfortable walking speed

In order to walk up a mountain trail comfortably, one should walk at an especially subdued pace for the first 30 to 60 minutes from the trailhead. This technique ensures maximum blood flow to the muscles during the walk. In endurance sports like mountain climbing, blood flow debt incurred is minimal when exercising at a constant intensity, and higher the blood flow, higher the endurance <sup>1)</sup>. Blood flow during exercise provides peak muscle oxygen uptake when maximal voluntary isometric contraction (MVC) is 33% <sup>2)</sup>. Increased intramuscular pressure at higher intensities causes the blood flow to decrease. Muscle blood flow stops in the systolic phase at 50% to 54% MVC in the rectus femoris, gastrocnemius, and soleus muscles, which are the principal muscles used when walking diagonally up a mountain trail.

Therefore, the most important aspect for a successful warm-up for mountain climbers is when the heart rate recorded at a “light” rating of perceived exertion (RPE) during the initial 30 minutes of walking is used as the base. From this base, the heart rate should increase by about 5 beats after every 30 minutes of walking. Maintaining a pace at approximately 33% MVC leads to both a comfortable gait and reduced walking time because it encourages a gradual increase in RPE and heart rate. This hypothesis is based on experimental data regarding heart rate management.

## ※ご参考 - 修正ポイント

クロスチェッカーとネイティブチェッカーが加えた修正・変更を分かりやすくご紹介します。なお、お客様への納品の際には、修正・変更履歴は残していません。

### ① Managing Maintenance of walking pace heart rate when during mountain climbing

~~A comfortable gait is determined by~~The initial walking pace determines the comfortable walking speed

② ~~In order to walk up a mountain trail comfortably, o~~One should walk at an especially subdued pace for the first 30 to 60 minutes fromafter the trailhead ~~in order to walk up a mountain trail comfortably~~. This technique ensures maximum <sup>①</sup>~~muscular~~muscle blood ~~flowing~~flow to the muscles <sup>②</sup>during ~~exercise~~the walk. ~~In~~Mountain climbing is an <sup>③</sup>endurance sports like mountain climbing as there ~~is little~~ blood flow debt incurred is minimal when exercising <sup>④</sup>at a constant intensity, ~~constantly~~ and ~~the~~ higher the one's maximum blood flow, ~~the~~ higher the one's endurance <sup>⑤</sup><sup>1)</sup>. Blood flow ~~volume~~ during exercise has provides <sup>⑥</sup>peak the most muscle oxygen uptake ~~(in sync with muscular muscle blood flow)~~ when maximal voluntary isometric contraction (MVC) is at <sup>④</sup>33% <sup>②</sup>. <sup>⑥</sup>Increased ~~intramuscular~~At a higher intensity, tensile pressure at higher intensities in the muscels causes the blood flow to decrease. ~~It has been reported that muscular m~~Muscle blood flow stops in the systolic phase at 50% to 54% MVC in the rectus femoris ~~muscle~~, gastrocnemius, ~~muscle~~ and soleus muscles, which are the princip<sup>⑦</sup>ale muscles used when walking diagonally up a mountain trail. Therefore, the most important <sup>⑧</sup>~~aspect for~~point of a successful warm-up for mountain <sup>⑨</sup>climbers is when the using their individual heart rate recorded when at a “light” ~~R~~rating of ~~P~~perceived ~~E~~xertion (RPE) during the initial 30 minutes of walking is used as ~~the~~a base. ~~From~~After this base, ~~they should raise their~~the heart rate intensity should increase by about 5 beats after everyper 30 minutes of walking. ~~Keeping~~ Maintaining a basie pace at of approximately 33% MVC leads to both a comfortable gait and reduced walking time because <sup>⑤</sup>it encourages of increased a gradual increase in RPE ~~level~~ and heart rate ~~level over time~~. This hypothesis is based upon experimental data regarding heart rate management.

クロスチェッカーが赤部分を修正、更に、ネイティブチェッカーが青部分を修正しています。

① 元原稿に基づき、クロスチェッカーが専門用語を修正しました。

② 明確さを考慮して用語を修正しました。

③ 誤訳を修正しました。

④ クロスチェッカーが抜けていた数字を補足しました。

⑤ フレーズ単位での訳抜けをクロスチェッカーが補足しました。

① 内容に基づきタイトルを変更しました。

② 明確性を考慮して文章構文を修正しました。

③ 読みやすさを考慮して文章構成を大幅に修正しました。

④ より適した単語に修正しました。

⑤ 専門分野特有の表現に修正しました。

⑥ 専門分野特有のスタイルに修正しました。

⑦ 正確な単語に修正しました。

⑧ より適切な単語に修正しました。

⑨ 読みやすさを考慮して文章構成を大幅に修正しました。