

Lewis and Clark Reloaded: The 3,041-Mile Bike Trail

by

Mary Rose Grant

School for Professional Studies

Saint Louis University



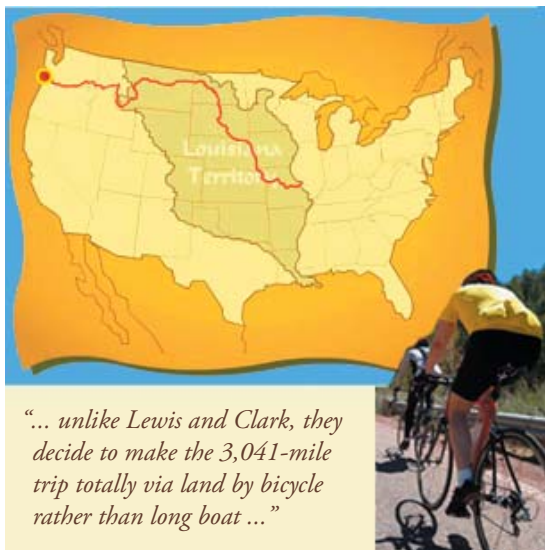
Part I—The Adventure Begins ... and Comes to a Screaming Halt

Introduction

Long distance cycling is a strenuous sport. Most cyclists train for months before attempting any long distance ride, whether competitive or not. Training is imperative for optimal physical endurance and strength. In this case, the bikers, both in excellent health and physical condition, trained for six months before attempting a trek across the United States. The training regimen for this event was well planned and intensive. It consisted of cycling 15 to 20 miles each day during the week and 40 to 50 miles a day on the weekends in all weather conditions. In addition to cycling for endurance and because the bikers would be carrying 50 pounds of additional gear during the actual trip, the bikers spent one hour per day, three days a week, lifting weights to build muscle mass and increase both upper and lower body strength. Vigilant about diet and nutritional requirements for athletic conditioning, the bikers ate balanced meals and drank appropriate types and amounts of fluids to maintain health during training and to meet the demands of the planned trip.

Scenario

Frank and Joe are 24-year-old fraternal twins. Like most twins, they enjoy similar activities. Being single and male, Frank and Joe enjoy girl-watching and more mundane sports, such as cycling. Being the adventurers they are, as well as history buffs, they decide to attempt their first long-distance cycling expedition this summer. Their first ultra-marathon is to retrace the journey of Lewis and Clark to the Northwest. But, unlike Lewis and Clark, they decide to make the 3,041-mile trip totally via land by bicycle rather than long



“... unlike Lewis and Clark, they decide to make the 3,041-mile trip totally via land by bicycle rather than long boat ...”

boat. They estimate that by pedaling an average of 50 to 60 miles per day, they can reach the Pacific Ocean from Illinois in 60 days.

It's July 27th. Frank and Joe, 20 days into their 3,041-mile bike ride, are crossing the prairie flats in Kansas. Blinded by the mid-day sun, Frank notices that Joe is having trouble controlling his bike. He shouts: “Joe! What’s wrong with you? You’re weaving all over the place ...”. Suddenly, Joe and his bike careen down a small ravine. Frank speeds up to the spot where Joe disappeared. By the time he gets there, Joe is climbing up to the road pushing his bike. “You scared the hell out of me!” says Frank.

Heart pounding and irritated with the whole situation, Joe snaps back, “I don’t know what happened ... I just lost

control of the bike ... No big deal! The lights were blinding me. I must have gotten a little dizzy. I don't know. Forget it."

"Well, you must have cut your forearm; you're bleeding through your shirt!" Frank says with concern about Joe's wound and his abnormal behavior.

"Give it a rest, Frank. Better me than my bike. Let's just stop here and rest for a while," Joe says with fatigue in his voice. "My muscles are tense and aching, my knees are stiff, and I've got a splitting headache on top of that!"

Frank offers Joe some water. Joe turns him down and reaches for his usual energy drink and some aspirin.

"Does your stomach hurt, Frank?" asks Joe.

"No I'm fine," replies Frank. "Why?"

Joe continues, "I think that roadside diner did me in this morning. I would have been better off eating road kill ... Of course you were more concerned with that little waitress ... Oh, God ..." Suddenly, Joe doubles up screaming in pain, falls to his knees, then passes out in the dirt.

Questions

1. What body systems are primarily affected and what physiological changes would you expect Joe and Frank to experience during such rigorous exercise?
2. List the symptoms Joe is manifesting on the 20th day of cycling.
3. Could Joe's symptoms be explained by your answers to Question #1 alone?



Part II—A Change of Scenery

Frank uses his cell phone to call for help. Thirty minutes later, Frank finds himself staring at white hospital walls waiting for the doctor and the Emergency Room staff to finish examining Joe. Frank thinks to himself, “What did Joe eat or drink or do that I didn’t to bring on this violent reaction and collapse?”

In the Emergency Room, Joe’s temperature is recorded at 99.1 degrees, his BP is 130/85, and his pulse is 87 beats per minute. He is extremely nauseous and vomits repeatedly. Dr. Smith examines Joe, orders a battery of tests, and interviews Frank about the course of events and contributing factors that might have led up to Joe’s collapse.

Dr. Smith begins, “Tell me about your daily routine, diet, water intake, rest and other activities, Frank.”

“Dr. Smith, Joe and I were very careful about our fluid intake, drinking plenty of water throughout the day, particularly here in Kansas. We stopped regularly to eat and rest, and to stretch our tired muscles and joints. We both experienced stiffness in our fingers, but, come to think of it, Joe had more leg tremors and muscle fatigue.”

“Can you be a little more specific about your diet, Frank?”

“Well, we started off each day with a hearty breakfast, lots of protein, eggs and bacon ... easy to cook on the road, you know, plus bread and juice, for our carbohydrate intake, and of course, coffee.”

Dr. Smith asks, “Did Joe follow the same regimen?”

Frank recalls that Joe drank additional high energy drinks during the day, as well as one espresso in the morning and one in the afternoon. “Joe brought his own little espresso coffee pot along,” Frank tells Dr. Smith. He also recounts the fact that both ate high protein snacks like peanuts, and that, “Joe loves chocolate and eats his peanuts, as well as his raisins, chocolate covered!”

Meanwhile, Dr. Smith is given the first laboratory results, blood work, and urinalysis that she ordered.

Patient Name: Joseph McGill

Date: July 27, 2004

MDPA/NP: Ellen Smith, MD

Facility: Prairie Flats Consolidated Health System

Laboratory Results

Hematology

Test	Pt. Values	Normal Values
RBC	7.3M/microL	4.2-5.6 M/microL
WBC	13.6 K/mm cubed	3.8-11.0 K/mm cubed
Hgb (Hemoglobin)	19.3 g/dL	14-18 g/dL
Hct (Hematocrit)	59%	39-54%
Neutrophils	93%	50-81%

Urinalysis

Color	dark gold	straw
Osmolality	1700 mOsm/L	80-1300 mOsm/L
Specific Gravity	1.086	1.0003-1.040

Questions

1. What, if any, of this new information might be relevant to this case?
2. What can you determine from the clinical lab results of Joe's blood work and urinalysis?
3. What additional information or tests would you request?



Part III—A Dangerous Detour

By now the sun has set in this small Kansas prairie town, and Joe McGill is conscious and starting to feel a little better. His brother, Frank, is still trying to figure out what led up to the events of the past few hours and how their bike trail ended up in this Urgent Care Center.

“Your parents are on the phone, Frank,” whispers Dr. Smith. “Let me have a few minutes with them first. While I explain the situation to them, as we understand it, I want both you and your brother to speak with my medical interns. As best you can, answer their questions about your activities on the road during the days before the accident.”



Your Task

From this point forward, you will role-play Dr. Smith’s medical consultants. Your task is to gather “missing” information from Joe and Frank, asking additional questions about their daily habits, activities, and experiences on the bike trail. Your instructor will role-play both Joe and Frank, as appropriate, and provide you with pertinent information necessary for you to make an accurate diagnosis.

Questions

1. Weeding out misinformation and piecing together the many facts presented, what is your diagnosis of Joe’s condition?
2. What signs, symptoms, risk factors, and conditions lead to this diagnosis?

Summary Questions

1. Define an “ergogenic aid.”
2. Describe the chemistry of and biological effects of caffeine.
3. What is the role of caffeine as an ergogenic aid in endurance sports?
4. What are the adverse effects of caffeine intoxication on different organ systems in the body?
5. Explain the legal implications, if any, of the use of caffeine in competitive sports.
6. Identify the position on safe caffeine consumption and legal limits of use by organizations such as the International Olympic Committee, the National Collegiate Athletic Association, the U.S. Cycling Federation, the World Anti-Doping Association, and the American Heart Association. Other organizations worth researching caffeine recommendations include:
 - a. American Medical Association
 - b. American College of Obstetrics and Gynecology
 - c. Center for Science in the Public Interest
 - d. International Food Information Council
 - e. American Dietetic Association
 - f. Mayo Clinic
 - g. Medline Plus
 - h. U.S. Dept. of Health & Human Services/National Health Information Center (<http://www.healthfinder.gov>)
7. Discuss the ethical issues of using caffeine, or any other substance, as an ergogenic aid for the specific purpose of enhancing athletic performance.
8. In counseling an athlete, what recommendations would you make if they insisted on using caffeine or any ergogenic aid before a sports event or athletic competition?
9. Expand the discussion of performance enhancing aids to current issues in Olympic competition and professional sports.

Image Credits: Title photo © Norman Eder. Underlying map courtesy of the United States Mint; superimposed cyclists © Paul Johnson.

Copyright © 2005 by the **National Center for Case Study Teaching in Science**.

Originally published 09/15/05 at http://www.sciencecases.org/bicycle_ride/bicycle_ride.asp

Please see our **usage guidelines**, which outline our policy concerning permissible reproduction of this work.