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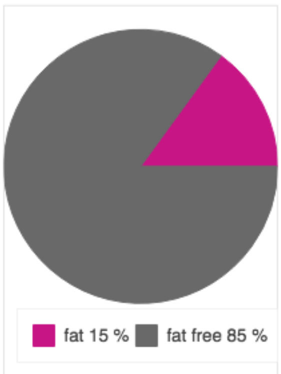
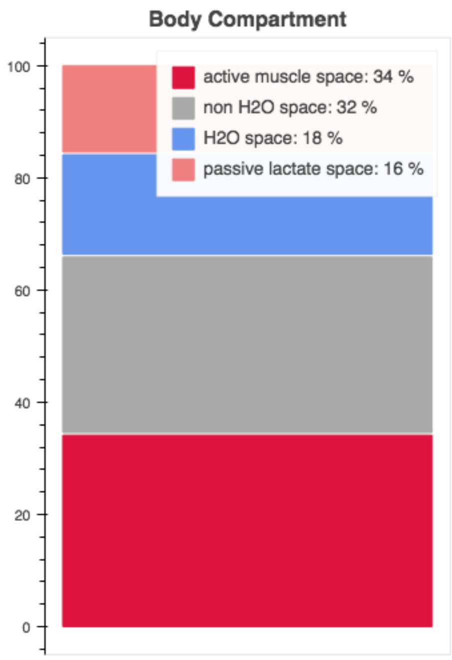
Performance Test Report

Date	07.10.2017
Place	City
Athlete	Chris Criterium
Coach	Greg Hillson
Email	greg@inscyd.com
Sport	Cycling

This is your complete performance testing report.
The following pages contain all significant information about your current state of performance.

Body Composition





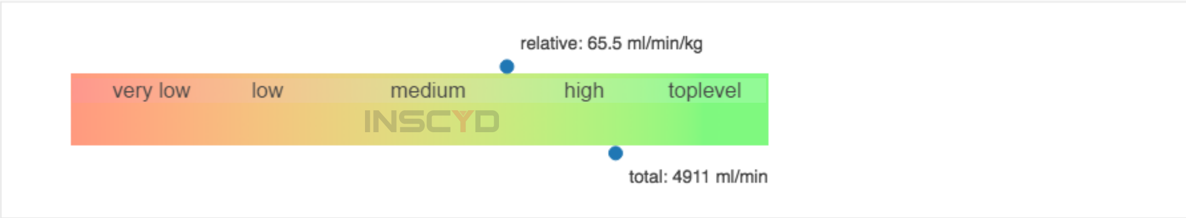
Body Mass	75.0 kg
Body Height	180.0 cm
Body Mass Index	23.1 kg/m2
Projected BSA	1.931 m2
Body Fat	15.0 % of body mass / 11.2 kg
Fat Free	85.0 % of body mass / 63.8 kg

The graphs and the table above show your actual body composition.
Please pay close attention to the 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 of what the best value is. The lowest possible value, may not always be the desired goal.

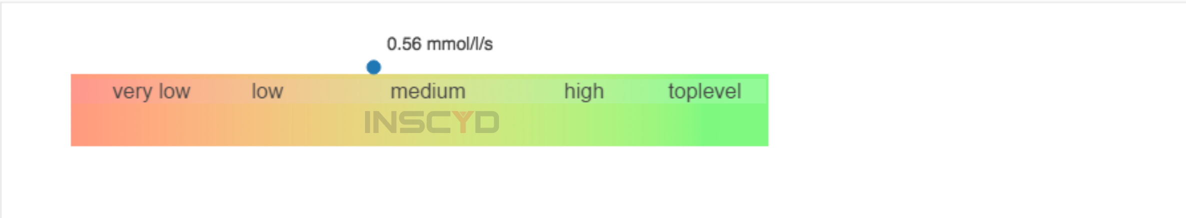
Next to the visualization of body fat and fat free mass, you see a visualization of the body compartments. Based on the measured metrics of body composition, the performance related compartments for lactate distribution and active muscle mass have been calculated. These metrics depend on 2 criteria; 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

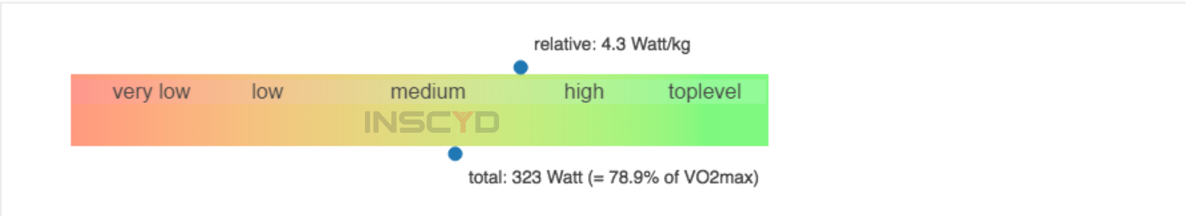
VO2max - aerobic capacity



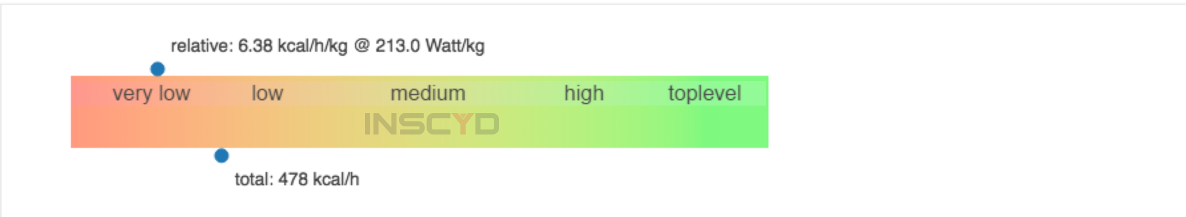
VLamax - anaerobic capacity



AT - anaerobic threshold



FatMax - maximum fat metabolism



CarbMax - carbohydrate metabolism

The visualization above shows the most important performance benchmarks. It shows your maximum aerobic capacity or VO2max. With every milliliter of oxygen your body is able to take up and use in the metabolism, energy is produced. A higher VO2max means higher energy turnover, and therefore more power. In almost all sports it is desirable to have a high VO2max, enabling a high power production by aerobic metabolism.

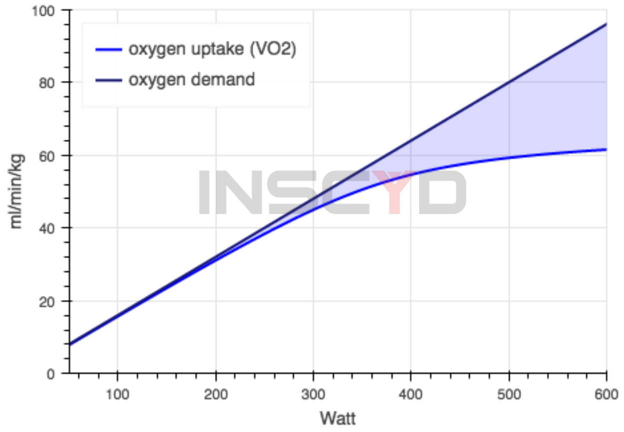
Vlamax is the maximum lactate production rate. With every bit of lactate produced, the muscle also produces energy. Therefore VLamax can be viewed as maximum glycoltic power (fluxrate), or simplified as anaerobic capacity. For endurance events, such as an Ironman, or a Marathon, a low VLamax is desirable. A comparable low VLamax allows for higher anaerobic threshold, higher fat combustion and better carbohydrate sparing. On the other hand a lower VLamax means lower glycolytic energy production, which compromises the performance in sprints. Therefore, in events which include sprinting or short intense bouts, a higher VLamax is associated with higher performance.
Anaerobic threshold (AT) has long been known as one of the most important benchmarks in endurance sports. AT marks the

intensity (speed or power) at which the production rate of lactate in the muscle equals the clearance rate of lactate. AT marks the highest possible intensity, which can be sustained without accumulating lactate. The exercise duration in this case is mostly limited by the availability of carbohydrates, which drain quickly at the intensity of AT.

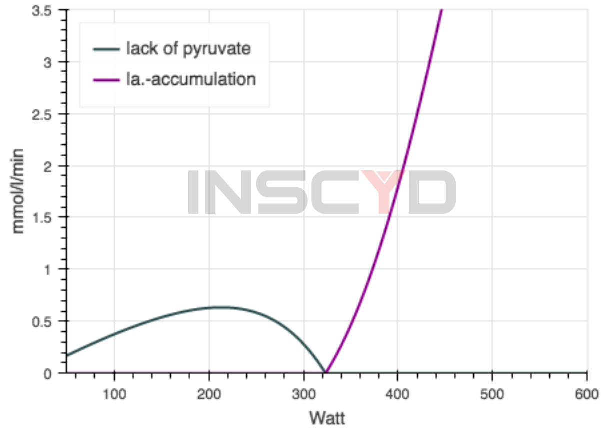
FatMax (if shown) marks the highest fat oxidation rate. Simplified, this is the maximum amount if energy (kcal) from fat combustion per hour. In endurance events, a high FatMax is associated with high endurance performance. Whilst carbohydrate stores (glycogen) are limited, utilizing fat as a fuel can help to spare carbohydrates. FatMax is also a training intensity, which can be helpful to assign individual intensity zones for training.
CarbMax marks the intensity (speed or power) at which the combustion of carbohydrates reaches 90g per hour. This rate of carbohydrate utilization is the non maximum of carbohydrate absorption per hour (this is shown as less than 90 grams per hour).

Load Characteristics

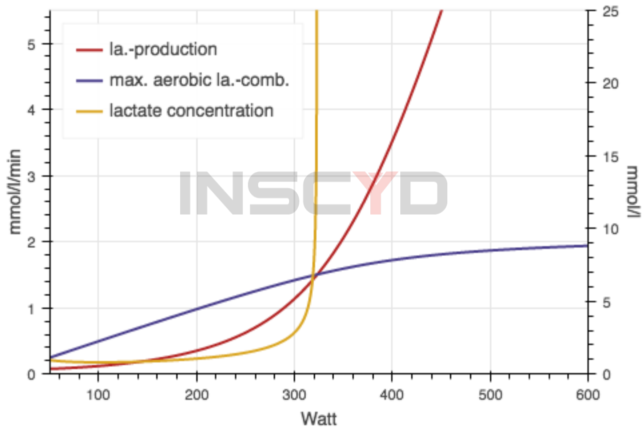
Metabolic demand & VO2



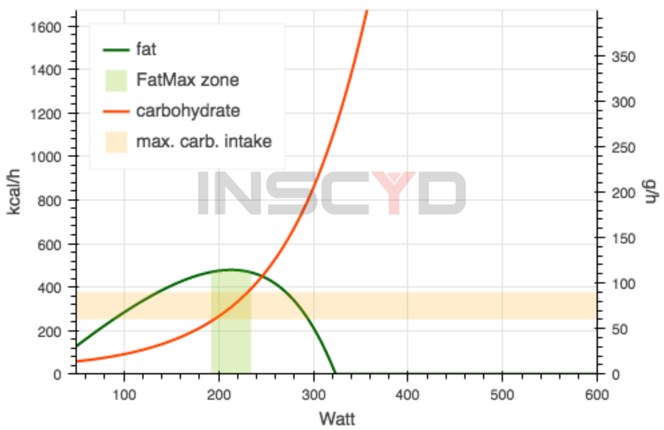
Lack of pyruvate & lactate accumulation



Lactate – production & max. oxidation & concentration



Fat & carbohydrate combustion



All graphs above visualize important endurance metrics, in steady state condition, in relation to the intensity (power or speed). The upper left graph shows the metabolic demand and oxygen uptake (in steady state). The oxygen demand (also named VO2tot – dark blue curve) increases with the intensity (speed or power). The oxygen demand is similar to the energy demand needed at a certain intensity. However it is converted into ml/min/kg of oxygen instead of using kJ or a similar unit of energy. Therefore the increment of oxygen demand in relation to the intensity shows the efficiency.

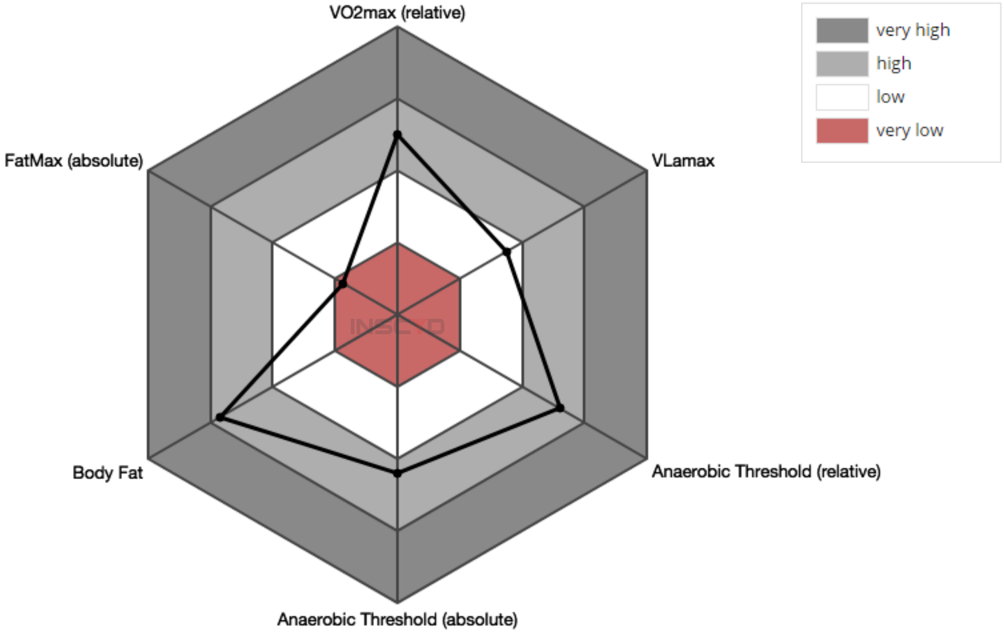
The light blue curve shows the actual oxygen uptake (VO2) in steady state conditions. The unit is ml/min/kg – oxygen normalized to the body weight. As can be seen, at lower intensities, the actual oxygen uptake almost matches the oxygen demand, thus the needed amount of energy is almost completely covered by aerobic metabolism.
At higher intensities however, a gap is opening up and the oxygen uptake cannot match the demand. This gap is shown as the light blue area, and shows the amount of energy (or more precisely oxygen) which needs to be covered by glycolytic metabolism.

The lower left graph shows: Gross lactate clearance rate (blue), the lactate production rate (red) and the lactate concentration (yellow).
During exercise lactate is be cleared from the muscle cell by aerobic metabolism (oxidation). Simplified, lactate gets burned and acts as a fuel in the aerobic metabolism. Therefore, the rate at which lactate can be cleared is directly related to the actual oxygen uptake. You will notice that the shape of the blue lactate clearance curve looks similar to the oxygen uptake curve above.
The red curve shows the actual lactate production. As lactate clearance, the unit here is mmol/l/min. Look for the crossing point of the lactate production (red) and the lactate combustion (blue) – this is intensity of anaerobic threshold. At any intensity below, it can be seen the possible combustion of lactate is higher then the actual production. At any intensity above this crossing point, the lactate production rate is higher then the possible combustion rate, which results in an accumulation of lactate.
The yellow line shows the lactate concentration in steady state conditions – this is a result of the production and clearance rates described above. Steady state means that time is infinite, and therefore shows the concentration that lactate concentration (in mmol/l) would reach. At anaerobic threshold – also known as maximum lactate steady state, the curve increase to infinite as no steady state can be reached anymore.

The top right graph shows the lack of pyruvate (or lactate, grey line) and the actual lactate accumulation (purple). If you look back to the lactate production and lactate combustion, you can identify the gap between both at intensities below anaerobic threshold (below the crossing point of both). The gap between gross production and gross clearance is the lack of pyruvate. Or in other words: the amount of lactate that could be cleared additionally to the gross production. Lack of pyruvate curve is shown in mmol/l/min of lactate clearance. It shows the ability to recover from lactate accumulation in relation to the intensity (speed or power). At anaerobic threshold it runs to zero – the aerobic metabolism is saturated with lactate and no additional lactate can be

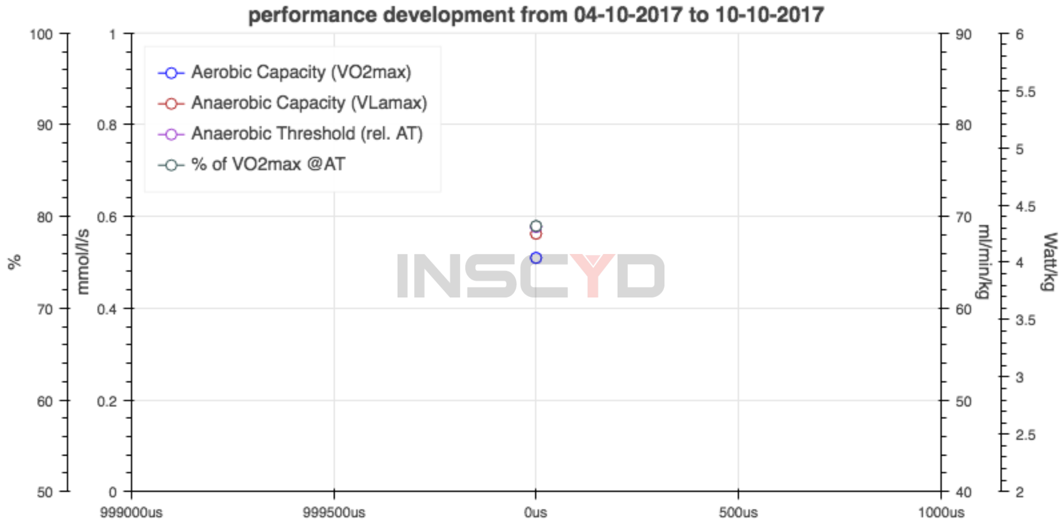
combusted.
The purple curve shows the rate of lactate accumulation. This occurs at intensities higher than anaerobic threshold. The steeper the curve, faster lactate accumulation at any given intensity.

Metabolic Fingerprint



This graph shows your strength and weakness profile at a glance. The most important 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 at the middle (towards the inside of the graph).
Each athlete has their own 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



The graph above aggregates todays test, and all previous test data. The most relevant performance metrics are displayed here. You can see how each metric develops over time.
Review your training diary to compare the training you have completed in between tests, and see which adaptations, specific training methods have triggered.

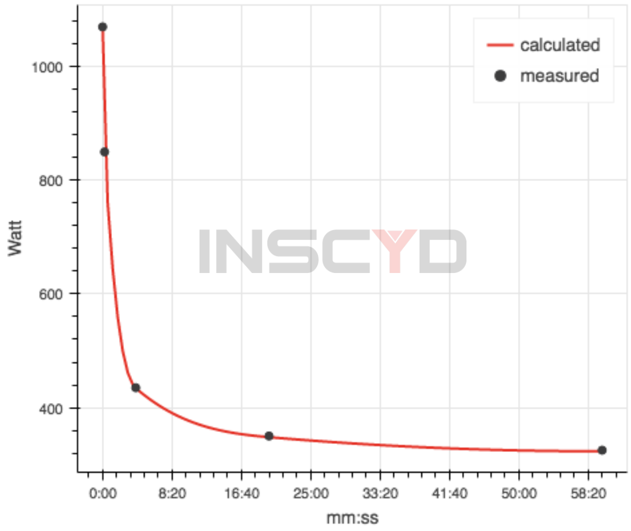
Training Zones

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	121	172	142	527	74	26	41	33
Zone 2	base	bas	172	222	202	748	64	36	50	65
Zone 3	medio	med	231	257	246	901	50	50	47	108
Zone 4	FATmax	fmax	192	235	213	787	61	39	51	74
Zone 5	anaerobic threshold	AT	300	346	323	1138	0	100	0	272
Zone 6	aerobic maximum	aemax	409	452	430					
Zone 7	high anaerobic	anmax	419	476	449					
Zone 8	lactate shuttling	LaEx	213	358						
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								

The table above shows your individual training zones. These zones are not generated as fixed percentages of anaerobic threshold, FTP, or other static metrics, like you get elsewhere. Each zone listed here has its own individual origin, and is related to an actual performance metric = your current status.
For each zone, you will find an upper and lower intensity limit, plus the target value, which you should focus on when training in this zone.
Where applicable the energy consumption per hour is listed and the distribution of fat and carbohydrate – both in percentage and as absolute consumption in grams per hour. You can use these numbers to better understand how you fuel yourself while training in those zones. Furthermore, you can see how much total fat you can burn in each zone.
Zones defined:
Zone 1 – recovery: the lowest intensity zone. Used mostly used for easy trainings, rest days and in between intervals.
Zone 2 – base: this is the “bread & butter” zone for endurance training. Zone 2 is the zone in which the long endurance trainings are to be completed.
Zone 3 – medio: a mid intensity zone, between the base endurance, and anaerobic threshold.
Zone 4 – FatMax: the intensity at which the consumption of fat as a fuel is highest.
Zone 5 – anaerobic threshold: the intensity at anaerobic threshold (lactate production rate equals lactate clearance rate).
Zone 6 – aerobic maximum: an intensity at which your oxygen uptake will raise to its maximum rate in very short time.
Zone 7 – high anaerobic: the intensity at which 25% of the needed energy comes from glycolytic energy supply (in steady state condition).
Zone 8 – lactate shuttling: the lower value shows the intensity at which you can clear lactate at the maximum rate. The upper values shows the intensity at which lactate accumulates at the same rate.

Test Data

Determination of critical power
r2 of optimization: 1.000



Raw Test Data

Measured Values		Calculated Values		
Time (mm:ss)	Measured Values (Watt)	Calculated (Watt)	% aerobic (%)	% anaerobic (%)
00:01	1070	1071.1		
00:15	850	850.8		
04:00	435	434.2	81.52	18.48
20:00	350	348.0	90.39	9.61
Anaerobic Threshold	325	323.1	92.28	7.72

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.