

# As cancer survivor Lance Armstrong heads for triumph in the Tour de France

This 33-year-old man can power up the Pyrenees generating 500 watts of power for 20 minutes. A fit 25-year-old man can do it for only 30 seconds.

## FUEL FOR ARMSTRONG'S BODY

Professional cyclists such as Lance Armstrong burn 4000 to 6000 calories during a flat stage and more than 8000 calories during a mountain stage. Studies say the average human burns between 1400 and 2500 calories a day. All that energy has to come from somewhere. Meals during the Tour are simple and nourishing. Breakfast consists of eggs, pasta, rice, bread, yoghurt, cereals. During the race, lunch is handed to the riders in bags called musettes. They contain high-carbohydrate items; small sandwiches filled with honey and banana slices, cakes, energy bars, energy gels and water or sports drinks. After a stage, team members snack on cereal and high-protein foods. Dinner consists of meats, pasta, rice, salad, bread and dessert.

## MARATHON MAN

### MUSCLES & BONES

A product of metabolism, lactic acid produces the excruciating burning sensation familiar to participants in strenuous physical activity. It could be a side effect of his grueling training regimen or the abnormally high percentage of slow-twitch muscles in his body. Armstrong produces less lactic acid than normal.

■ **THIN BONE** Unusually long, it allows Armstrong to apply more force to the pedals.

■ **BODY FAT** At about 4 or 5 per cent, Armstrong's body fat is so low that he is more susceptible to infections.

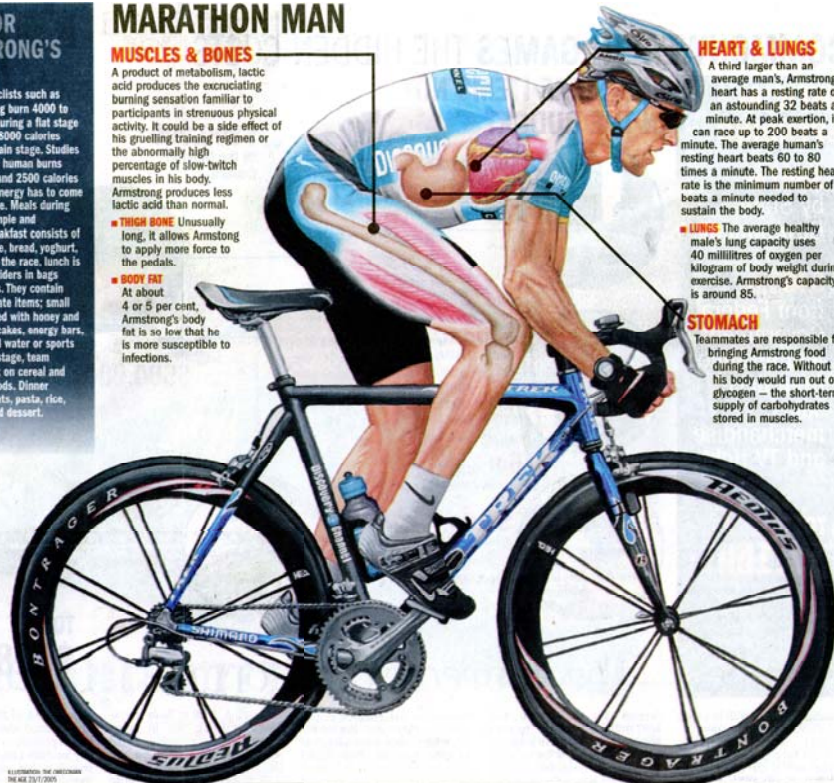
### HEART & LUNGS

A third larger than an average man's, Armstrong's heart has a resting rate of an astounding 32 beats a minute. At peak exertion, it can race up to 200 beats a minute. The average human's resting heart beats 60 to 80 times a minute. The resting heart rate is the minimum number of beats a minute needed to sustain the body.

■ **LUNGS** The average healthy male's lung capacity uses 40 millilitres of oxygen per kilogram of body weight during exercise. Armstrong's capacity is around 85.

### STOMACH

Teammates are responsible for bringing Armstrong food during the race. Without it, his body would run out of glycogen — the short-term supply of carbohydrates stored in muscles.



Being a physical freak has given Lance Armstrong a big break over his rivals, reports Mike Van Niekirk

**T**OMORROW in Paris, Lance Armstrong will call it quits. Barring an accident before the 2005 Tour de France crosses the Champs Elysees finish line, the 33-year-old American will retire with a seventh straight yellow jersey on his shoulders and a reputation as one of the greatest athletes of his generation.

Watching the devastating ease with which Armstrong this week matched every attack by his rivals in the steep climbs of the Pyrenees, you would think he was superhuman — and you would be right. Armstrong is a physical freak, spectacularly well adapted to the harsh demands of endurance bicycle racing.

His heart is a third bigger than average, pumping blood to his muscles more efficiently; at rest his heart rate is 32 beats a minute, less than half the average. His blood is more saturated than normal, even for a top-level sportsman, with energy-producing oxygen; his VO2 Max rating, which measures how much oxygen the lungs can consume during exercise, is 85. An average healthy male might rate a 48.

Even in an untrained state, Armstrong is at the same level as a highly trained but less gifted athlete, according to



scientist Edward Coyle.

Go back to those Pyrenean climbs again. Armstrong can ride uphill generating about 500 watts of power for 20 minutes, something a typical 25-year-old could do for only 30 seconds. A professional hockey player — perhaps even an AFL footballer — might

last three minutes then throw up, according to Coyle, director of the human performance laboratory at the University of Texas.

Between 1992 and 1999, Coyle had the unique opportunity to test Armstrong's body and chart how it adapted to intense training and competition. Armstrong "was an extraordinary athlete who... dramatically improved over time".

To do well, Coyle said, cyclists needed a big heart, low levels of lactic acid in their blood — the byproduct of intense exercise — and the ability to efficiently generate power, measured in watts. When Armstrong, then 20, first asked Coyle for an analysis of his potential, he already had the big heart and low lactic acid. "But his muscle efficiency was not very good," Coyle said. "It came in at 21 per cent.

That first year, two other athletes we studied were better." Armstrong improved until his career was suspended in 1996: he was diagnosed with testicular cancer, which had spread to his lungs and brain. Eight months after his treatment ended, Coyle's tests found nothing permanently wrong with Armstrong.

The last test was done in 1999, after Armstrong won his first Tour de France.

In the previous two years his lactic acid had dropped further and his efficiency increased to 23 per cent. Together with the weight loss during cancer treatment he was delivering 18 per cent more power — meaning he could go faster up mountains with less effort.

Coyle's study, "Improved Muscular Efficiency Displayed as Tour de France Champion Matures", in the June issue of the *Journal of Applied Physiology*, reveals the combination of natural gifts and focused hard work that took Armstrong to the top.

Stimulated by years of train-

ing intensely for up to six hours most days, Armstrong's muscles changed from 60 per cent slow twitch fibre — the kind that doesn't burn out quickly — to 80 per cent.

"Clearly, this champion embodies a phenomenon of both genetic natural selection and the extreme to which the human can adapt to endurance training performed for a decade or more in a person who is truly inspired," Coyle wrote.

Good genes and sheer hard work. Armstrong is a driven personality, whose attention to detail shocked the Europeans. Never had anyone recognised every mountain climb months ahead of the tour — ridden there repeatedly for training, as well as memorised those parts where he or other riders might attack.

Few, if any, top cyclists have combined a precision diet to give themselves exactly the right race-ready weight in July with the strength of this year's performance, measured against his

first mountains. Jan Ullrich, Armstrong's most noted challenger for six of the past seven years, is well known to put on weight in the off season then over-compensate by losing the excess too quickly before the tour, stressing his system. Armstrong has surrounded himself with experts, such as celebrity coach Chris Carmichael and Italian Michele Ferrari — although less openly since he was implicated in a drugs scandal — with whom he daily discusses training statistics.

Finally, there is Armstrong's incredible desire to win. Even surrounded by attacking rivals, as he has been in this tour, he has never once sat back when the challenges came.

It's possible the 102-year-old Tour de France will never again produce another rider who can win seven times straight. No one has done it before.

Astonishingly, Armstrong has quit at the height of his powers. It's commonly accepted that on the strength of this year's performance, measured against his

rivals, he could likely win an eighth yellow jersey in 2006.

What he'll do now is open to speculation. Having earned a reported \$36.6 million in 2004 in salary and endorsements, on top of previous years' earnings and with an ongoing commercial relationship with the Discovery Channel and other sponsors, he'll be able to do as he pleases. He will certainly continue promoting the work of his Lance Armstrong Foundation for cancer research and awareness.

In an interview with *Outdoor* magazine last month, Armstrong said that one night recently he drove with his rock musician girlfriend Sheryl Crow past the governor's mansion in his home town of Austin, the capital of Texas. "It's a nice mansion. Nice place, nice house," he teased. If he does decide to go into public life, it's certain you will hear the name Lance Armstrong in future just as often as when he was winning the Tour de France.