Numerous studies have been carried out in Spain to determine the importance of viral hepatitis in this country. It has been reported [1] that the percentage of hepatitis B (HBV) carriers is about 1.4%, which places it among the countries with low (≤ 0.9%) and moderate endemicity (2%–9%) [2]. Seroprevalence rates of hepatitis A (HAV) have shown that the incidence of this disease has considerably decreased throughout the last decade [3, 4]. The results obtained in Barcelona on the prevalence of hepatitis C (HCV) in high-risk populations have been recently published [5, 6]. Two control groups were used in these studies: pregnant women and blood donors [5] and a group of patients without liver disease [6]; the percentage of patients who were anti-HCV seropositive was 1.2% and 7.3%, respectively.

Over the last three or four years the mass media of our country have provided extensive coverage on hepatitis B. This has led many SK&F SAE employees to request that they be given the recombinant yeast-derived hepatitis B vaccine marketed by our company. The majority of seroepidemiological studies on hepatitis B which have been carried out in Spain have included very specific subject groups (i.e. patients, blood donors, pregnant women, health care personnel, etc.); very few of these studies have been conducted on healthy individuals taken from the general population. Because of this, it was decided to undertake a seroepidemiological study on hepatitis B in a healthy population made up of the employees of the firms belonging to the SmithKline Beckman (SKB) group in Spain. This study, which not only included the employees of the SKB group but also family currently residing with them, was carried out during a HBV vaccination campaign. Taking advantage of the serum sample obtained for hepatitis B screening, it was also decided to determine the presence of antibodies to HAV and HCV.

### Material and Methods

The companies belonging to the SKB group were Allergan, Beckman, Laboratorios Morrith and SK&F SAE; as this last company has two completely separate divisions, the Pharmaceutical Division and the Animal Health Division, they were considered as different companies. All are health care companies and together had a total of 453 employees. Except for a chemical plant of SK&F SAE in Zaragoza (330 km to the NE of Madrid), all are located in the Autonomous Community of Madrid (ACM) (including two manufacturing plants, one of which is situated in Alcalá de Henares, a city 30 km from Madrid).
The recombinant yeast-derived hepatitis B vaccine is imported as a finished product from Belgium to the SK&F SAE's Pharmaceutical Division's manufacturing plant in Alcalá de Henares, where it does not undergo any type of manipulation. None of the employees of the manufacturing plants manipulate human derived biological products.

The vaccination campaign was carried out during the months of April–June 1989, and 36 meetings of 10–20 employees were held at their workplaces. The meetings consisted of a talk on hepatitis and its prophylaxis, both of which were then discussed by the participants. This was followed by information on the steps to be taken in order to obtain the hepatitis B vaccine. All employees and their cohabitating family members residing in the ACM or Zaragoza were invited to participate.

The services of a private laboratory were hired and two blood sample extraction sites in Madrid and one in Zaragoza were set up for the months of May to July. Those employees and their family members who wished to participate made an appointment by phone to have the blood samples taken. Each sample was divided into three. HBV markers were always determined first, and then HAV and HCV markers. In some cases, either because the sample was smaller than usual due to extraction problems, or because positive HBsAg results were confirmed by another technique, anti-HAV and anti-HCV could not be determined.

After completing a questionnaire, each employee was provided with the doses of the vaccine for all the seronegative members of the family unit. The questionnaire collected the following data: company in which the employee worked and his/her job category, age, sex, family relationship, marker results for each participating volunteer and the total number of cohabitating family members, whether or not they had participated in the study. The job categories included in the questionnaire were: “staff”, which included executives, middle managers and technical personnel; “factory workers”; “administrative personnel”; and “sales force representatives”. These categories were defined according to the employee’s type of work and wage level.

All markers were determined by ELISA: HBsAg, anti-HBs and anti-HBc (Organon Hepagnostika); anti-HAV (IgG; Abbott); and anti-HCV (Ortho Diagnostic Systems). All determinations were performed by the same team.

Before informing a subject of a positive HBsAg result, it was confirmed by RIA (Abbott). Anti-HCV presence in serum was determined by ELISA: anti-HAV (IgG; Abbott); and anti-HCV (Ortho Diagnostic Systems). All determinations were performed by the same team.

As only 24 people worked at the chemical plant in Zaragoza, it was decided, with the aim of preventing any possible bias, to include the data from the participating employees from Zaragoza in the overall analysis of the vaccination campaign and seroepidemiological study, but to exclude them from the remaining analyses which thus only include subjects residing in the ACM.

Statistical analysis: The analysis of results for both the overall population as well as the ACM population was carried out using the percentage comparison t-test. The relationship between age and positive hepatitis A results was analysed using the Pearson correlation test followed by linear regression analysis. Pearson’s Chi-square test was used to assess the homogeneity of the subjects in the various job categories according to sex. The ANOVA and Newman-Keuls tests were used to evaluate the homogeneity of the various groups by age. = 0.05 and = 0.2 were considered significant.

Results

Of the 497 persons (with age ranges of six months to 75 years) included in the study, 443 lived in the ACM and the remaining 54 in Zaragoza. The total number of employees was 453, of which 36.6% (166) participated. The participation rate was significantly higher (p < 0.001) among the employees of the Pharmaceutical Division of SK&F SAE (53.3% of 165) than among the employees of the other four companies of the group (26.5% of 294). The overall participation rate per family unit (no. of participants/no. of family members x 100) was 82.6%, and there were no differences in the participation rates of families in which some member worked in the Pharmaceutical Division and those in which some member worked at one of the other four companies. All employees collected the number of vaccine doses that corresponded to the number of seronegative members of his or her family unit.

Table 1 shows the number of participants and the overall prevalence rate for each type of hepatitis as well as the distribution of markers by sex. The overall rates of hepatitis B, A and C markers were 11.7%, 59.1% and 0.6%, respectively. There were no statistically significant differences according to sex, the company in which the employee worked or the employee’s place of residence (ACM or Zaragoza).

Table 2 shows the prevalence rates for each of the three hepatitis B markers studied. None of the four persons (two in ACM and two in Zaragoza) who were HBsAg-positive reported any known risk factor. The results according to age for hepatitis A and B markers in the population studied in ACM are given in Table 3. The subjects in the age groups 0–9 and 10–19 years had significantly lower prevalence of hepatitis B markers (p < 0.05 for all groups with the exception of the 50–59-year-old group). There was also a statistically significant corre-