

TABLE III

Annual Incidence of Congestive Heart Failure According to Age, Sex and Diabetic Status at Each Biennial Examination: 18 Year Follow-Up Study

Diabetic Status	Age 45 to 54 Years			Age 55 to 64 Years			Age 65 to 74 Years		
	Person Years at Risk	New CHF Cases	Incidence CHF per/10,000	Person Years at Risk	New CHF Cases	Incidence CHF per/10,000	Person Years at Risk	New CHF Cases	Incidence CHF per/10,000
Men*									
Nondiabetic	13,696	26	19	9,864	40	41	3,428	20	58
Diabetic	404	2	50	550	3	55	272	6	221
Total	14,100	28	20	10,414	43	41	3,700	26	70
Women*									
Nondiabetic	17,268	8	5	13,156	36	27	4,904	25	57
Diabetic	330	3	91	532	5	94	328	9	274
Total	17,598	11	6	13,688	41	30	5,232	34	65

* Men: For all ages combined difference in incidence is statistically significant at ($P < 0.05$) (chi square 6.50); relative risk 2.4. Women: For all ages combined difference in incidence is statistically significant ($P < 0.01$) (chi square 42.54); relative risk 5.3. Method of Mantel-Haenszel.

Diabetes and congestive heart failure: During the 18 year study, diabetes was present or developed in 141 men and 151 women, allowing 1,226 person years of follow-up experience for men, 1,190 for women. Almost 40 percent of those labeled "diabetic" were treated with insulin. In most of these patients, diabetes was already evident at entry into the study. Another 40 percent were treated with oral hypoglycemic agents and about 20 percent were following a diet only or were receiving no treatment. Examination of the incidence of congestive heart failure according to diabetic status at each biennial examination revealed a distinct excess risk in diabetic subjects of both sexes and at all ages (Table III). The small numbers do not allow accurate age-specific estimates of risk, but for all ages combined, men had a 2.4-fold increased risk and women a 5-fold increased risk (Table IV).

Role of factors leading to atherogenesis and coronary heart disease: Diabetic subjects are generally believed to have higher than average blood pressures, lipid values and relative weights and to manifest coronary heart disease at an accelerated rate. The excess frequency of congestive heart failure in diabetic subjects could derive from these abnormalities, particularly the hypertension⁵ and coronary heart disease. However, an examination of the prevalence of antecedent coronary or rheumatic heart disease in all subjects with congestive heart failure revealed the same proportion of subjects with prior heart disease in the diabetic and nondiabetic groups (Table V). This finding suggests that the increased risk of congestive heart failure in the subjects with diabetes has another cause than accelerated atherogenesis and coronary heart disease although age and severity of coronary disease are not taken into ac-

TABLE IV

Risk of Congestive Heart Failure According to Sex and Diabetic Status at Each Biennial Examination: 18 Year Follow-Up Study

Diabetic Status	Person Years At Risk	Incidence		Relative Risk
		Crude Annual per 10,000	Age- Adjusted* per 10,000	
Men Aged 45 to 74 years				
Nondiabetic	26,988	31.87	32.14	2.36†
Diabetic	1,226	89.72	75.98	
Women Aged 45 to 74 years				
Nondiabetic	35,322	19.53	19.75	5.14‡
Diabetic	1,190	142.85	101.60	

* Indirect method.

† Significant at $P < 0.05$ (chi square = 6.50).

‡ Significant at $P < 0.01$ (chi square = 12.53).

TABLE V

Prevalence of Antecedent Coronary (or Rheumatic) Heart Disease (CHD) Among Patients Aged 45 to 74 Years with Congestive Heart Failure (Diabetic vs. Nondiabetic Subjects): 18 Year Follow-Up Study

	Diabetic Subjects		Nondiabetic Subjects	
	With CHD	Without CHD	With CHD	Without CHD
Men	5	6	54	32
Women	10	7	39	30
Total	15	13	93	62