Eva López SubHangs Strength Endurance Protocol

Jędrzej November 1, 2019 2 Comments

"I've been climbing hard for some years, but I hit a performance plateau. Thanks to StrengthClimbing, I finally reached the next level in a fast, progressive, and safe way with a personalized program! I achieved my best bouldering results, and I feel strong and healthy in my fingers as I've never felt!"

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Quick summary

Eva López SubHangs strength endurance protocol

Eva López SubHangs strength endurance protocol was introduced on her blog in early 2018 [1]. The method is very similar to her MaxHangs routine for finger strength. Still, longer hang times are applied, which is aimed primarily at improving strength endurance and potentially also strength itself, through hypertrophy. For the MaxHangs, hang times of about 10 seconds are common, but for the SubHangs strength endurance protocol, hang times of up to 45 seconds are used [1][2].

In a way, Eva López SubHangs strength endurance protocol is quite similar to the more old fashioned way of hangboard training, where long hangs till failure were preferred [3]. This resulted in many shoulder injuries because the shoulder joint gets fatigued quicker than the fingers [4]. The protocol can be executed in two versions, the minimum edge with no added weight (SubHangs MED) and with added weight (SubHangs MAW). However, the MAW version is recommended only for advanced climbers [1].

Eva López SubHangs MED protocol details

1. Choose an edge on which you can hang between 20 and 45 seconds.

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Eva López SubHangs MAW protocol details

1. Choose an edge between 14 – 20 mm and a corresponding load, so that you can hang between 20 and 45 seconds.
2. Perform one hang of 20 – 45 seconds, rest for 30 seconds up to 2 minutes.
3. Perform 4 – 8 sets.

Table 1: Eva López SubHangs protocol summary.

SubHangs MED/MAW	
Hang test time [s]	20 - 45
MVC-7 load	55 - 85%
Sets	4 - 8
Hangs/set	1
Hang time [s]	20 - 45
Rest betw. sets [s]	30 - 180
TUT [s]	80 - 360
Total time [min]	3 - 27

SubHangs strength endurance routine remarks

- The SubHangs strength endurance MAW protocol is only recommended for advanced climbers with a lot of training experience. Beginners and intermediate should stick to SubHangs MED.
- You can tailor the program to suit your current performance requirements:
  - If you need to improve your recovery time between sustained sections of a route, you should start with long rests of 2 – 3 minutes between sets. Shorten the rests gradually while progressing through the program, down to a minimum of 30 seconds. Keep the hang duration or load constant.
  - Alternatively, if you need to be able to hold a specific grip position for a longer time, you can increase the hang period and keep the pause unchanged.

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failure or near-failure in the last hang of the session.

- If the pause between sets is 2 – 3 minutes, select the load in such a way so that you reach failure or near-failure at the end of each set.
- You may need to adjust the load (SubHangs MAW) or edge depth (SubHangs MED) for each set or even repetition, to reach failure exactly when it is required.
- Training frequency [5]
  - For improving your strength endurance perform the drills twice a week, with 48 – 72 hours recovery between the sessions.
  - If you want to maintain your current strength endurance level, exercising once a week should be sufficient.
  - For advanced climbers who train 5-6 times per week, three SubHangs sessions a week are possible if they don't climb during the weekends.
- Make sure to warm up your shoulders before you start the protocol. The longer hangs, above 30 seconds, can be very straining on the shoulders and potentially lead to rotator cuff injuries.

Video 1: Short video demonstration of the Eva López SubHangs protocol.

> *Make sure to warm up your shoulders thoroughly, if you're going for the long hang times above 30 seconds.*

Typica TOP Hangs strength endurance training cycles

The basic principle for the SubHangs protocols is to create a training overload by progressing the volume. Steve Bechtel applied a similar approach in his 3-6-9 Ladders strength training protocol [6][7]. Once the progress slows down, you should start changing other workout parameters. You may try the following two approaches [5]:

- Keep the hang intensity and recovery times fixed while extending the hang duration up to 45 seconds.
- Keep the hang intensity and hang times fixed while shortening the recovery time between sets down to 30 seconds.

SubHangs strength endurance training cycle for beginners

- **Week 1:** 2 sets/session
- **Week 2:** 3 sets/session
- **Weeks 3 and 4:** 4 sets/session
- **Weeks 5 and 6:** rest
- **Weeks 7 and 8:** 3 sets/session
- **Weeks 9 and 10:** 4 sets/session

For beginners, a single 4-week cycle may be sufficient.

SubHangs strength endurance training cycle for intermediate

- **Week 1:** 3 sets/session
- **Weeks 2 and 3:** 4 sets/session
- **Week 4:** 5 sets/session
- **Week 5:** rest
- **Weeks 6:** 3 sets/session
- **Week 7:** 4 sets/session
- **Weeks 8 and 9:** 5 sets/session

SubHangs strength endurance training cycle for advanced

- **Week 1:** 3 sets/session
- **Week 2:** 4 sets/session
- **Weeks 3 and 4:** 5 sets/session
- **Week 5:** 3 sets/session
- **Week 6:** 4 sets/session
- **Weeks 7 and 8:** 5 sets/session
- **Week[illegible]):** compulsory rest

Eva Lopez SubHangs hang times and intensity

The SubHangs are a relatively new hangboard endurance routine, and we can find little information on the topic, other than on Eva's blog. Still, let's try to analyze it a bit deeper. The first noticeable thing is that the hang times are much longer than for most hangboard protocols. The longest hang times in the protocols discussed until now were used in Steve Bechtel's 3-6-9 Ladders protocol (up to 12 seconds), and in the Eva Lopez MaxHangs protocol (up to 15 seconds) [2][7]. The Zlagboard Forearm Endurance Workout uses 60-second hangs, but the feet are supported on some footholds, which significantly reduces the load [8].

> *Eva López SubHangs are characterized by much longer hang times than most hangboard protocols.*

Which brings us to the second important factor, namely the relative hang intensity. Let's take a look at the hang time vs. relative hang intensity curves in Figure 1. A hang time of 20 seconds corresponds roughly to a maximum of 85% MVC-7, while a hang time of 45 seconds is equivalent to a minimum of 55% MVC-7. This intensity range is more oriented at structural adaptations, rather than at neural adaptations, which is what could be expected from a strength endurance training protocol. In fact, the SubHangs hang intensity range is very similar to the standard 7/3 Hangboard Repeaters strength endurance protocol, where intermittent hangs at 60 – 80% MVC-7 are very commonly used [9]. So the difference between the SubHangs climbing endurance protocol and the Hangboard Repeaters is that with the SubHangs you generally hang longer, you rest longer, and you perform less hangs in total.

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Figure 2: The relation between %MVC and time to failure according to [10][11][12][13][14][15], adjusted for 7-second MVC. Intensity level ranges for the SubHangs, MaxHangs, Ladders and "7-53" protocols are indicated.

PCr and pH response for the SubHangs strength endurance protocol

While the rests between hangs for the SubHangs are much longer than it is in the case of Hangboard Repeater TOP e still too short to ensure full PCr recovery, as can be seen in the graph in Figure

which makes the stimulus in terms of blood pH a bit similar to the Zlagboard Forearm Endurance Workout.

Figure 2: PCR restoration dynamics and lactic pH changes in calf muscle during rest, exercise, and recovery periods of a high-intensity plantar flexion test according to [16].

SubHangs strength endurance training adaptations

When SubHangs strength endurance protocol is executed, partial blood flow occlusion is triggered, which causes lactic acid (Lac), hydrogen (H+), inorganic phosphorus (Pi), and Reactive Oxygen Species (ROS) accumulation in the forearms. This is particularly the case during the longer, lower intensity hangs of over 30-seconds duration. PCr stores are rapidly exhausted, resulting in most of the ATP being generated through glycolysis. We know that during low-intensity intermittent exercise, the contribution of aerobic glycolysis to ATP synthesis may reach from 75% in untrained individuals up to 95% in e athletes. The rest is covered by anaerobic processes [17]. However, when the

During the 30 – 180 second rest periods, PCr in the forearms will get partly renewed. The rate of recovery will be much faster in endurance-trained athletes, like sports climbers than in sprint-trained athletes, like boulderers. This is caused by the differences in the mitochondrial density in the muscles between the two groups [18][19]. Notice in the graph above that the pH keeps going down even during the rest period since it is a byproduct of PCr resynthesis [17][16]. As PCr stores cannot get fully recharged in 30 – 180 seconds, this means that lactic acid is continuously being produced throughout the entire 3 – 20-minute duration of the protocol. In consequence, very high blood lactate concentrations in the forearms and very painful pump buildup at the end [20].

Based on the above considerations, we can classify the SubHangs protocol as a form of anaerobic interval training [21]. The routine leads to local hypoxia in the forearms, which means that not enough oxygen is temporarily delivered to the muscles. This induces increased adenosine monophosphate protein (AMP) levels and triggers mitochondrial growth in the forearm muscles. Furthermore, the vascularization of type II muscle fibers is enhanced. What is perhaps even more important, the activity of enzymes involved in anaerobic metabolism is boosted. On top of that, the tolerance to high acidic loads is improved, while the A-VO2 difference increases.

Eva López SubHangs Forearm Endurance Workout conclusions

The SubHangs strength endurance protocols are quite new, and there is no information available yet regarding their effectiveness. They seem to be an interesting alternative to other strength endurance protocols, such as Repeaters, or IntHangs. With the SubHangs climbing endurance protocols, you should improve your PCr recovery, and the total PCr levels in your muscles will be heightened [22]. What is more, you may expect muscle hypertrophy, owing to anabolic hormone secretion, caused by lowered blood pH, and fast-twitch muscle recruitment [21].

The adaptations listed above mostly concern the anaerobic energy system and are expected to enhance the energy store component W', but not CF, which is more related to aerobic metabolism [23]. Thus the SubHangs climbing endurance protocol has the characteristics of a typical strength endurance training method.

> *Eva López SubHangs take very little time. Anyone can invest 10 minutes in str* TOP *ndurance training, right?*

What I really like about Eva López SubHangs is that they take very little time. If you're going for the short hang times at low loads and with short rests, e.g. 20-second hangs at 60% MVC-7, with 30-second rests, you could be done in under 10 minutes. Anyone can invest 10 minutes in strength endurace training, right? As far as the longer hang times are concerned, this version of the protocol takes more time – even up to 27 minutes. Proper warmup adds a bit extra to that, because you need to pay extra attention to warming up your shoulders properly.

Give the SubHangs climbing endurance protocol a go if you want to mix up your fingerboard training and provide a different kind of stimulus to the forearm muscles. Because the method is likely different from the typical hangboard protocols you tried before, you should notice quick benefits both for your anaerobic forearm endurance, as well as for finger strength itself! Let me know how it went for you!

If you have any questions or comments, feel free to contact me. Please subscribe to the blog to keep up to date with the upcoming posts on cutting edge methods of climbing training!

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About the author

Jędrzej

A veteran hangboarder and a Moonboard fan, Jędrzej is crazy about training for climbing. There's nothing he likes more than trying out different protocols and applying the newly acquired skills on the wall. Jędrzej also enjoys playing the electric guitar, baduk, and reading articles on the science of sports training. He holds a Ph.D. in electrical engineering.

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2 thoughts on “Eva López SubHangs strength endurance protocol”

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Hello, I am liking your dedication and research intently, I was wondering what your sources was to say that it is most effective to train at c.f. to enhance aerobic capacity or atleast to increase thst critical as some other content that I have read (lactate.com) mention that your best well below or well above for adaptations as training at critical force itself is very draining on the nervous system and requires a great deal more recovery time. They seem to use lactate testing kits to physically test the blood ph and lactate in the worked muscle as it should be pretty steady aerobically then suddenly increases when you hit the lactate threshold, which I assume is another name for critical force based on the descriptions. Both being indicators of when the lactate system takes the brunt of the work as your at a certain percentile of mcv in this case. Any information would be much appreciated and corrections if I'm confused. I myself lately have been training more intuitively doing moving hangs on a hangboard it feeling it out(going to take your suggestion and find theoretical critical force as a percentile of mvc and try it precisely although without having my
Legs permantly supported by a devise of which can measure the force output of them then there seems to be some ambiguity. It in the mean time I could do with reading about the research about and around the lactate threshold and critical force and what type of adaptations are expected by using said requirements. Kind regards Shaun

Reply

JĘDRZEJ
MAY 7, 2020 AT 1:08 PM

Hi Shaun!

Thank you very much for your comment and for subscribing to the mailing list! I have some exciting content in preparation, so I hope you will like the upcoming articles as well!

You asked some very good but difficult questions, and I had to dig deep in my notes and in the scientific papers to look for the answers! I will try to address them one by one.

The conclusion that aerobic endurance training is most effective precisely at CF load comes from the Ph.D. thesis of Kerry McGawley (link). You will find the information you are looking for on page 174. Still, I strongly urge you to read this fascinating publication in full, as I know no other source that would so comprehensively deal with the notion of Critical Power. Every time I read it, I learn something new and get more ideas!

I visited lactate.com (I actually knew this site before), and I couldn't find the information that training at CP is heavy on the CNS. Could you please send me the direct link to the section you're referring to? For what I know training at high intensities, around 90% of MVC does indeed put significant stress on the nervous system, but for Endurance Repeaters, the CF usually lies around only 45% MVC-7. I often conclude my training sessions with Endurance Repeaters at CF, and I don't p[illegible]hem as requiring a lot of recovery time.

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concentration and exercise intensity regimes. If you look at Figure 10.3 on page 187, you will see the following definitions:

P-LT – power at the lactic threshold, which is the exercise intensity at which lactic acid starts to deviate from the baseline.

Maximal Lactate Steady State (MLSS) – it's the highest workload that can be maintained without a continuous blood lactate accumulation over time. I think this is the intensity level to which you referred to when using the term Lactate Threshold. These terms are often used interchangeably, but Kerry proposes to differentiate between them.

Critical Power (CP) – the exercise intensity, which can be sustained for a very long time (but not infinitely), usually around 20 – 60 minutes.

VO2 max – maximal oxygen consumption

According to the model proposed, CP is not a steady lactate state, and it lies above the MLSS. Anyway, there's tons of great information in that thesis, and I'm sure you will enjoy reading it! Another great resource, if you can get it, is the "Fundamentals of Endurance Training" https://www.sciencedirect.com/science/article/pii/B978012815137200005X?via%3Dihub.

Incidentally, I'm currently developing an experimental hangboard training program, and I'm working with a group of climbers for whom I design personalized training sessions and perform progress monitoring. The program combines strength training with endurance training, to obtain a high level of synergy and maximize gains. Maybe you'd be interested in taking part? Please write me an email if you'd like to learn more details!

Good luck with your training!

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