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Performance Test Report

Date	30.11.2019
Place	Loughborough
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Sport	Cycling

Thank you for attending your recent INSCYD Physiology Assessment. This report is intended to highlight to you the key areas in physiology that will affect your performance. Different types of athletes will require slightly different strengths and will have different weaknesses. One of the key reasons you have performed this test is because you want to know more about YOU.

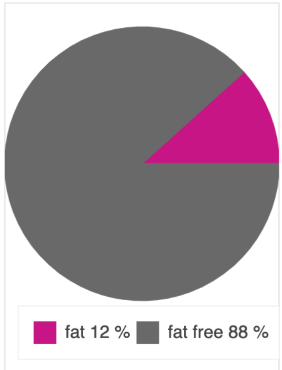
Using the information in this report you can create, or your coach can create, a programme designed to help you meet the demands of the event that you want to succeed in. Not based around a generic % of FTP or Threshold as most platforms allow, but based upon you and your strengths and weaknesses.

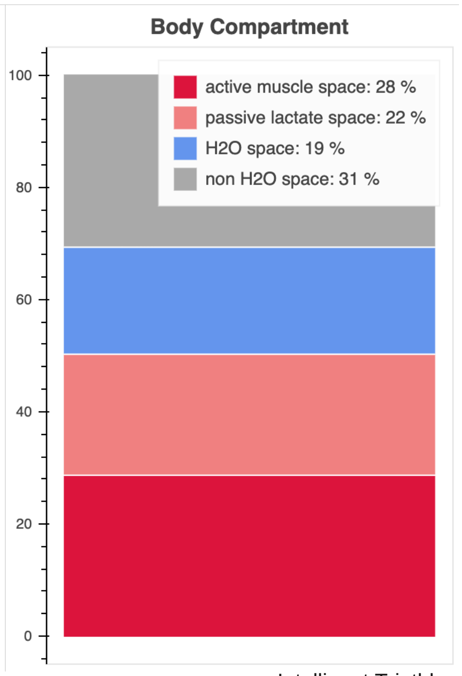
Regular testing enables you to track progress and make informed decisions about the training you need to do, and the intensity best suited to making that happen.

Included as part of this assessment is a guide to using the data, you will receive one specific to your sporting requirements. For instance, long-distance triathletes will receive one with specific information on what their profile means for long-distance triathlon.

If you require a consultancy with us to help understand the details more and look at how your current training has contributed to your results, and what you should be doing next you can book one thorugh our website www.itt.world (https://itt.world/product/training-consultancy/). Use InscydConsult as a coupon to get £15 off the advertised price. This is free for coached athletes.

Body Composition





Body Mass	66.8 kg
Body Height	182.0 cm
Body Mass Index	20.2 kg/m2
Projected BSA	1.847 m2
Body Fat	11.7 % of body mass / 7.8 kg
Fat Free	88.3 % of body mass / 59.0 kg

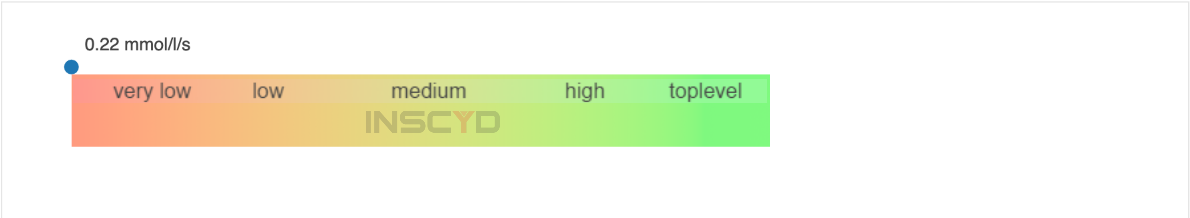
The graphs and the table above show your actual body composition. Please pay close attention to body fat and fat-free values. In most sports, it is desirable to achieve a low body fat percentage (= high fat-free mass). However, with body fat, there are inter-individual differences in what the best value is. The lowest possible value, may not always be the desired goal.

Next to the visualisation of body fat and fat-free mass, you see a visualisation of the body compartments. Based on the measured metrics of body composition, the performance-related compartments for lactate distribution and active muscle mass have been calculated. These metrics depend on 2 criteria; your body composition, and the involvement in muscle mass. For example, in cycling, the percentage of used muscle mass (primarily lower body muscles) is lower compared to rowing (full-body workout). These body compartment metrics are used further down in the analysis of performance relevant metrics, such as lactate clearance and production.

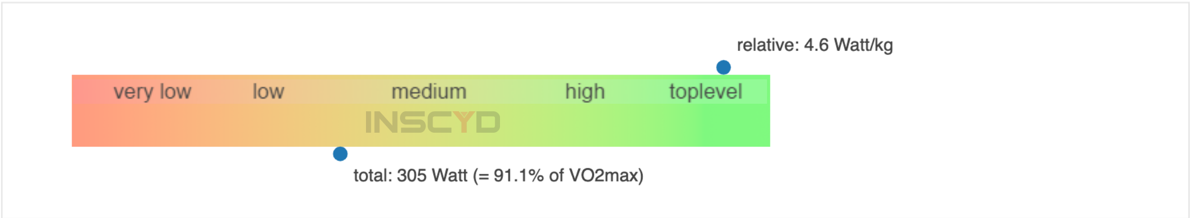
Metabolic Capacities

VO2max - aerobic capacity

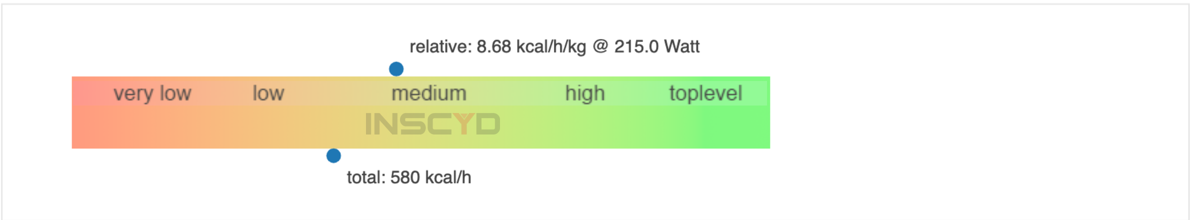
VLamax - anaerobic capacity



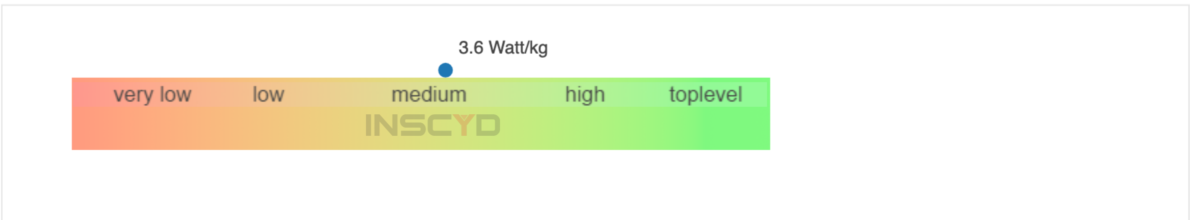
AT - anaerobic threshold



FatMax - maximum fat metabolism



CarbMax - carbohydrate metabolism



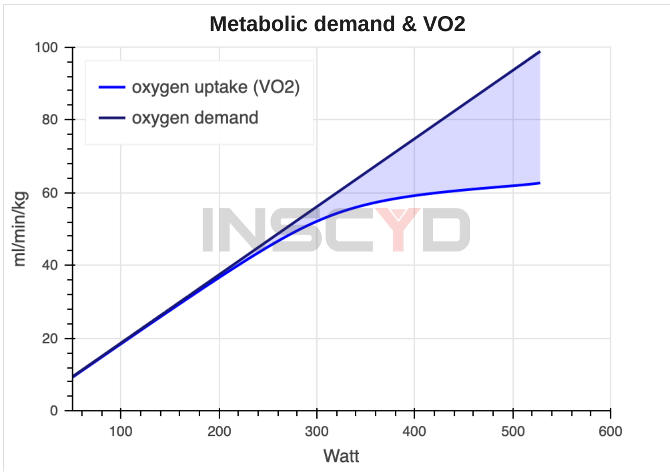
For detailed descriptions of these metrics please refer to the additional PDF with this report.
Below are comments upon the key physiological metrics from your test.
You expressed an interest in how this data could be useful in improving your Hill climb performance, as well as shortish lumpy road races. Hill climbs can range from very short (1-min to multiple minutes and this slightly changes the characteristics required, think kilo rider to pursuiter, a top-class pursuiter still puts in decent kilo, but can a top-class kilo rider put out a decent pursuit?)
Power to weight is obviously very important.

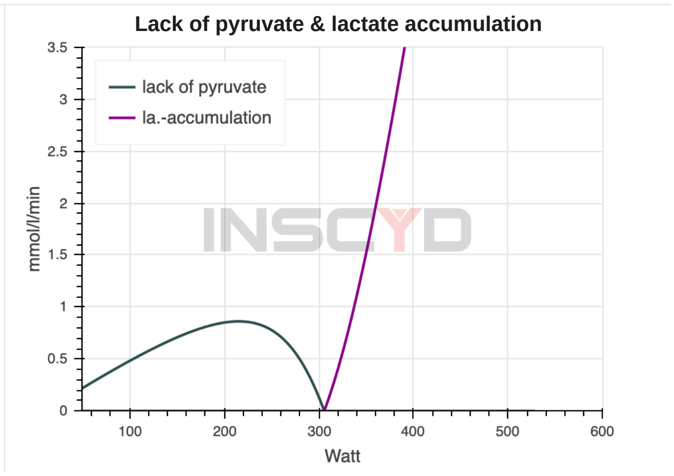
VO2max (ml/kg): This is 'normal' not high and not low, for your aims, this is certainly something that should be targeted
VO2max (l/min): As a lean athlete this is closely aligned with weight-related VO2max,
Power at VO2max (watts): 333-w, certainly something to be targetted, I will elaborate later in the report.
VLamax: This is very low, and for your events is too low. This shows a very well developed aerobic engine, but one that has a low anaerobic capacity. This is the most significant variable her for your events, this needs to be raised - significantly. A

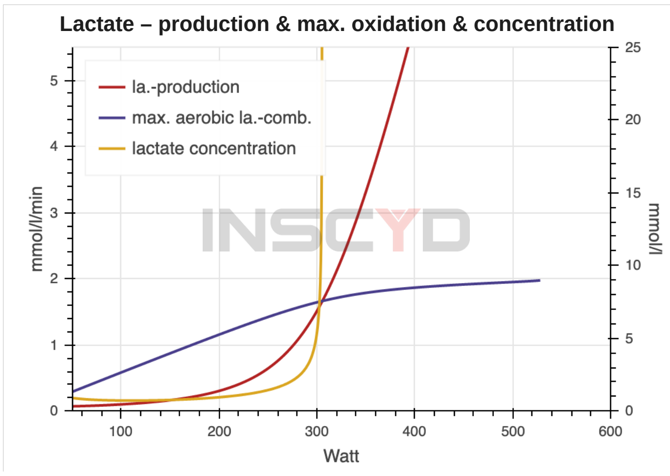
consequence of this will be a reduction in FTP, but fo the hills you need the extra capacity above FTP. For your road racing, this is potentially a strength if you use it properly. More on that later.
AT/FTP (w/kg): As a light lean athlete this is top class, and will serve you well on longer steady climbs
AT/FTP (watts): Good, and as a lighter rider you are always going to be 'rated' lower than in your w/kg.
AT/FTP (%VO2max): This is very high, too high, as a function of a low Vlamax. You wouldn't train specifically to change this but we should see this drop-down to closer to 80% with a reduction in Vlamax
FatMax (kcal/h/kg): For hill climbing, not really relevant, but for road racing over 2hrs then this has a part to play and in road races over 3hrs certainly. For your events, you don't need to train specifically to improve it. It may improve thorugh some of your training anyway, but it's not a target.
Fatmax (watts): as above
FatMax (watts) %FTP: Normal at 71%.
Fat Max (Total Kcal/hr): as above
Carbmax (w/kg): Again not as important as other metrics but in hard road races, of ~2hr duration this could be significant, as it's possible to hold high power outputs for this duration and as the next charts will show, you could be using very high rates of carbs. Without a proper nutrition plan, you could find yourself empty by the end if you are not fuelling adequately.
Carbmax: (watts): 245-w.
Carbmax %FTP (watts): 80% normal relative intensity.

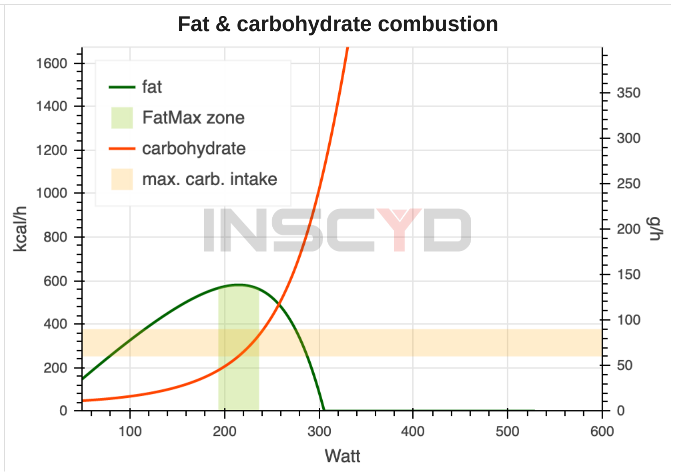
Key Points:
1. Increasing VLamax - more on how to do that in the supplemental guide and on the next set of charts
2. Increase VO2max
The time you have available to train could have a profound effect on how you chose to structure your training.
I would also suggest you need to think about the periodisation of your training, as hill climbs require some specific characteristics, but only for a short period of time in the season. In an ideal world, you will be able to increase VO2max, reduce Vlamax and maintain your FTP?AT where it is. This would give you the same power in long efforts/hills but enable you to pick the power-up much more, on the short hills.
Have a look at comments on the LOP chart in the next section......

Load Characteristics









Metabolic Demand and VO2:
This graph helps us to define power at VO2max. This is a key figure for maximising your VO2max training if required.
If you look at the chart at just over 300w and then see the amount of light blue shading, you can see that the anaerobic component of your profile is small. An athlete with a higher Vlamax would have significantly more light blue shading. The main use for this is picking off your power at VO2max, which is useful for intervals targeting VO2max.

Lack of Pyruvate & Lactate Accumulation (LOP/LA):
This graph is very useful in determining the effect of efforts of over FTP and the recovery from them. If you know your peak lactate value, see Test Data, then you can use the purple line to calculate time to fatigue at a specific power, then use the grey line to work out the duration required to recover at it, and the optimum power to do this at.

For example:
Peak Lactate = 10mmol/l/min
Lactate Accumulation at 300w = 2.5mmo/l/min
Time to fatigue = 4min
LOP peak = 0.5mmol/l/min
10/0.5 = 20min to return to baseline.
The higher the LOP peak the faster you will recover from high-intensity efforts. Values >1mmol/l/min are exceptional.

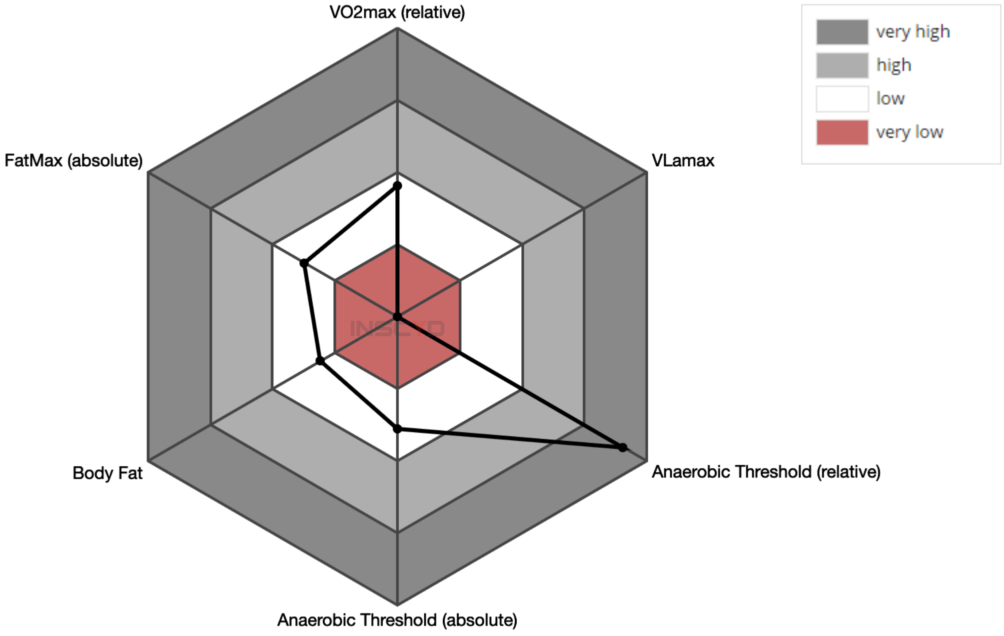
Personal LOP = 0.86-mm/l/min @ 215-w - this is fantastic, and shows that you have a tremendous ability to be able to recover from high-intensity efforts. Very useful when cresting hills and wanting to push on. In hard efforts, this is the ideal power for you to be recovering and returning to baseline as quickly as possible
La-acc @ 110%FTP (333-w) = 0.9-mmol/l - Power at Vo2max is relatively low because of the low Vlamax, which means your VO2max power occurs at a low % of FTP. As a TTer this would be perfect.
La-acc @ VO2max (333-w) = 0.9-mmol/l/min - In most athletes this is not the same as the value above.
La-acc @ 125%FTP (378-w) = 2.89-mmol/l/min - This is alot, which means that once you are a little over FTP you are building lactate very quickly. However, you can sustain very high levels. This needs to be treated with caution though, yes you can sustain very high levels and you do clear lactate very well too, but, this also means you burn carbs at very high rates at FTP and above. At 300w you are burning 275g/hr. More on that below.......
Peak Lactate = 14.0-mmol/l/min

Fat & Carbohydrate Combustion: This graph shows how you fuel exercise intensity, initially predominantly by fat sources, then as

the intensity rises by a combination, with increasing reliance on carbohydrate.
Your Fatmax power and rate are good, but once you have exceeded this you start to burn carbs at significant rates. You can use the graph above to see what different power would require.
At FTP (303w) you require 248g carbs per hr. At 330w that's a huge 400g/hr. So you can see that if you are putting in some big efforts on climbs as well as working on the flat over the top, you are going to finish a 2hr race with a high utilisation rate, which could leave you on the verge of being carb depleted and therefore unable to achieve the higher power outputs required.

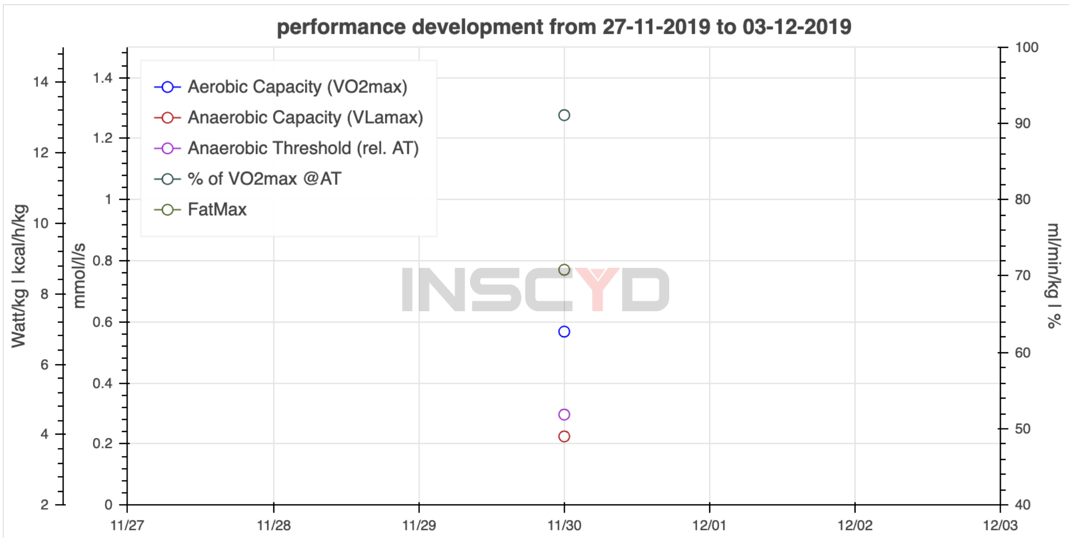
As a guide, if you were fully glycogen (carb) replete you would be able to store ~400 - 450g carbs. Upper limit of absorption from gels/drinks/food etc is 90g/hr (Carbmax). If you are burning an average of 160g per hour and replacing it at 90g then you have a deficit of 70g an hour or ~5hrs of ride time before you 'blow'. Its slightly individual but most people will hit this point with 100-150g of stores remaining, which means in reality that example is more like 3.5 - 4hrs. if you had a couple of strong climbs in an hour you could easily burn 160g in 30min, or if your ingestion rate is a gel an hour (25g/hr), then you can see you will be left very low on available glycogen.

Metabolic Fingerprint



This graph shows your strength and weakness profile at a glance. The most critical performance metrics are shown and rated here. The rating is based on your gender, your sport and your athletic level (professional, amateur, recreational). Your actual values are ranked against a comparison group. High values are on the outside of the graph. Low values are displayed in the middle (towards the inside of the graph). Each athlete has their individual performance fingerprint, with strength and weakness = area in which he /she is stronger or weaker. Compare this overview with previous and future tests and see how you can or have reduced your weaknesses and increased your strengths.

Performance Development



Training Zones

Name		Code	Power		respect to target value					
			lower	upper	target	energy cons.	%fat	%carbo	fat abs	carbo abs
			Watt	Watt	Watt	kcal/h	%	%	g/h	g/h
Zone 1	recovery	rec	120	169	139	546	82	18	47	23
Zone 2	base	bas	169	219	199	774	74	26	60	48
Zone 3	medio	med	235	284	260	988	48	52	51	122
Zone 4	FATmax	fmax	194	237	215	834	70	30	61	61
Zone 5	anaerobic threshold	AT	284	327	305	1120	0	100	0	268
Zone 6	aerobic maximum	aemax	335	369	353					
Zone 7	high anaerobic	anmax	373	416	395					
Zone 8	lactate shuttling	LaEx	215	334						
Zone 9	custom 1	C1								
Zone 10	custom 2	C2								
Zone 11	custom 3	C3								
Zone 12	custom 4	C4								
Zone 13	custom 5	C5								

Unlike most training apps such as Training Peaks, these zones are not sequential. Instead, they describe the intensity for specific training adaptations. You may notice that there are some gaps in the zones; these can be considered grey zones, where there is not a significant training adaptation. For instance, there may be a gap between Medio and Base; this gap represents an intensity which is too hard to be base training but not sufficient to be developing the "Sweetspot" that Medio represents.

Use these zones to help set your intensity for training, the quality VO2max efforts should be in the Zone 6 Aerobic Max range, the volume-based VO2max sessions in Zone 2 Base.
To increase VLamax, you need to be hitting very high powers, with a long recovery, enabling a full recovery, however, this can be worked into your volume VO2max sessions see the supplemental guide for more information.

SUMMARY
With the Hill Climb season over, I would be focussing upon your Road Race season, which means VO2max work as a priority. As a trained and 'regular' rider this means 2 - 3 quality sessions per week, and 1 - 2 long aerobic rides a week. 12 - 16 weeks should be sufficient to see a significant change. You can include 1 x Vlamax improving session in there as one of your long rides. Try to keep the overall intensity down on those long rides to maximise the quality of those high-intensity VO2max sessions. This means sustained efforts over Carbmax should be avoided as much as possible.

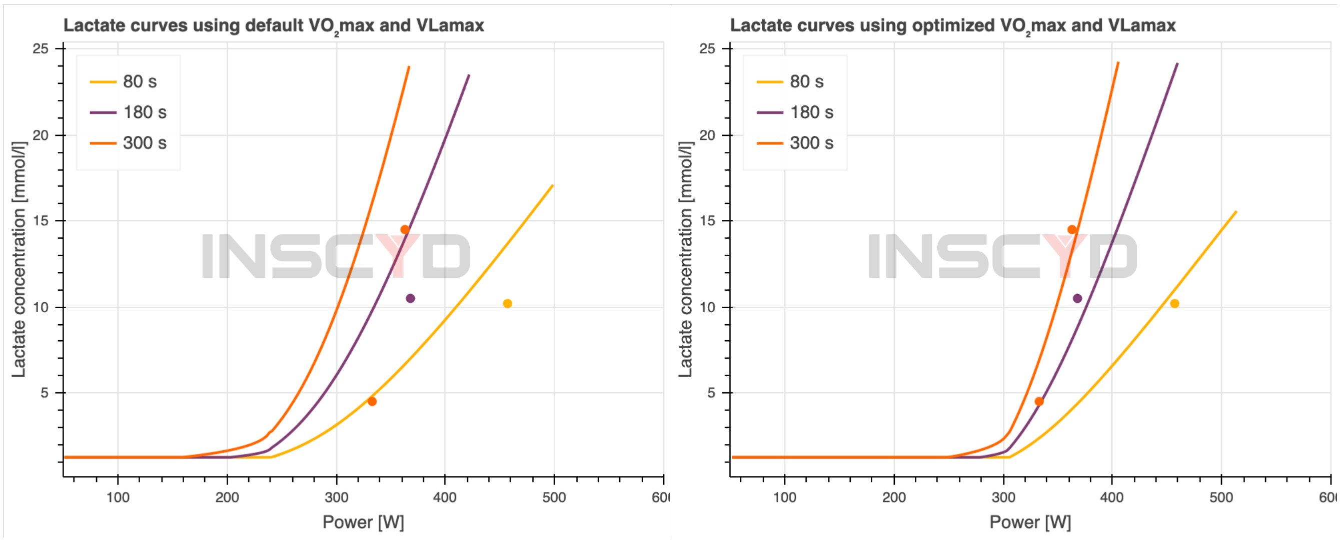
Remember consistency is a key factor here, sustained overload with regularly scheduled recovery is better than a big overload, followed by substantial rest.

Any questions please let me know.

Test Data

Determination of lactate accumulation

Sum of squared errors before optimization: 236.94 , after optimization: 10.90



Raw Test Data

Measured Values				Calculated Values		
Run	Time (mm:ss)	Power (W)	Max Lactate (mmol/l)	VO2tot (ml/min/kg)	% aerobic (%)	% anaerobic (%)
0	05:00	333	4.5	62.31	88.93	11.07
1	05:00	363	14.5	67.93	84.62	15.38
2	03:00	368	10.5	68.86	83.86	16.14
3	01:20	457	10.2	85.52	44.89	55.11

The graph and table above show the actual test data as measured. You can see the measured values for each test and time duration plotted as dots. The lines show the fitted curves to the actual measured values. The better the fitting, the higher the accuracy of the test.

The table below shows you the raw data as tested. Next to this data, the distribution of aerobic and anaerobic energy for each trial is listed. With higher intensity and shorter duration, the anaerobic energy contribution tends to be higher. Understanding the energy contribution at each intensity provides important insights into how the metabolism functions in specific situations. It also shows which energy system might offer the greatest potential for improvement.