

# **The Effect of Raisins and Peanuts as a Pre-Event Meal in Young, Trained Soccer Players 10-12 Years of Age, Playing a Standard Soccer Game**

**REPORT - AUGUST 1, 2001**

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## **Study Design**

Each participant played two soccer matches after consuming different pre-event meals in a cross-over design. Half of the participants ate one of the two pre-event meals before game one, on June 23, 2001. Three days later, on June 26, 2001 each participant ate the other pre-event meal before the second game. Which pre-event meal was consumed first was randomly assigned.

One pre-event meal consisted of a raisin and peanut mix containing peanuts (175 Kcal) and raisins ( 175 Kcal). The other pre-event meal consisted of one half of a plain white flour bagel, providing 135 Kcal, and a glucose lemonade drink providing 215 Kcal. Both pre-event meals provided a total of 350 Kcal.

Seven boys and seven girls between the ages on 10 and 12 participated in the study. These subjects had blood drawn before and after the game, and wore activity monitors during the game. The blood samples were tested for glucose, insulin and lactic acid. The samples were kept on ice and taken from the soccer field to the laboratory immediately after each cycle of blood draws. Other boys and girls of the same ages were used to complete the soccer teams, and rotated in and out of the game to assure that the study participants all played for the same length of time.

## **Summary of game day schedule for Soccer Study June 23 and 26, 2001**

As the players arrived, those who were participating in the blood draw portion of the study were assigned a number, G1 through G7 for the girls and B1 through B7 for the boys. Each number was one of three in a rotation group used to assure uniform timing for each subject.

### Rotation routine

Group A	G1, G2, B1
Group B	G3, B2, B3
Group C	G4, G5, B4
Group D	G6, B5, B6
Group E	G7, B7

The members of each group had their blood drawn at the same time for both games by one of three phlebotomists. Groups moved through the blood draw station at five minute intervals beginning at 9:40 am, ending at 10:00 am.

After blood draws were complete, subjects were fed their assigned snack for that game. The 14 subjects were randomly assigned to one of two food groups. One group ate the raisin and peanut mix for game one and the bagel half and lemonade the second game. The second food group reversed the order. Each subject ate both snacks over the course of the two games.

Feeding began in five minute intervals starting with group A at 10:20, and ending with group E at 10:40. The children were watched as they ate to assure complete consumption of the pre-game meal.

The game began at 11:15 with only group A playing. Substitutes were used to complete the teams. Groups B through E were sent in at five minute intervals. After half an hour of play each group was rotated out for a five-minute rest and water break, then rotated back in at five-minute intervals. At the end of the game the groups were removed at five-minute intervals, beginning with group A. The others continued to play while A had their blood drawn immediately after removal from the game. Groups B through E continued to exit the game at 5 minute intervals and have their blood drawn.

The same schedule was followed for the second game.

### Results

Table 1 shows a summary of the before and after results for glucose, lactic acid and insulin blood levels from the two games conined. Results from subjects eating raisins and peanuts in game one were combined with those eating the same pre-event meal in game two. The same was done for the bagel and lemonade pre-event meal.



1. **Blood glucose.** There was definite hyperglycemia (high blood glucose above normal levels) at the end of the game for the bagel and lemonade meal group, while the raisin group was in the normal range.

2. **Blood insulin.** Insulin levels were lower for the raisin group (-3.5 uU/ML) at the end of the game than at the beginning, while were higher for the bagel and lemonade group, showing definite hyperinsulinimia.

3. **Blood lactate.** Lactate was slightly higher at the end of the game than at the beginning for the bagel/lemonade group than for the raisin group .

Tables 1 – 3 show overall results for girls and boys combined and for boys and girls separately.

**Table 1**

	GLUCPRE	LAPRE	INSPRE	GLUCPOST	LAPOST	INSPPOST
Raisin and peanut average	82.36	12.07	13.71	95.36	15.86	10.21
Raisin and peanut SD	10.07	3.47	4.77	13.54	8.47	4.46
Bagel and lemonade average	87.14	13.21	12.07	111.43	19.29	16.86
Bagel and lemonade SD	6.37	8.48	4.85	18.39	11.89	8.17

**Table 1a**

	change gluc	change la	change ins
Raisin and peanut	13	3.79	-3.5
Bagel and lemonade	24.29	6.07	4.79

This table 1a show the key results of the study, where the bagel/lemonade (glucose) group had hyperglycemia and hyperinsilunimia.

Table 2 shows results for the girls only and Table 3 shows the results for the boys only.

Table 2

Girls only	Glucose pre-game	Glucose post-game	Lactate pre-game	Lactate post-game	Insulin pre-game	Insulin post-game
Raisin and peanut average	84.57	99.57	13.57	15.14	15.14	11.71
Bagel and lemonade average	85.29	119.43	16.14	24.00	11.43	18.14

	change gluc	change la	change ins
Raisin and peanut	15	1.57	-3.43
Bagel and lemonade	34.14	7.86	6.71

Table 3

Boys only	Glucose pre-game	Glucose post-game	Lactate pre-game	Lactate post-game	Insulin pre-game	Insulin post-game
Raisin and peanut average	80.14	91.14	10.57	16.57	12.29	8.71
Bagel and lemonade average	89.00	103.43	10.29	14.57	12.71	15.57

	change gluc	change la	change ins
Raisin and peanut	11	6	-3.58
Bagel and lemonade	14.43	4.28	2.86

Heart rate monitoring done on all subjects showed that all were active throughout the game, supporting the validity of the blood data, blood data that were the purpose of the study. Videos of the game confirmed that there was intense activity at the level typical of a soccer team game for this age range.

### Discussion

The results are very positive for the raisin/peanut group. The bagel/lemonade group showed definite hyperinsulinemia with none in the raisin group and the bagel/lemonade showed noticeable hyperglycemia compared to the raisin group that remain euglycemic. There was a slight higher lactate for the bagel/lemonade than for the raisin group. These results are such that papers/abstracts can be prepared for scientific meetings/journals and related news items prepared for the press.

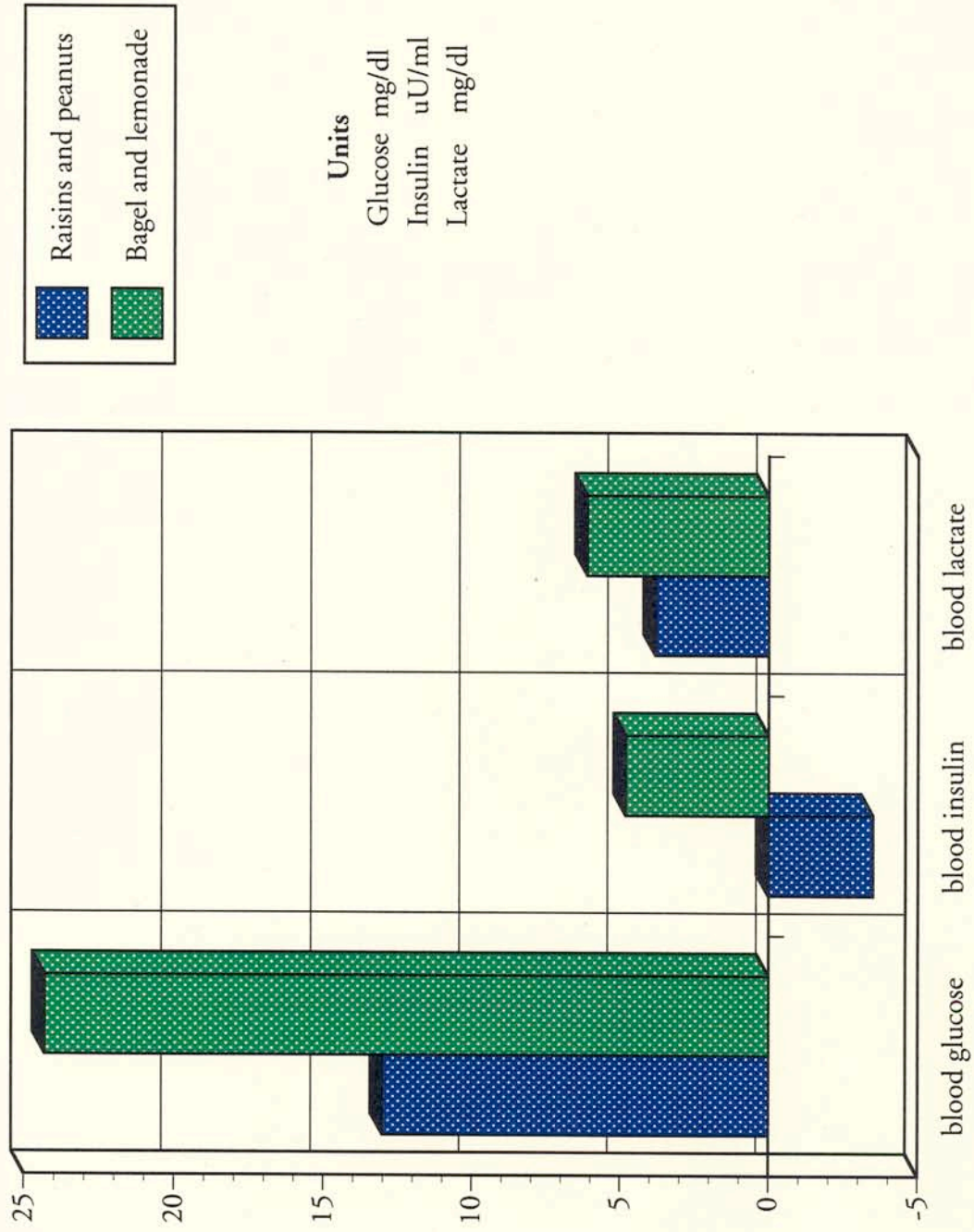
### Other key investigators/collaborators

Stanford University: William Haskell, PhD and Karen Bolen, MS

Health Research and Studies Center: Laura Schultz, BS. MT, Beverly Miller, BS and Karen Bratcher, RN.

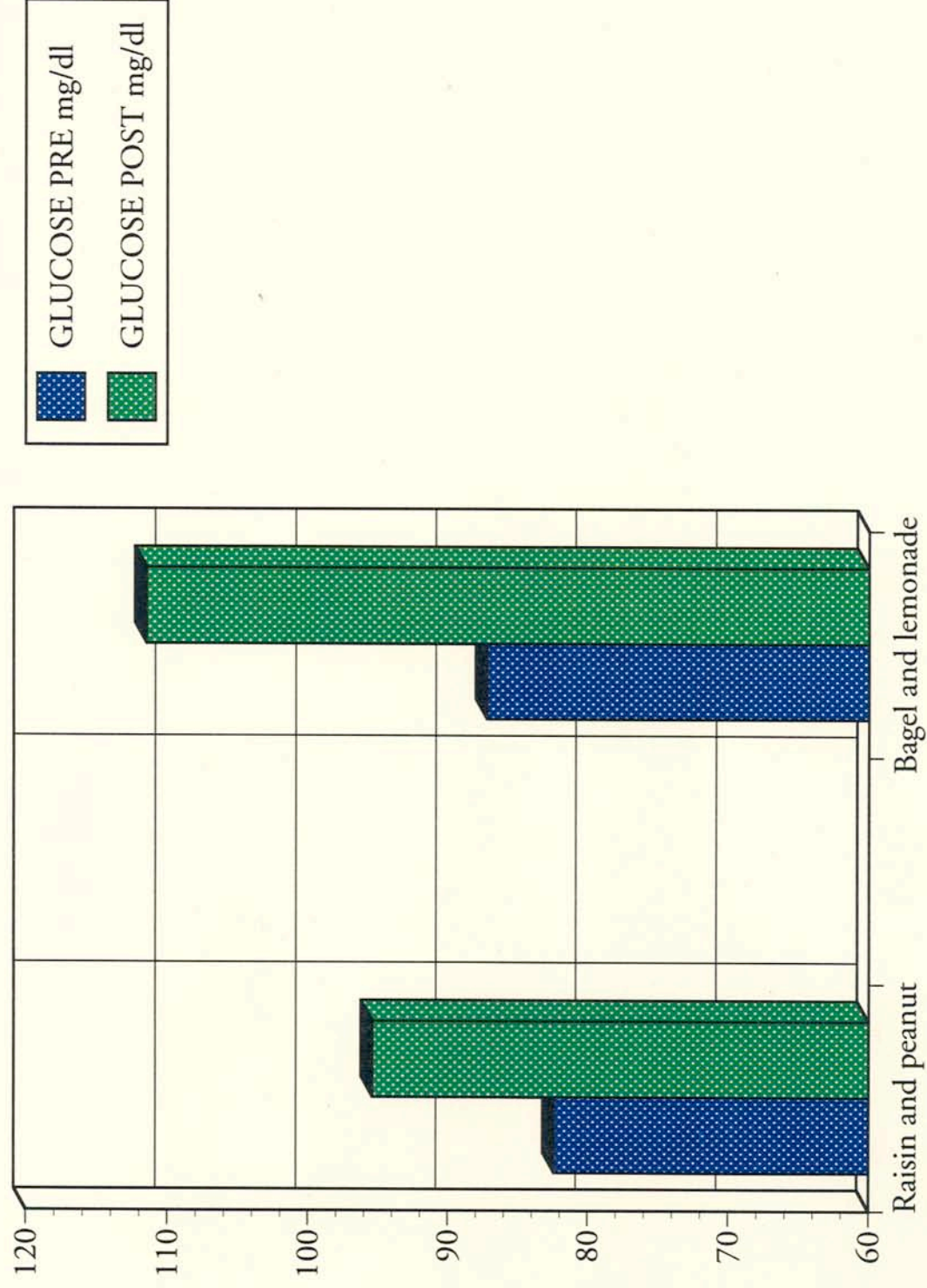
Soccer teams and coaches supervisor: Ken Bratcher

# CHANGES IN BLOOD VALUES (POSTGAME LESS PREGAME)

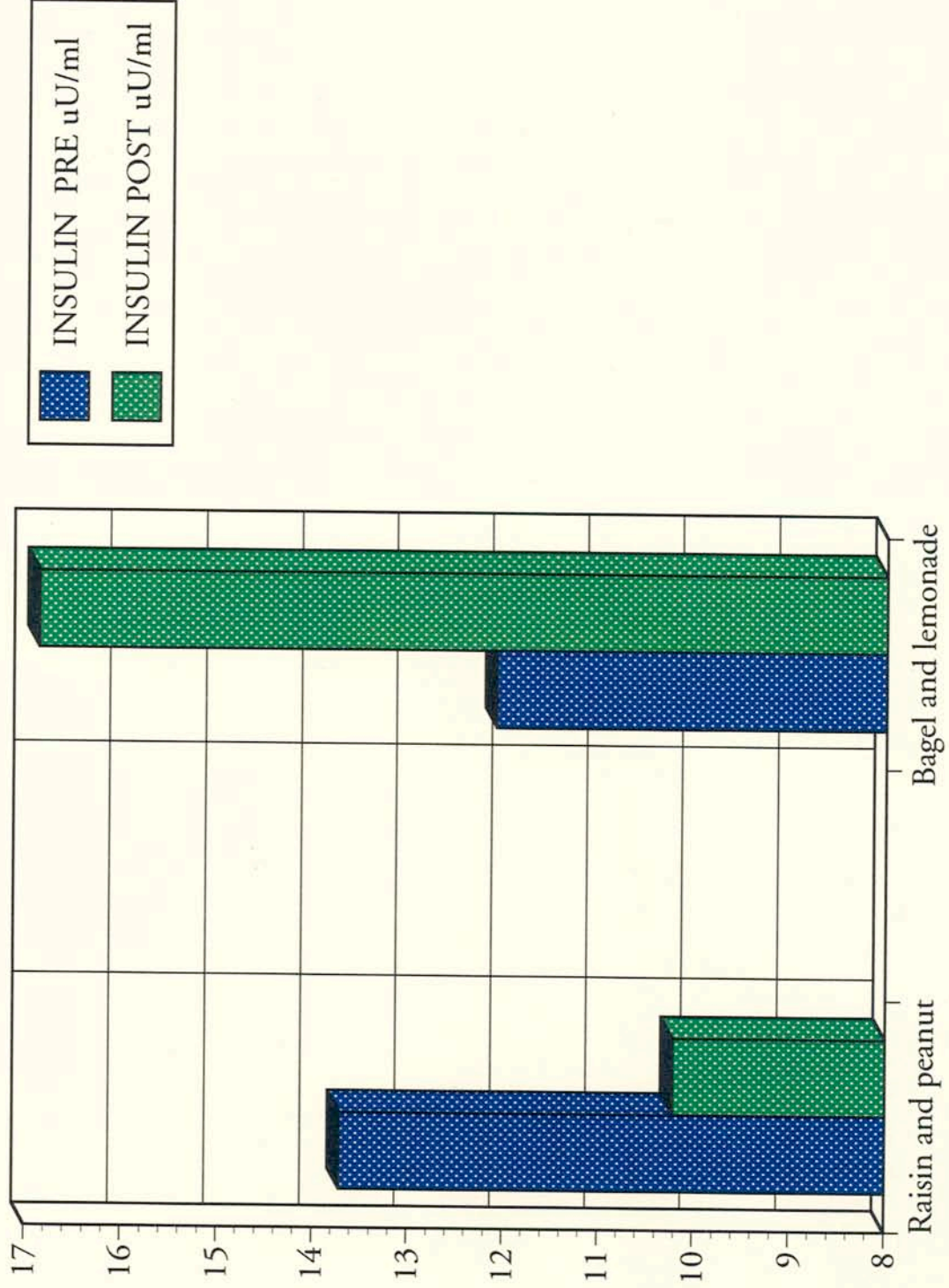




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