Effects on Serum Lipids of Adding Instant Oats to Usual American Diets

ABSTRACT

This study was designed as a test of the serum lipid response and dietary adaptation to recommended daily inclusion of instant oats in an otherwise regular diet. Hypercholesterolemic adults were randomly assigned to a control or intervention group. Participants in the intervention group were given packages of instant oats and requested to eat two servings per day (approximately two ounces dry weight), substituting the oats for other carbohydrate foods in order to maintain baseline calorie intake and keep weight stable. Serum lipids were measured in blood collected by venipuncture at baseline, four weeks, and eight weeks. Baseline mean total cholesterol (TC) levels were 6.56 mmol/L and 6.39 mmol/L for intervention and control groups, respectively. After eight weeks, mean serum total cholesterol of the intervention group was lower by −0.40 mmol/L, and mean net difference in TC between the two groups was 0.32 mmol/L (95% CI: 0.09, 0.54). Low-density lipoprotein-cholesterol was similarly reduced with mean net difference of 0.25 mmol/L (95% CI: 0.02, 0.48) between the two groups. Mean soluble fiber intake increased along with slight self-imposed reductions in mean total fat, saturated fat, and dietary cholesterol intake in the intervention group. Neither group changed mean body weight. Daily inclusion of two ounces of oats appeared to facilitate reduction of serum total cholesterol and LDL-C in these hyperlipidemic individuals. (*Am J Public Health* 1991; 81:183–188)

Linda Van Horn, PhD, RD, Alicia Moag-Stahlberg, MS, RD, Kiang Liu, PhD, Carol Ballew, PhD, Karen Ruth, MS, Richard Hughes, MD, and Jeremiah Stamler, MD

Introduction

Elevated serum cholesterol is an established risk factor for coronary heart disease (CHD).[1,2] About 1.5 million Americans have heart attacks each year. Evidence is extensive that lowering blood cholesterol reduces risk of heart attack, and slows, stops and even reverses atherogenesis.[2–7] The report of the National Cholesterol Education Program (NCEP) Adult Treatment Panel states that diet is the cornerstone of treatment for high blood cholesterol.[8] Epidemiological studies, controlled clinical trials, animal experimental data, and autopsy studies demonstrate that diet and plasma lipids are causally related.[9] Dietary fatty acids, dietary cholesterol, weight change, and water soluble fiber have all been observed to affect serum cholesterol.[10–12]

These and other studies have generated growing public interest in appropriate foods to help lower blood cholesterol. Physicians and other health professionals recommend reducing intake of total fat, saturated fatty acids, and cholesterol to maximize blood cholesterol lowering. A relatively simple step toward improving dietary behavior may be emphasis on daily inclusion of carbohydrate foods high in water soluble fiber, such as oats, to help displace some of the saturated fat and cholesterol containing foods. By advocating foods to eat rather than focusing solely on foods to restrict, dietary adherence and nutrient adequacy may be better achieved. To explore the efficacy and feasibility of this approach, this study was designed to measure the dietary changes and biochemical response of including moderate daily amounts of instant oats in the diet of free-living, hyperlipidemic men and women.

Methods

Participants

Men and women volunteers were recruited from a financial institution in Chicago. Capillary blood cholesterol levels were measured with use of the Reflotron* desk-top instrument, to confirm hypercholesterolemic status of individuals previously screened by the company and found to have serum cholesterol levels above 5.20 mmol/L. Eligibility criteria included: availability and willingness to follow study protocol, attendance at all data collection visits and completion of all food records, not on lipid-lowering drugs or anti-hypertensive medication, not diabetic, not pregnant or lactating, not greater than 1.5 times desirable body weight (1959 Metropolitan Life Insurance Weight Tables as standards), and not on a weight-loss diet. All participants signed informed consents. Participants were required to complete a three-day food record before the baseline data collection visit.

Data Collection

Individuals were randomized to one of two groups, stratified by sex and pre-

From the Department of Community Health and Preventive Medicine, Northwestern University Medical School. Address reprint requests to Linda Van Horn, PhD, RD, Associate Professor, Department of Community Health and Preventive Medicine, Northwestern University Medical School, 680 North Lake Shore Drive, Suite 1102, Chicago, IL 60611-4402.

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*Boehringer-Mannheim, Indiana.

TABLE 1—Baseline Means and Standard Deviations for Group 1 and Group 2

	Group 1 Intervention	Group 2 Control
	n = 42	n = 38
Male/Female	21/21	19/19
Age (years)	42.9 ± 13.5	42.1 ± 11.9
Age Range (years)	25.0–76.2	22.2–66.9
Serum Total Cholesterol mmol/L	6.56 ± 0.82	6.39 ± 0.88
Low Density Lipoprotein Cholesterol mmol/L	4.58 ± 0.81	4.61 ± 0.73
Body Weight (kg)	76.2 ± 15.1	75.7 ± 13.4
Height (cm)	169.9 ± 10.8	169.8 ± 8.9
Body Mass Index (BMI)(kg/m^2)	26.2 ± 3.4	26.2 ± 3.8
Blood Pressure (mm Hg)	128/80 ± 14/10	129/79 ± 20/8

screen cholesterol level, above or below 6.34 mmol/L, prior to baseline visit. Group 1 was the treatment group and was asked to consume two packets (56.7 grams dry weight) of instant oats per day. This represented 5.6 grams of total dietary fiber per day, of which 3.4 grams was insoluble fiber and 2.2 grams was soluble fiber. Group 2 served as the control group and was asked to maintain usual intake throughout the study. Food records, height, weight, blood pressure, and serum blood lipids were measured at baseline and two subsequent visits, after four and eight weeks. Biochemical variables assessed were serum total cholesterol, triglycerides, low density lipoprotein cholesterol (LDL-C), high density lipoprotein cholesterol (HDL-C), and very low density lipoprotein cholesterol (VLDL-C). Total cholesterol, HDL-C, and triglycerides were measured enzymatically (Technicon Autoanalyzer)** VLDL-C and LDL-C were calculated from the other lipids.[13] Body mass index (BMI) was calculated as weight (without shoes), measured in kilograms on a beam balance scale, divided by height in meters squared (kg/m^2). Blood pressure was measured twice by trained, certified technicians using a standard sphygmomanometer.

To avoid weight change, the intervention group was briefly instructed how isocalorically to substitute oats for other carbohydrate foods in their diet. Choice of preparation methods, time of day to consume the oats, and whether the packets of oatmeal should be eaten together or at separate times were left to the participants. No other dietary changes were advised. The intervention and control groups met separately.

**Technicon, New York.

Analyses

A two-tailed, two sample t-test was used for the analyses. The computer software program SPSS[14] was used.

Split samples of blood were analyzed for 10 percent of participants for quality control. Technical error was calculated by the formula:

$$TE=\sqrt{\sum_{i=1}^{N} d_i^2/2N},$$

where d_i is the difference between the ith pair of values for a person and N is the number of pairs; technical error divided by group mean ×100 was used to estimate percentage error. Food records were edited and coded by trained, certified nutritionists at the Nutrition Coordinating Center in Minneapolis. The National Heart, Lung and Blood Institute (NHLBI) nutrient data base (tape no. 16) was used for the nutrient analyses.[15] Blinded duplicates of 10 percent of all food records were sent for recoding and analysis for external quality control.

Subgroup analyses were performed comparing observed versus predicted cholesterol responses between groups based on change in Keys Scores. The Keys Score: $1.35 \times (2\,\Delta S - \Delta P) + 1.5\,\Delta Z$—where ΔS stands for the difference between the two diets in calories for saturated fatty acids (SFA), ΔP is the percent of calories for polyunsaturated fatty acids (PUFA), and ΔZ is the difference in the square root of dietary cholesterol in milligrams per 1,000 calories per day—can be used to predict group change in serum cholesterol level.[16] Analysis of covariance was used to measure mean changes in serum cholesterol adjusted for study group, sex, body mass index, and baseline cholesterol.[6]

Results

Prescreen total cholesterol levels were measured on 245 individuals. Of those, 111 met eligibility criteria, signed consents, and were randomized prior to the baseline visit. Failure to attend the baseline visit with a completed food record constituted a drop out. In all, 80 individuals completed all data collection visits; 14 were dropped from the Intervention Group and 17 from the Control Group. The majority of dropouts (18) did not bring food records and/or did not attend the baseline visit; other reasons: ill (5), wanted to lose weight (6), pregnant (1), and "oat product was too sweet" (1).

Mean age for the total cohort was 42 years (Table 1). There were no differences between the two groups in the characteristics measured including mean lipid levels.

As presented in Tables 2 and 3, after four weeks of intervention, Group 1 mean cholesterol was lower by 0.28 mmol/L and mean net difference, or the difference of the difference, between groups was 0.20 mmol/L. After eight weeks, mean net difference in total cholesterol was 0.32 mmol/L (95% CI = 0.09, 0.54) and in LDL-C was 0.25 mmol/L (95% CI = 0.02, 0.48). There were no significant differences between the groups in HDL-C or triglycerides.

Technical errors for serum lipid measurements were: total cholesterol, 1.6 percent, HDL-C, 2.7 percent; and triglycerides, 3.2 percent.

Reported dietary intake data are summarized in Table 4. At visit 3, Group 1 reported slightly decreased total fat, dietary cholesterol, and saturated fat. For the control group, there were slight increases in these dietary values. These opposite changes across groups resulted in an absolute difference in Keys Score of 5.31 (p = 0.039) from visit 3 to visit 1. Intervention group food records indicated increased intake of total, soluble, and insoluble fiber, iron, calcium, vitamin B_6, folacin, niacin, magnesium, and retinol. Group 1 reported consuming an average of 1.9 packets (54 grams) of instant oatmeal each day. This represented 5.3 grams of total dietary fiber of which 3.2 grams was insoluble fiber and 2.1 grams was soluble fiber. There were no reports of side effects from eating the oats.

TABLE 2—Group Means and Standard Deviations at Visits 1, 2, and 3 for Serum Lipids, Lipoproteins and Blood Pressure

Variables	Visit 1 Baseline	Visit 2 4 Weeks	Visit 3 8 Weeks
Total Cholesterol			
Group 1			
mmol/L	6.56 ± 0.82	6.28 ± 0.92	6.15 ± 0.86
Group 2			
mmol/L	6.39 ± 0.78	6.32 ± 0.84	6.30 ± 0.82
LDL-C			
Group 1			
mmol/L	4.58 ± 0.81	4.24 ± 0.87	4.16 ± 0.83
Group 2			
mmol/L	4.61 ± 0.73	4.39 ± 0.75	4.44 ± 0.77
HDL-C			
Group 1			
mmol/L	1.29 ± 0.34	1.36 ± 0.28	1.28 ± 0.29
Group 2			
mmol/L	1.26 ± 0.32	1.35 ± 0.26	1.30 ± 0.25
VLDL-C			
Group 1			
mmol/L	0.70 ± 0.50	0.68 ± 0.42	0.71 ± 0.48
Group 2			
mmol/L	0.51 ± 0.23	0.58 ± 0.28	0.56 ± 0.24
Triglycerides			
Group 1			
mmol/L	1.52 ± 1.09	1.48 ± 0.92	1.54 ± 1.04
Group 2			
mmol/L	1.12 ± 0.51	1.26 ± 0.61	1.22 ± 0.53
Blood Pressure (mm Hg)			
Group 1	127.9/80.3 (± 13/10)	121.8/80.8 (± 11/8)	123.5/77.0 (± 14/11)
Group 2	129.1/79.1 (± 20/8)	124.8/80.0 (± 11/8)	124.2/77.2 (± 13/9)

Group 1 = Intervention (oats), n = 42.
Group 2 = Control, n = 38.

Mean group difference in body mass index from visit 1 to visit 3 was not significant (Table 4). Average weight change from visit 1 to visit 3 was less than one pound with a slight decrease in Group 1 and increase in Group 2. Blood pressure changes also were not significant (Table 2).

Subgroup analyses explored possible differences in cholesterol response according to baseline median levels of serum total cholesterol, BMI, Keys Score, and sex (data not shown). Greater reductions in total cholesterol were observed among those individuals above the baseline median serum total cholesterol level of 6.34 mmol/L and below the median BMI of 26.17. Men and women in the intervention group experienced similar reductions in serum total cholesterol. In regression analysis to adjust for baseline total cholesterol, sex, BMI, and study group (Table 5), serum total cholesterol at visit 3 was significantly different between the two groups. Changes in serum cholesterol from visit 1 to visit 3 were also significantly different between the two groups, independent of sex, changes in BMI, and the baseline serum cholesterol.

Discussion

In this study, consumption of a moderate amount of instant oats in the daily food pattern fostered blood cholesterol lowering in hyperlipidemic individuals. The data suggest that dietary adaptation to the practice of regularly eating oats potentiates favorable effects on blood total and LDL-cholesterol levels as well as on nutritional status by reducing intake of total fat, saturated fat, and cholesterol without weight gain and improving intake of commonly deficient nutrients, i.e., iron, calcium and vitamin B_6. Participants appear to have, at least in part, substituted oats for other carbohydrate foods isocalorically, rather than simply adding oats to the baseline intake. Proposed mechanisms for the effect of oats relate to soluble fiber's capacity to bind bile acids and interfere with fat absorption, to increase fecal excretion of bile acids affecting hepatic secretion of lipoproteins and to ferment colonic bacteria, thus forming gases and short chain fatty acids and affecting hepatic cholesterol synthesis.[11,17]

Our group has previously reported that in a free living, normolipidemic population, 2 oz. (56 grams) of oatmeal or oat bran led to additional decreases in serum cholesterol of 4.2 to 5.3 mg/dl (adjusted for the reduction in the control group) over what was attributed to dietary fat and cholesterol modification.[18] This finding was confirmed by a follow-up study where the addition of 2 oz. of oatmeal decreased serum cholesterol 4.7 mg/dl more than what was achieved by a fat-modified diet alone.[19] Subgroup analysis further showed greater reductions in participants with higher baseline serum cholesterol levels.[19] Other intervention studies in free-living, hypercholesterolemic individuals have shown that one cup of oat bran plus five oat bran muffins daily (100 grams oat bran) induced a significant decrease in plasma cholesterol.[20]

A review of intervention studies in this area noted that addition of soluble fiber from oats, oat bran, legumes, pectin, guar, or locust bean gums has been reported to reduce plasma total cholesterol by 6–19 percent.[10] Particularly in hypercholesterolemic individuals, addition of oats has been reported to induce total cholesterol and LDL-C reduction.[21,22] The combination of a fat modified diet plus regular intake of oat bran by hyperlipidemic individuals was also shown to be as effective in cholesterol lowering as cholestyramine resin or colestipol with fewer side effects and less cost.[23]

More recently, Swain, *et al,*[24] reported blood cholesterol reductions of 7 to 8 percent in free-living, normolipidemic individuals (baseline mean serum cholesterol of 4.8 mmol/l) who consumed 100 gram supplements of oat bran or wheat cereal over six weeks in a crossover design study. The supplements were consumed in the form of muffins or entrees representing 35.6 percent (oat bran) and 40.8 percent (wheat cereal) of mean caloric intake reported during the two study periods. The authors concluded that isocaloric substitution of either oat bran or wheat for other carbohydrates produced similar blood cholesterol lowering effects in these normolipidemic individuals.[24] It was further suggested that previous studies including similar quantities (100 grams per day or more) of oat bran may have simultaneously induced quantitative and qualitative shifts in fat intake through replacement with oat bran and that these shifts were more directly responsible for

TABLE 3—Mean Group[a] Differences ± Standard Deviations for Serum Lipids

Serum Lipid	V2 – V1 (Baseline—4 weeks) Group 1	Group 2	Net Diff V2 – V1	95% CI	V3 – V1 (Baseline—8 weeks) Group 1	Group 2	Net Diff V3 – V1	95% CI
Total cholesterol mmol/L	−0.28 ± 0.59	−0.07 ± 0.50	0.20	−0.04, 0.45	−0.40 ± 0.55	−0.09 ± 0.43	0.32	0.09, 0.54
LDL-C mmol/L	−0.33 ± 0.68	−0.22 ± 0.42	0.11	−0.14, 0.36	−0.42 ± 0.58	−0.17 ± 0.42	0.25	0.02, 0.48
HDL-C mmol/L	0.07 ± 0.16	0.09 ± 0.19	0.02	−0.06, 0.10	−0.00 ± 0.18	0.04 ± 0.20	0.04	−0.04, 0.13
Triglycerides mmol/L	−0.04 ± 0.56	0.13 ± 0.29	0.17	−0.03, 0.37	0.02 ± 0.52	0.09 ± 0.37	0.07	−0.13, 0.27

[a]Group 1 = Intervention (oats), n = 42,
Group 2 = Control, n = 38.
*p <0.05
**p <0.01

TABLE 4—Baseline[a] Group[b] Means, Standard Deviations and Visit 3 Differences in Nutrient Intake from 3-Day Food Records

Dietary Factor	Baseline Means Group 1	Group 2	Difference V3 – V1 Group 1	Group 2	Difference Group 1 – Group 2
Calories	1909.5 ± 465.0	2007.4 ± 519.0	76.2 ± 537.0	13.9 ± 560.5	62.4
Protein (%kcal)	17.0 ± 3.0	16.0 ± 2.7	−0.90 ± 4.0	−0.03 ± 3.5	−0.9
Carbohydrate (%kcal)	44.6 ± 7.1	44.6 ± 8.2	2.7 ± 7.0	−1.4 ± 7.6	4.00*
Total Fat (%kcal)	36.8 ± 6.6	37.0 ± 6.9	−0.20 ± 7.0	2.8 ± 6.4	−2.9*
SFA (%kcal)	12.6 ± 2.6	12.6 ± 3.0	−0.50 ± 3.0	0.93 ± 3.2	−1.4*
MFA (%kcal)	13.8 ± 2.9	13.6 ± 2.9	0.04 ± 3.3	1.6 ± 2.9	−1.6*
PFA (%kcal)	7.4 ± 2.4	7.8 ± 2.4	0.27 ± 2.7	0.12 ± 2.6	0.2
P:S Ratio	0.61 ± 0.2	0.66 ± 0.3	0.08 ± 0.30	−0.04 ± 0.3	0.1
Keys Score[c]	41.5 ± 9.3	41.1 ± 10.4	−2.4 ± 10.8	3.1 ± 12.3	−5.3*
Sodium (mg)	3235 ± 777	3371 ± 930	284 ± 1085	154 ± 1150	130.0
Cholesterol (mg)	264.8 ± 116.3	284.7 ± 131.5	−8.6 ± 158.9	23.9 ± 176.6	−32.5
Total Fiber (gm)	14.5 ± 5.2	16.0 ± 7.1	3.5 ± 4.8	−0.78 ± 5.6	4.2***
Soluble Fiber (gm)	5.2 ± 1.9	5.5 ± 2.3	1.4 ± 1.8	−0.48 ± 1.9	1.8***
Insoluble Fiber (gm)	8.6 ± 3.5	9.3 ± 4.5	2.2 ± 3.4	−0.07 ± 3.9	2.3**
Alcohol (%kcal)	2.5 ± 4.3	3.4 ± 4.4	0.67 ± 3.3	−1.4 ± 3.7	2.1
BMI (Kg/m^2)	26.2 ± 3.4	26.2 ± 3.8	−0.1 ± 0.56	0.1 ± 0.6	0.2
Thiamin (mg)	1.6 ± 0.7	2.5 ± 3.2	0.7 ± 1.6	−0.4 ± 4.3	1.0
Riboflavin (mg)	1.8 ± 0.9	2.4 ± 2.4	0.3 ± 1.5	0.5 ± 2.4	0.3
Niacin (mg)	21.7 ± 8.3	27.5 ± 22.3	4.9 ± 12.0	−5.1 ± 20.8	10.0**
Folic Acid (mcg)	276.2 ± 153.0	286.9 ± 145.3	167.1 ± 208.6	−17.1 ± 134.6	184.3***
Vitamin B_6 (mg)	1.9 ± 0.9	2.1 ± 1.3	0.6 ± 1.3	−0.3 ± 1.1	0.9**
Vitamin B_{12} (mcg)	6.5 ± 7.2	5.5 ± 3.4	−1.1 ± 7.4	1.9 ± 7.7	2.9
Pantothenic Acid (mcg)	5.2 ± 3.4	6.0 ± 4.8	0.02 ± 3.9	−1.1 ± 4.6	1.1
Calcium (mg)	764.4 ± 385.8	729.2 ± 280.7	172.9 ± 356.3	9.7 ± 250.2	163.2*
Iron (mg)	15.9 ± 8.7	14.7 ± 4.8	11.9 ± 12.7	1.0 ± 6.4	10.9***
Zinc (mg)	12.0 ± 4.5	12.1 ± 7.1	1.2 ± 7.8	0.9 ± 7.6	0.3
Magnesium (mg)	274.8 ± 87.5	291.4 ± 102.6	34.7 ± 96.5	−13.9 ± 107.7	48.6*

[a]Visit 1 = baseline
[b]Group 1 = Intervention (oats), n = 42
Group 2 = Control, n = 38
[c]Keys Score = $1.35 \times (2\Delta S - \Delta P) + 1.5\Delta Z$
Where ΔS is the change in percentage of calories for SFA, ΔP is the change in percentage of calories for PUFA and z is square root of dietary cholesterol in milligrams per 1,000 calories per day.
*p ≤ .05
**p ≤ .01
***p ≤ .001

the observed serum cholesterol reduction than any effect of the oat bran itself. Demark-Wahnefried, *et al,*[25] similarly reported that both fat-modified and oat-bran enhanced diets lowered serum cholesterol by 10–17 percent among free-living, hyperlipidemic individuals (group mean baseline serum cholesterol level was 7.15 mmol/l). Relatively small sample sizes, differences in baseline blood cholesterol levels, differences in dietary assessment methodologies and incomplete nutrient data bases (lacking soluble versus insoluble fiber data) have made meaningful comparisons between such studies difficult.

TABLE 5—Regression Coefficients for Models of Visit 3 Total Serum Cholesterol (mg/dl) and Change in Total Serum Cholesterol (Visit 3 – Visit 1).

Dependent Variable = Visit 3 Total Cholesterol Independent Variable	Coefficient	S.E. Coefficient
Group (0 = Control, 1 = Intervention)	−11.25	4.33
Total Serum Cholesterol Visit 1 (mg/dl)	.85	.07
BMI at Visit 3 (Kg/m^2)	.23	.65
Sex (0 = women, 1 = men)	−3.02	4.42
Dependent Variable = Change in Total Serum Cholesterol (Visit 3 – Visit 1)		
Independent Variable	**Coefficient**	**S.E. Coefficient**
Group (0 = Control, 1 = Intervention)	−9.00	4.26
Total Serum Cholesterol Visit 1 (mg/dl)	−.16	.07
Change in BMI (Visit 3 – Visit 1) (Kg/m^2)	9.05	3.67
Sex (0 = women, 1 = men)	−2.18	4.14

From a public health perspective, perhaps the most important finding common among these studies is that the combined decreased fat and increased carbohydrate approach is practical, feasible, nutritious, and efficacious in lowering blood cholesterol among normolipidemic as well as hyperlipidemic individuals.

The study reported here measured self-imposed changes in dietary behavior and lipid response resulting from daily inclusion of instant oatmeal in the otherwise regular diet of hyperlipidemic men and women. Some of the earliest studies exploring the simple addition of fiber to a usual diet did not report specific dietary changes or displacement invoked when oats were substituted for other possibly high fat foods.[10,20,21,23] A more recent study incorporated large amounts of oats, constituting a major share of the caloric intakes thus limiting the participants capacity for other foods.[24] Documentation of the dietary changes associated with oat intervention serves to more accurately attribute blood cholesterol response to the relevant dietary factors. This study represents an initial attempt to document these changes. Results of nutrient analyses suggest that the recommendation to incorporate oats on a daily basis led to self-initiated changes in dietary fat intake, as well as increased intake of several essential nutrients. These results also illustrate the feasibility of eating moderate amounts of oats daily, without weight gain or side effects reported when greater amounts are consumed.[24] The differences between observed versus predicted blood cholesterol values in the intervention group suggest that the minor changes in dietary lipid intake alone did not completely explain the observed reductions. The instant oats, presumably by increasing soluble fiber intake, and the slight weight loss appear to have contributed to the overall serum cholesterol response. The relatively high drop out rate prior to baseline may have contributed to the imbalance in mean baseline blood cholesterol levels between groups that, although not statistically significant, may have somewhat confounded these results. Intensified intervention aimed at further decrease in intake of total fat, saturated fatty acids and dietary cholesterol, increased carbohydrate and reduction of excess body weight, would predictably further reduce serum cholesterol levels among these individuals.

More research is needed to clarify dose responses and evaluate long term effects of increased soluble fiber intake among hyperlipidemic and normolipidemic individuals. Potential differences in response to such regimens requires further exploration. □

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Calendar for APHA 1991 Policy Development Process

The following schedule has been established for the development of APHA public policy resolutions and position papers in 1991. Full details of the Association's procedures for this activity can be obtained from:

AMERICAN PUBLIC HEALTH ASSOCATION, Attention: Richard Carson, 1015 Fifteenth Street, NW, Washington, DC 20005; (202) 789-5623

March 22 All proposed resolutions and position papers are due at APHA headquarters. They should be sent to the attention of the Joint Policy Committee. Proposals submitted via fax must be followed by hard copy within two days.

May 6–7 The Joint Policy Committee (JPC) meets in Washington to make an initial group assessment on each proposed policy statement. (Between March 22 and May 6, members of four reference committees will review each proposed policy statement. In addition, appropriate section chairpersons, SPIGs, and selected individuals are asked to review related proposed policy statements.)

May 24 All proposed statements are returned to authors with an inital assessment by the JPC.

June 28 Revised policy statements, to be considered by the 1991 Governing Council, must be back at APHA headquarters.

September Proposed policy statements are mailed to all APHA members in *The Nations's Health.* Copies are mailed to members of the Governing Council.

November 10 Annual Meeting—"Late-Breakers"—Submission deadline 6:00 pm (Sunday), for "late-breaking events." The chairpersons of the public hearings will be instructed that only those policy statements which address issues that have arisen between March 22 and the Annual Meeting will be considered as late-breaking events.

November 11 Annual Meeting—Public Hearings are conducted by the Reference Committees.

November 12 Annual Meeting—Joint Policy Committee meets in executive session to develop final recommendations for presentation of proposed resolutions and position papers to the Governing Council on Wednesday.

November 13 Annual Meeting—Governing Council votes on policy.