

ERMANCIA: Epidemiology of Stroke in Martinique, French West Indies

Part I: Methodology, Incidence, and 30-Day Case Fatality Rate

Didier Smadja, MD; Philippe Cabre, MD; Florence May, MD; Jean-Luc Fanon, MD; Patrick René-Corail, MD; Christophe Riocreux, MD; Jean-Christophe Charpentier, MD; Pierre Fournier, MD; Martine Saint-Vil, MD; Jeannine Ketterlé, MD; and the ERMANCIA Study Group

Background and Purpose—The ERMANCIA (Etude Réalisée en Martinique et Centrée sur l'Incidence de Accidents vasculaires cérébraux) study was designed to provide the first comparable epidemiological data on stroke in a black Caribbean population.

Methods—ERMANCIA was a prospective community-based study performed in Martinique (French West Indies) from June 1, 1998, to May 31, 1999. The black at-risk population was approximately 360 000. Multiple sources were used to identify hospitalized and nonhospitalized patients with first-ever stroke.

Results—Five hundred eighty patients (285 men and 295 women; mean \pm SD age, 71.2 \pm 14 years) suffered from a first-ever in a lifetime stroke, yielding a crude annual incidence of 164/100 000 per year (95% CI, 151 to 177). The rates adjusted by age and sex to the French population (1999 census) and to the European population were 202 (95% CI, 185 to 218) and 151 (95% CI, 139 to 164), respectively. Thirty-eight patients (6.5%) were not hospitalized during the acute phase of the stroke; 92.8% had CT scan. Pathological types of strokes were infarction (79.8%, including 23% of lacunar strokes), intracerebral hemorrhage (14.3%), subarachnoid hemorrhage (3.4%), and undetermined (2.4%). The main risk factors for stroke were hypertension (69.1%) and diabetes (29.5%). The 30-day case fatality rate was 19.3% (15.8% for cerebral infarction and 37.3% for intracerebral hemorrhage).

Conclusions—In Martinique, the ERMANCIA population-based study showed a high stroke incidence and a high prevalence of hypertension and diabetes in the stroke population compared with those observed in continental France. Epidemiological data on stroke in African Caribbeans from Martinique are comparable to those reported in blacks from the United States and United Kingdom. (*Stroke*. 2001;32:2741-2747.)

Key Words: blacks ■ epidemiology ■ hypertension ■ stroke

The epidemiology of stroke in blacks has been studied mainly in the United States and more recently in the United Kingdom. A strong body of data demonstrated higher stroke incidence and higher stroke mortality in US and UK blacks than whites.¹⁻⁵ Thus, stroke is an important contributor to overall higher mortality in African Americans. In addition, extracranial carotid atherosclerosis is far less frequent as a cause of ischemic stroke in blacks, leading to a striking interethnic difference in incidence of carotid endarterectomy in African Americans.⁶ However, many questions remain regarding the basis for racial differences in stroke epidemiology. Obviously, risk factors show higher prevalence in black persons, especially hypertension,^{2,7-9} for which blacks

could have a special genetic predisposition,¹⁰ and diabetes mellitus.⁹⁻¹¹ Other causes, such as social disfavor, racism, or genetic predisposition for stroke, have been suggested.²

By contrast, data on stroke in black populations outside the United States and United Kingdom are still insufficient. Most of the studies from outside these 2 countries do not meet standard criteria for comparative analysis. Indeed, studies are mostly hospital rather than population based, are retrospective rather than prospective, and lack appropriate diagnostic technologies. Notwithstanding these limitations, stroke appears now as a major public health problem in terms of morbidity and mortality in black populations outside the United States and United Kingdom, especially in the Carib-

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From the Departments of Neurology (D.S., P.C., F.M., P.F., M.S.-V.), Geriatrics (J.-L.F.), Rehabilitation (P.R.-C.), and Emergency Medicine (J.K.), University of Fort-de-France, Fort-de-France, Martinique, French West Indies; Méthodologie et Recherche Clinique (J.-C.C.), Reims, France; and Caisse Générale de la Sécurité Sociale de la Martinique (C.R.), Fort-de-France, Martinique, French West Indies.

The members of the ERMANCIA Study Group are listed in the Appendix.

Correspondence to Professor Didier Smadja, MD, Department of Neurology, hôpital Pierre-Zobda-Quitmann, BP 632, 97 261 Fort-de-France Cedex, Martinique, French West Indies. E-mail dsmadja@outremer.com

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bean. In Jamaica¹² and in the French West Indies (FWI), stroke is the leading cause of death in adults and is among the top causes in other Caribbean islands.¹³ In England and Wales, mortality from stroke was highest in the Caribbean natives compared with other black immigrants and natives.¹⁴

Martinique (FWI) is an ideal setting to determine stroke incidence and case fatality rates because it is a small island with a high-density population, wide availability of health services, and easy access to hospitals and to diagnostic technologies, including CT and MRI. Moreover, in Martinique there is an experienced neurological team at the University Hospital of Fort-de-France. A unique opportunity was therefore offered to provide the first epidemiological stroke data in a black Caribbean population. Here we present the first-year results of the community-based ERMANCIA (Etude Réalisée en Martinique et Centrée sur l'Incidence de Accidents vasculaires cérébraux) study.

Subjects and Methods

Study Design

The ERMANCIA study was a community-based epidemiological survey of incidence and outcome of acute cerebrovascular diseases in Martinique, FWI. ERMANCIA was a part of the Martinique Stroke Project, which sought to organize a stroke health network in this island. The methodology of our epidemiological study was based on recent recommendations on this topic.¹⁵

Area of Investigation

Martinique is a French island situated in the Caribbean basin (latitude 14°30' north, longitude 61° west). Its area is 1128 km². The climate is tropical, with an annual average temperature ranging from 22°C to 30°C. The island is flat in the south, with mountains in the north. Until the late 1970s the economy was based only on agriculture, but the ratio of industrial to agricultural activities reversed between 1990 and 1992 as tourism and large businesses developed. This has modified the lifestyle of the population, bringing it closer to that of European countries. For example, availability of water and electricity in a household has increased from 40% to 98% during the last 20 years. Martinique is now the most developed island in the whole Caribbean basin, together with Guadeloupe.

Study Population

The population in Martinique at the 1999 census was 381 364, of which approximately 360 000 were French African Caribbeans (FAC). The remaining 21 000 included French Caucasians, descendants of immigrants from the Indian subcontinent, and non-FAC. FAC are descendants of interracial mating that occurred between French Caucasians and black Africans in the 17th and the 18th centuries. A previous study of HLA antigens estimated the Caucasian admixture in the FAC population to be approximately 30%.¹⁶ The target population of ERMANCIA was limited to FAC. The population is served by 12 public hospitals, including the University Hospital of Fort-de-France and 2 other major general hospitals, 1 small private hospital, 291 general practitioners (GPs), 3 private neurologists, and 2 on-call physician systems. Medical care is free of charge, allowing unrestricted access to high-quality medical services within the acute phase of stroke.

Duration of the Study

The registration of patients began on June 1, 1998, and continued until May 31, 1999. We calculated our at-risk population as sufficient to limit the study to only 1 year.

ERMANCIA Team

A team of investigators was specially constituted for the study, including all the neurologists of the Neurology Department (D.S., P.C., F.M., P.F., M.S.-V.), the geriatrist (J.-L.F.), and the rehabilitation physician (P.R.-C.) from the University Hospital of Fort-de-France. Moreover, 7 other physicians joined the ERMANCIA team for the follow-up part of the study.

Case Ascertainment

All cases of stroke (first-ever in a lifetime and recurrent) occurring during the period study were registered. Any patient who might have had a cerebrovascular event was visited as soon as possible by one of us, whether or not he or she was hospitalized. Symptoms that indicated the possibility of stroke were wide and included dizziness, vertigo, confusion, headaches, transient global amnesia, coma, and transient ischemic attacks (TIA). We used several sources of information inside as well as outside of the hospital, including the following: (1) Admission lists were checked daily in the emergency department of the 3 major hospitals and twice per week in other minor hospitals. (2) Notification was obtained from the GPs. Before the study started, we informed all GPs from Martinique about the aims and the procedures of the registration of the ERMANCIA study via mailings, several meetings throughout the island, and a special booklet including a summary of the protocol and a specific telephone number with a 24-hour telephone-answering device, on which GPs were requested to leave a message. Moreover, during the study an intensified search for nonhospitalized cases was performed over a 1-month period: nearly all the GPs were asked weekly by telephone for new suspected stroke cases that they did not hospitalize. A second 1-month period of intensified research was planned but was finally rejected because of the time-consuming nature of such a procedure. (3) Discharge lists from the 3 major hospitals were screened, in a monthly manner, on the basis of the *International Classification of Diseases, 10th Revision* (codes I-60, 61, 63, 64, 67.0, and 67.9). (4) Death certificates of all residents of Martinique were examined every month. (5) Notification was received from on-call urgent medical services such as "SAMU" or "SOS-médecins." (6) Systematic visits were made to the internal medicine departments of the 3 major hospitals twice per week to avoid missing cases from admission registers.

We attempted to obtain a CT scan within 30 days from stroke onset. We sought to reach a rate of CT scanning of 80% to make our cases suitable for examination of pathological types. When the first CT did not show an appropriate ischemic lesion, we tried to obtain a second scan. In Martinique necropsy is very rarely available because of local tradition; consequently, autopsy diagnosis of stroke was not expected to be a potential significant source. For pathological diagnosis in those cases without a CT in the appropriate time window, because of death or any other reason, we used the Siriraj score, a well-validated clinical scoring system.^{17,18} A special daily stroke clinic was created in the University Hospital. The aim of this consultation was to ascertain doubtful cases from other hospitals or from their residences and also to perform a CT scan and, in some case, certain biological tests. Despite all these procedures, if a patient was not seen by the study group because he or she died rapidly or for any reason, we collected information from relatives, GPs, or hospital forms. Sudden deaths at the subject's domicile were only investigated on the basis of death certificates. Apart from clinical and CT data, a special effort was made to obtain information about vascular risk factors (see Definitions). All clinical and laboratory data were reported on a special form, including personal data, Siriraj score, and Barthel Index score between days 5 and 9 after stroke. We met weekly to discuss each case before the definitive registration of the patient.

Follow-Up

All included cases were followed up prospectively. The date of the eventual death and the suspected cause of death were recorded. Survivors were interviewed by investigators (12, so that each followed a 1-month series of cases) with a structured telephone

questionnaire designed to detect recurrent cerebrovascular and cardiovascular events and to determine the modified Rankin Scale¹⁹ score at 1, 6, and 12 months.

Definitions

According to the World Health Organization criteria, stroke was defined as “rapidly developing clinical symptoms and/or signs of focal and at times global loss of cerebral function, with symptoms lasting more than 24 hours or leading to death, with no apparent cause other than that of vascular.”²⁰ We registered every stroke, but only first-ever in a lifetime strokes were included in the study.¹⁵

Our cases were classified as follows: definite infarction (CT diagnosis); probable infarction (CT not performed within 30 days, Siriraj ≤ 1); definite intracerebral hemorrhage (CT diagnosis); probable intracerebral hemorrhage (CT not performed within 30 days, Siriraj > 1); definite subarachnoid hemorrhage (CT and/or lumbar puncture diagnosis); probable subarachnoid hemorrhage (CT and lumbar puncture not available, typical clinical presentation); and undetermined type (CT not done within 30 days, Siriraj score not available or between -1 and 1). Definite and probable infarctions were further subdivided according to the Oxfordshire Community Stroke Project (OCSP) classification²¹ into 4 subtypes: total anterior circulation infarction, partial anterior circulation infarction, lacunar infarction, and posterior circulation infarction. This classification had a clinical basis, but a reallocation by CT scan was done every time that it was needed.

For further comparison with other epidemiological studies, definitions of risk factors for stroke were deliberately conservative. Hypertension was defined as known hypertension with antihypertensive therapy (the number of drugs was recorded) or systolic blood pressure > 160 mm Hg and/or diastolic blood pressure > 90 mm Hg on 2 different occasions, the second one > 1 week after stroke. Diabetes mellitus was diagnosed in patients with previously treated diabetes or in patients with fasting blood glucose concentration > 9 mmol/L. Hypercholesterolemia was diagnosed in patients with previously treated hypercholesterolemia or in patients with a fasting cholesterol serum concentration > 6.5 mmol/L. For glucose as well as cholesterol, a high level at admission had to be confirmed by a second measure > 1 week after stroke. Smoking was defined as a cumulative consumption > 10 pack-years. Alcohol abuse was diagnosed when the patient had a daily consumption > 120 g. Atrial fibrillation was diagnosed when present on a standard 12-lead ECG. Peripheral arterial disease was recorded on the basis of a history of intermittent claudication or previous arterial intervention or Doppler ultrasonography documentation. Coronary heart disease was defined as history of acute myocardial infarction or angina pectoris.

Statistical Methods

Sex- and age-specific incident rates were adjusted to the French population in 1999 by the direct method, and the comparison with different studies was performed by direct standardization to the European and world populations.²²

Assumption of normal distribution of the data was analyzed by the Shapiro and Wilk test and by the kurtosis and skewness standardized coefficients. Underlying assumptions of each statistical procedure were tested, and the following tests were used: χ^2 test, Fisher's exact test, and Mann-Whitney *U* test.

SAS version 6.12 was used for all descriptive and inferential analyses. All inferential analyses were performed by means of a 2-sided test, with a level of significance of 5%.

Ethics

Written consent was provided by patients or next of kin. The ERMANCIA study has been approved by the Ethics Committee of Martinique and by the *Comité consultatif sur le traitement de l'information en matière de recherche dans le domaine de la recherche* from the Ministry of Research.

Results

On the whole, the Martinican population is younger than the French population: 12.3% of the Martinican population is aged > 65 years compared with 15.8% of the continental French population (1999 census).

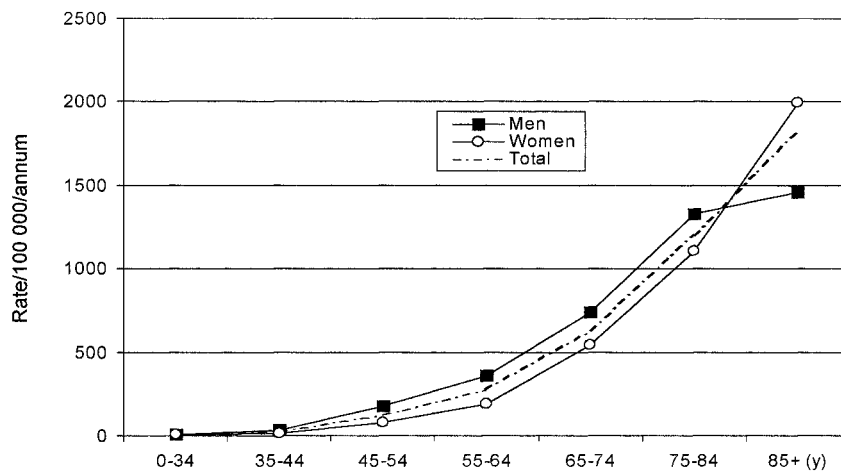
A total of 973 patients with suspected stroke or TIA were notified to the study. After clinical assessment by a study investigator, 393 of 973 cases were excluded: 135 for recurrent stroke (representing 18.9% of all stroke patients) and 258 for nonvascular cerebral pathology, including focal epilepsy ($n=78$; 30.2%), TIA ($n=50$; 19.2%), metabolic encephalopathy ($n=24$; 9.4%), subdural hematoma or intracerebral tumor or abscess ($n=10$; 3.9%), and other causes ($n=76$; 29%).

Finally, 580 of 973 cases were considered as having a first-ever stroke during the study period. The median delay of description of these cases was 1 day (range, 0 to 460 days). Distribution according to the source of referral was as follows: hospital admission register searches, 72.1%; systematic visits of the internal medicine departments by investigators, 13.9%; GP notifications, 6%; on-call urgent medical services notifications, 2.2%; other sources, 0.4%; and ≥ 2 sources, 5.4%. Five hundred thirty subjects (91.4%) were seen by investigators, with a median delay of 3 days (range, 0 to 210 days). Twenty-nine patients died before the study physician's examination.

Among the 580 first-ever stroke patients, 295 were women, and 285 were men. Mean \pm SD age of these patients was 71.2 ± 14 years, with a range of 3 to 106 years. Women were older than men (74.5 ± 14 versus 67.9 ± 14 years; $P=0.0005$). A total of 418 patients (72%) were aged ≥ 65 years. The crude annual incidence of first-ever stroke was 164/100 000 persons per year (95% CI, 151 to 177), with a rate of 170 (95% CI, 150 to 190) for men and of 159 (95% CI, 141 to 177) for women. The rates adjusted by age and sex to the 1999 population of continental France and to the population of Europe were 202 (95% CI, 185 to 218) and 151 (95% CI, 139 to 164), respectively. The age- and sex-specific incidence rates for first-ever stroke are shown in the Figure and detailed in Table 1. As expected, the rate increased constantly by each decade in men and women, reaching almost 2000/100 000 in patients aged ≥ 85 years.

Thirty-eight patients (6.5%) were not admitted to the hospital during the acute phase of their stroke, mostly because of advanced age. The 1-month period of intensified nonhospitalized case finding yielded only 3 cases, no more than during the rest of the study (35 cases for the 11 remaining months). Among the 542 hospitalized patients, 361 (66.6%) were admitted to the University Hospital of Fort-de-France, 156 (28.8%) to the 2 other major hospitals, and the remaining 25 (4.6%) to the 8 local hospitals. The median delay from onset of symptoms to admission was 1 day (range, 0 to 21 days). Only 114 patients (21%) were hospitalized in the Neurology Department.

Five hundred thirty-eight patients (92.8%) had a CT scan within 30 days from the stroke. The main reason for not obtaining a CT scan in the 42 remaining patients was rapidity of death ($n=29$). As expected, no necropsy supporting the diagnosis of stroke was performed. There was no case of



Age- and sex-specific incidences rates for first-ever stroke in the ERMANCIA study (n=580).

subarachnoid hemorrhage that had needed a lumbar puncture because of a negative CT scan. One hundred one patients had a second CT. The pathological classification of first-ever stroke is shown in Table 2. Cerebral infarction was diagnosed in approximately 80% of the cases. A coexisting asymptomatic lesion was observed at CT scan in 183 cases (34%), including 101 with lacunes, 87 with leukoaraiosis, and 31 with silent infarct. Classification of cerebral infarcts is detailed in Table 3. TIA preceding cerebral infarction was present in 30 (6.5%), not present in 310 (67%), and undetermined in 123 (26.5%).

Table 4 shows the prevalence of traditional risk factors according to the pathological type of stroke. Hypertension was diagnosed in 401 patients (69.1%), including 92 without treatment in the prestroke period, and diabetes mellitus in 171 (29.5%). The low prevalence of smoking, hypercholesterolemia, and coronary heart disease was noteworthy. Women more frequently had hypertension, diabetes mellitus, and peripheral arterial disease (Table 5). There was no significant association between OSCP ischemic subtypes and risk factors for stroke, except for atrial fibrillation, which was more frequent in total anterior circulation functions (20%) than in lacunar infarctions (6%).

At 30-day follow-up, 112 patients (19.3%) had died. The case fatality rate was 15.8% for cerebral infarction, 37.3% for intracerebral hemorrhage, 25% for subarachnoid hemorrhage, and 21.4% for undetermined stroke.

Discussion

The ERMANCIA study provides the first strong epidemiological data on a black population in the Caribbean. Because ERMANCIA is a prospective, population-based study that fulfilled most of the standard recommended criteria, it allowed an accurate measurement of incidence and case-fatality rates and good information on risk factors of stroke. Only very few studies meeting some of the standard criteria have been performed in non-US/UK black populations.²³

In the biracial cohort studies available, incidence of stroke has been consistently higher in blacks than whites. In the National Health and Nutrition Examination Survey I Epidemiologic Follow-Up Study,²⁴ blacks were found to suffer higher rates of stroke incidence than whites during a follow-up period from 1971–1975 to 1987. At 10 years, the age-adjusted relative risk was 1.8 in women and 1.3 in men. In the Greater Cincinnati/Northern Kentucky Stroke Study,²⁵ the adjusted incidence rate for first-ever hospitalized or autopsied stroke among blacks was 288/100 000 compared with 179/100 000 in whites in Rochester, Minn, a few years before.²⁶ In a prospective population-based study conducted in northern Manhattan, the adjusted-incidence rate was 223/100 000 for blacks, 196/100 000 for Hispanics, and 93/100 000 for whites.²⁷ In southern London, the adjusted incidence ratio of blacks to whites was 2.3, with an age-adjusted incidence rate of 256 per 100 000 blacks.⁵ US blacks have greater incidence rates for every stroke subtype, with the likely exception of cerebral infarction due to extracranial

TABLE 1. Average Age- and Sex-Specific Incidence Rates (per 100 000) for First-Ever Stroke

Age Group, y	Women			Men			All		
	No. of Cases	Rate	95% CI	No. of Cases	Rate	95% CI	No. of Cases	Rate	95% CI
0–34	6	7	1–12	8	9	3–15	14	8	4–12
35–44	4	13	1–26	9	34	12–56	13	23	10–35
45–54	17	76	40–113	34	179	119–239	51	124	90–157
55–64	31	193	125–261	51	362	262–461	82	272	213–331
65–74	72	543	417–668	80	738	576–900	152	630	530–731
75–84	91	1103	876–1330	77	1328	1031–1624	168	1196	1015–1377
≥85	74	1995	1540–2449	26	1457	897–2017	100	1820	1463–2177
Total	295	159	141–177	285	170	150–190	580	164	151–177

TABLE 2. Pathological Classification of 580 First-Ever Strokes

	Infarction	Intracerebral Hemorrhage	Subarachnoid Hemorrhage	Undetermined
No. of definite cases	444	74	20	14
No. of probable cases	19	9	...	
Total	463 (79.8%)	83 (14.3%)	20 (3.4%)	14 (2.4%)

carotid artery occlusion. Data on stroke in blacks outside the United States and United Kingdom are sparse but indicate that stroke is now common in sub-Saharan Africans,^{23,28} while it is a major cause of death in people in the Caribbean islands. Transformation from a rural lifestyle to an urbanized and industrial pattern in these populations is clearly associated with higher prevalence of overweight, hypertension,²⁹ and probably stroke.

The Martinique population is engaging in a rapid westernization of lifestyle and could be in a position to increase the magnitude of the stroke burden. Our study confirmed the expected high incidence of stroke in this black Caribbean population. The rate adjusted to the European population in our study (151/100 000) is high compared with that of continental France (100/100 000).³⁰ However, such comparison is not as valid as one from a biracial cohort because these 2 populations differ not only in ethnicity but also in a number of environmental factors, including climate, alimentation, and cultural customs. If we nevertheless use French data as the baseline category, the adjusted incidence rate ratio of Martinican to French is 1.6. This excess incidence of stroke in blacks from Martinique appears very similar to those in blacks from the United States and United Kingdom.

Moreover, an underestimation of incidence rate in our study may be anticipated for several reasons. First, we cannot assume that all nonhospitalized cases were detected because of the very low rate of such cases (6.5%). The proportion of all strokes not admitted to the hospital varied widely in population-based studies, from 40% to 5% or less.¹⁵ However, the intensified search for nonhospitalized cases in a 1-month period was not profitable, and a high rate of hospitalization is consistent with the French practice in the matter of stroke.³¹ Second, the absence of subarachnoid hemorrhage cases who died rapidly at home, which was 16% in a recent study from the United Kingdom,³² is intriguing and suggests that such cases did not undergo the death certificate search. On the other hand, the rate of stroke incidence increased constantly with increasing age, even at age ≥ 85 years, which is characteristic of an "ideal" study of

stroke epidemiology, with only a few missing cases that do not influence the overall results.

Although not strictly comparable because of methodological discrepancies, studies performed in African American (Cincinnati and Manhattan) and in UK blacks (south London) yielded higher incidence rates of stroke than ours. However, in the future the incidence of stroke in black populations outside the United States/United Kingdom, particularly in African Caribbeans, could approach and even surpass the rates among US/UK blacks because of the progression of westernization in these countries.³³ To assess this forecast, of particular interest would be a regular survey of the stroke incidence rate in Martinique in the next decades.

The potential causes of excess incidence of stroke in blacks include an excess of risk factors such as hypertension, diabetes, and smoking; low access to medical care; and measures of health or racial predisposition. The relatively high incidence rate of first-ever stroke in black Martinicans cannot be ascribed to low access to medical care, and the hypothesis of a racial predisposition to stroke was not assessed from our monoracial population study. On the other hand, risk factors for stroke, especially hypertension and to a lesser degree diabetes, were likely to have a major role as promoters of a high overall stroke incidence. Hypertension was a contributing factor in approximately 70% of strokes, and diabetes was a contributing factor in 30%. These figures are very similar to those observed in black stroke subjects from south London and the United States. Interestingly, our study demonstrates a higher frequency of hypertension and diabetes in women than in men in the stroke population. We suggest that this ratio may be correlated with overweight, a contributing factor to hypertension and diabetes, which is a striking emergent problem in Martinican women.

Some studies suggest that intracerebral hemorrhages and lacunar strokes are more common in blacks than in whites, mostly because of the high prevalence of hypertension in the

TABLE 3. Classification of Cerebral Infarction (n=463)

Subgroup of Infarction	No. of Cases
Total anterior circulation infarction	67 (14.5%)
Partial anterior circulation infarction	208 (44.9%)
Lacunar infarction	107 (23.1%)
Posterior circulation infarction	62 (13.4%)
Multiple arterial infarction	9 (2%)
Cerebral venous thrombosis	3 (0.6%)
Undetermined	7 (1.5%)

TABLE 4. Frequency of Risk Factors in the 2 Main Pathological Types of Stroke (n=543)

Cerebrovascular Risk Factor	Cerebral Infarctions (n=463)	Intracerebral Hemorrhages (n=83)
Hypertension	71.2%	68.7%
Diabetes	31.8%	24.1%
Hypercholesterolemia	12.6%	8.4%
Smoking	7.9%	3.6%
Atrial Fibrillation	15.1%	3.6%
Peripheral arterial disease	14.4%	4.8%
Coronary heart disease	6.1%	3.6%
Alcohol abuse	12.2%	21.7%

TABLE 5. Frequency of Risk Factors by Sex (n=580)

	Men (n=285)	Women (n=295)	P
Hypertension	64.8%	76%	0.003
Diabetes	22.4%	37.5%	<0.0001
Hypercholesterolemia	9.6%	13.9%	0.11
Smoking	14.2%	...	<0.0001
Atrial fibrillation	12.5%	14.6%	0.46
Alcohol abuse	25.3%	4.2%	<0.0001
Peripheral arterial disease	9.6%	17%	0.009
Coronary heart disease	4.6%	6.9%	0.24

former. In our study the main stroke type was cerebral infarction, which accounted for 80% of all strokes, including 23% of lacunar strokes, whereas the intracerebral hemorrhage frequency was approximately 14%. As in the biracial cohort of south London, our study showed only a slight trend toward higher prevalence of intracerebral hemorrhage and lacunar strokes compared with the white stroke cohort from Dijon, France.^{30,31} Our results are in agreement with the recent demonstration that cerebrovascular risk factors have little influence not only on pathological distribution of strokes but also on subtype distribution of ischemic strokes according to the OCSF classification.⁹

Case fatality at 30 days was 19.3%, which is comparable to rates reported in other centers including black subjects.^{5,34} This figure provides some evidence that the high mortality as a result of stroke in Martinique is due to excess incidence rather than case fatality.

In summary, the first-year results from ERMANCIA show a relatively high incidence of stroke in Martinique, FWI, and a high prevalence of hypertension and diabetes in the stroke population compared with data from Dijon, France. Our results are comparable to those from other black subjects in the United States and United Kingdom, although the overall incidence rate is lower in Martinique. The rapid westernization of the Martinican population for the last decades is hypothesized as the causative factor for the increase in hypertension and diabetes. There is a need to plan effective prevention to avoid more devastating neurological consequences of these cerebrovascular risk factors in the future.

Appendix

The members of the ERMANCIA Study Group were as follows: J. Barnay-Montézume, R. Bellance, P. Cabre, C. Chatot-Henry, S. Cirille, C. Delaunay, J.N. Drault, J-L. Fanon, P. Fourmerie, M.A. François, S. Kaidomar, J. Ketterlé, J.R. Longhi, F. May, H. Medahou, V. Moravie, P. Numéric, P. Olive, G. Panelatti, C. Ramialison, M. Raynaud, P. René-Corail, G. Ribier, A. Ridarch, M. Saint-Vil, D. Smadja, L. Thomas (University Hospital of Fort-de-France); A. Antoine, M. Baubrun-Diant, J.M. Delord, D. Fagnano, A. Ranlin, S. Ribal, B. Tyburn (General Hospital of Lamentin); E. Florent, G. Gervaise, M. Juston, L.R. Luccin, L. Lin (General Hospital of Trinité); M. Jannot, R. Saint-Olympe, F. Thomas (Hospital of Lorrain); J. Ludon, C. Calixte-Rouvel (Hospital of Marin); P. Constant-Desportes, R. Fardin (Hospital of Saint-Esprit); J. Léti, Y. Séraline (Hospital of Saint-Joseph); J.M. Party (Hospital of Saint-Pierre); M. Camy, H. Cazin, G. Edouard-Alivon, A. Miccoulloud, P. Peyre-Costa, A. Ray, C. Riocreux, J.P. Thomasset, L. Trévidic (Contrôle médical de la Caisse Générale de Sécurité Sociale de la

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