European Journal of Ophthalmology / Vol. 15 no. 3, 2005 / pp. 392-399

Visual phenotype of multiple sclerosis in the Afro-Caribbean population and the influence of migration to metropolitan France

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PURPOSE. To describe the visual phenotype of multiple sclerosis (MS) in the Afro-Caribbean population living in Martinique (French West Indies) and to specify the influence of the migration to metropolitan France on ocular impairment.
DESIGN. Prospective consecutive observational case series.
METHODS. A complete ophthalmologic examination was performed.
Participants. A total of 112 patients of Afro-Caribbean origin with MS satisfying McDonald's diagnostic criteria, divided into 53 cases (47.3%), the non-migrant patients (group NM), who had never left the Caribbean basin, and 59 cases (52.7%), the migrant patients (group M), who had lived in metropolitan France for at least 1 year before age 15.
RESULTS. MS first manifested as an impairment of the optic nerve in 41 cases (36.6%): 25 cases (47.1%) in group NM and 16 cases (27.1%) in group M. Visual function was recovered in 13/25 cases (52%) in group NM compared to 13/16 cases (81%) in group M. Two-thirds of patients presented with a clinical ocular impairment, which was bilateral in 58.5% of cases in group NM. Fourteen cases (12.5%) met the criteria of neuromyelitis optica, nine cases (17%) in group NM and five cases (8.5%) in group M. In group NM, when the initial visual attack did not regress, the visual Expanded Disability Status Scale (EDSS) score was 5±1.5 ; 75% of patients had monocular blindness and 50% binocular.
CONCLUSIONS. In the non-migrants (group NM), MS manifested more frequently with an optical neuropathy, the ocular impairment was more severe, and corresponded to neuromyelitis optica in 17% of the cases; a visual presentation and the absence of complete recovery from the first attack represented a factor of poor prognosis. This series is the largest description of the visual phenotype of MS in patients of African origin. The results confirm the preferential impairment of the optic nerve in the black population in the course of the disease. The migration towards an area of high prevalence of MS influences the visual phenotype in terms of a lower incidence and less severe prognosis of ocular impairment. (Eur J Ophthalmol 2005; 15: 392-9)

KEY WORDS. Afro-Caribbean population, Blacks, Optic neuritis, Multiple sclerosis, Neuromyelitis optica, Migration

Accepted: November 22, 2004

1120-6721/392-08$15.00/0

INTRODUCTION

Visual impairment from multiple sclerosis (MS) has been widely documented in the white population (1). It is not as well known in black and Asian populations due to the rarity of the disease in the affected countries (2, 3). However, the limited information available seems to indicate that impairment is more severe in both black and Japanese subjects than in whites (4, 5). The unequal global distribution of MS is associated with genetic and environmental factors. Genetic susceptibility to MS is clearly established on the basis of several parameters: the female predominance of the condition, the frequency of the hereditary forms estimated at 5% (6), the risk of concordant pairs in relation to the higher disease rate in monozygotic twins than dizygotic twins (7), and finally, a significant association between the antigens of the major histocompatibility complex HLA-DRB1 1501 and HLA-DQB1 0602 (8, 9).

The influence of an environmental factor linked to latitude has also been implicated based on the study of migrant populations. Subjects emigrating after the age of 15 retain the risk of acquiring MS from the country of origin, whereas subjects emigrating before the age of 15 acquire the risk from the host country (10-12).

Martinique is an island in the French West Indies situated in the middle of the arch of the Lesser West Indies at a latitude of 14°36 north and a longitude of 62°34 west. The Martinican population (381,500 inhabitants) essentially comes from the inter-racial mixing of the Amerindian, black, white, and Indian populations that have occupied it over the centuries. Whites comprise between 8 and 10% of the total population. Martinique is now located in a tropical zone of medium prevalence of MS because of a pronounced increase in the past 20 years of a return of Martinicans back to their island after having spent their childhood in metropolitan France, which is an area of high MS prevalence (13). Thus, subjects who have acquired the disease in these two zones with very different prevalences live alongside each other. These special conditions allow a study to be carried out on the possible influence of the environment on the phenotype; in this case our study will be based on the visual side of the symptoms of MS. As the number of cases has increased over the past several years, the actual population affected by this disease makes this type of study feasible.

PATIENTS AND METHODS

This clinical study was conducted in a prospective manner from January 1, 1993, to December 31, 2002, at the University Hospital Centre of Fort de France in Martinique. It consisted of a consecutive series of 112 patients of Afro-Caribbean origin with MS satisfying McDonald's diagnostic criteria (14). The patients of white origin were not included. The patients were classified into two groups: a non-migrant group (group NM), with 53 enrolled patients (47.3%) who had never left Martinique or the Caribbean basin, and a migrant group (group M), with 59 enrolled patients (52.7%) who had lived in metropolitan France for at least 1 year before the age of 15. For each patient, the following data were noted: the age on December 31, 2002, the year of the onset of MS, the age at the onset of the disease, time elapsed since the onset of

TABLE I - TOTAL POPULATION AND COMPARISON BETWEEN NON-MIGRANTS AND MIGRANTS - GENERAL CHARACTERISTICS

	Total, n = 112	**Non-migrants, n = 53**	**Migrants, n = 59**	**p value**
Mean age, yr, ±SD	42±11.3	40.7±12.17	43.2±10.4	0.19 NS
Male: female ratio	0.19 (18 M/94 F)	0.15 (7 M/46 F)	0.22 (11 M/48 F)	0.43 NS
Year of onset, ±SD	1993±7.8	1993±8.6	1993±7	0.75 NS
Age at onset, yr, mean ±SD	31.5±10.25	30.3±10.8	32.6±9.7	0.25 NS
Average duration of disease course, yr, mean ±SD	9.8±7.8	9.6±8.5	10±7	0.46 NS
Relapsing remitting, n (%)	85 (75.9)	41 (77.3)	44 (74.6)	0.09 NS
Secondary progressive, n (%)	19 (17)	11 (20.7)	8 (13.6)	0.09 NS
Primary progressive, n (%)	8 (7.1)	1 (2)	7 (11.8)	0.09 NS
Overall EDSS, mean ±SD	4.2±2.5	5±2.7	3.5±2.1	0.008
Overall EDSS≥6, n (%)	44 (39.2)	27 (51)	17 (28.8)	0.017

EDSS = Expanded Disability Status Scale, NS = Not significant

MS, the progressive form (relapsing-remitting, secondary progressive, primary progressive), and the overall score of the handicap according to the Expanded Disability Status Scale (EDSS), ranging from 0 to 10 (15). The examining ophthalmologists were not aware of whether the patient had a short-term stay in metropolitan France. The ophthalmologic examination was carried out at least 6 months after the last ocular attack. When MS manifested in the form of an impairment of the optic nerve, we noted after 6 months if the symptoms had regressed. The ophthalmologic exploration specifies the ocular history and looks for an afferent pupillary defect. It includes a determination of the best-corrected visual acuity, a biomicroscopic examination of the anterior and posterior segment, and an investigation for oculomotor injuries. The visual field was read with the help of an automatic perimeter (Humphrey II 730). An abnormal visual field was defined as one with a central, centrocecal, fascicular, or diffuse deficiency. The saturated Farnsworth 15 Hue test was used to check for dyschromatopsia. The visual evoked potentials (Sereme Spectral) were obtained after stimulation by dark squares (squares of 10' to 60', 40 passages in 1 second). The results of the visual evoked potentials (VEP) were considered abnormal when the latency of P100 was measured over 110 msec and/or when there was a difference of 7 msec between the two P110. The visual handicap was classified according to the EDSS scale of visual function from 0 to 6 (15). The diagnosis of neuromyelitis optica was retained according to the diagnostic criteria proposed by Wingerchuk et al (16). The data analysis was carried out in a strictly anonymous computerized manner. The statistical analysis used the following tests: chi-square for frequency comparisons, chi-square with Yates correction for small enrollment, and Student t-test for the comparison of means.

Because the Martinican population is inter-racially mixed, we tried to assess if the subjects who migrated to metropolitan France presented a higher degree of racial mixing than the subjects who had always lived in Martinique, which could introduce a genetic bias in the comparison of the characteristics of the two populations. It is established that the ABO and Rhesus blood groups differ significantly between the populations of African origin and those of white European. Therefore, a survey was carried out with a sample of 800 Martinicans aged 15 to 64, representative of the Martinican population according to the

TABLE II - TOTAL POPULATION AND COMPARISON BETWEEN NON-MIGRANTS AND MIGRANTS

	Total, n = 112	**Non-migrants, n = 53**	**Migrants, n = 59**	**p value**
Visual presentation, n (%)	41 (36.6)	25 (47.1)	16 (27.1)	0.028
Regression of the 1st attack, n (%)	26/41 (63.4)	13/25 (52)	13/16 (81)	0.04
History of retrobulbar optic neuritis, n (%)	57 (50.9)	31 (58.5)	26 (44.1)	0.13 NS
History of papillitis, n (%)	7 (6.25)	6 (11.3)	1 (1.7)	0.036
Average visual acuity, mean±SD	20/25±20/70	20/30±20/70	20/25±20/125	0.006
Blindness 1 eye, n (%)	15 (13.4)	12 (22.6)	3 (5.1)	0.006
Blindness 2 eyes, n (%)	7 (6.3)	7 (13.2)	0	0.004
Optical atrophy 1 eye, n (%)	32 (28.6)	20 (37.8)	12 (20.3)	0.04
Optical atrophy 2 eyes, n (%)	15 (13.4)	11 (20.8)	4 (6.8)	0.03
Abnormal visual field 1 eye, n (%)	57/103 (55.3)	29/50 (58)	28/53 (52.8)	0.59 NS
Abnormal visual field 2 eyes, n (%)	34/103 (33)	21/50 (42)	13/53 (24.5)	0.06 NS
Abnormal color vision 1 eye, n (%)	39/103 (37.9)	20/50 (40)	19/53 (35.8)	0.66 NS
Abnormal color vision 2 eyes, n (%)	29/103 (28.2)	17/50 (34)	12/53 (22.6)	0.2 NS
P100: average value (ms), mean±SD	122.6±31	133.2±33.1	114.6±26.8	0.001
Abnormal VEP 1 eye, n (%)	71/98 (72.4)	35/44 (79.5)	36/54 (66.6)	0.15 NS
Abnormal VEP 2 eyes, n (%)	49/98 (50)	29/44 (65.9)	20/54 (37)	0.004
Visual EDSS, mean ±SD	1.46±1.8	2±2.2	0.95±1.3	0.005
Clinical visual impairment, n (%)	74 (66.1)	38 (71.7)	36 (61)	0.23 NS
Bilateral clinical visual impairment, n (%)	54 (48)	31 (58.5)	23 (39)	0.04
Clinical and infraclinical visual impairment, n (%)	90/105 (85.7)	44/49 (89.8)	46/56 (82)	0.26 NS
Bilateral clinical and infraclinical visual impairment, n (%)	70/101 (69.3)	36/45 (80)	34/56 (60.7)	0.03
Neuromyelitis optica, n (%)	14 (12.5)	9 (17)	5 (8.5)	0.17 NS

NS = Not significant; VEP = Visual evoked potentials; EDSS = Expanded Disability Status Scale

criteria of age, sex, socioprofessional categories, and place of residence, taking into account residence in metropolitan France before the age of 15 and the blood group (75% of responses). The results of this study show an identical distribution (p>0.05) of the blood groups O+, A+, B+, O-, AB+, B-, A- in the population having lived in metropolitan France (respectively: 51%, 20%, 16%, 5%, 4%, 4%, and 0%) and in the West Indian population having always resided in the Caribbean basin (respectively: 54%, 22%, 14%, 3%, 5%, 1%, and 1%). This demonstrates a genetic homogeneity between the migrants and non-migrants.

RESULTS

The total population studied is made up of 112 cases of MS. Table I displays the general characteristics of the total population and of the two groups studied. Group NM is composed of 53 patients (46 women and 7 men), the average age is 40.7±12.17 years, the average age at onset of illness is 30.3±10.8 years, the average duration of disease course is 9.6±8.5 years, and the overall EDSS score is 5±2.7. Group M is composed of 59 patients (48 women and 11 men), the average age is 43.2±10.4 years, the average age at disease onset is 32.6±9.7 years, the average duration of disease course is 10±7 years, and the overall EDSS score is 3.5±2.5. On average, MS manifested in 1993. There is no significant difference between the average age, sex ratio, age at MS onset, duration of disease course, and the distribution of progressive clinical forms. The number of patients where the handicap is severe enough to alter everyday activities (EDSS≥6) is 44 (39.2%): 27 (51%) in Group NM and 17 (28.8%) in Group M.

Table II displays the results of the different visual parameters. MS manifested as an impairment of the optic nerve in 41 cases (36.6%): 25 cases (47.1%) in group NM and 16 cases (27.1%) in group M (p=0.028). Visual function was recovered after the first attack in 13/25 cases (52%) in group NM compared to 13/16 cases (81%) in group M (p=0.04). The incidence of at least one episode of papillitis was noted in 6 cases (11.3%) in group NM and in 1 case (1.7%) in group M (p = 0.036). The history of retrobulbar optic neuritis was also more frequently observed in the non-migrants (58.5%/44.1%). The history-taking, symptomatology, clinical examination, and com-

TABLE III - INFLUENCE OF VISUAL PRESENTATION ON THE OVERALL AND VISUAL PROGNOSIS

	Visual presentation: yes	**Visual presentation: no**	**p value**
	Total population (n = 112)		
Overall EDSS, mean±SD	4.87±2.7	3.85±2.3	0.08 NS
Visual EDSS, mean±SD	2.65±2.2	0.77±1.1	0.00000
Blindness 1 eye, n (%)	12/41 (29.2)	3/71 (4.2)	0.0001
Blindness 2 eyes, n (%)	7/41 (17)	0	0.0006
Neuromyelitis optica, n (%)	12/41 (29.2)	2/71 (2.8)	0.00004
	Non-migrants (n = 53)		
Overall EDSS, mean±SD	5.2±2.9	4.71±2.6	0.6 NS
Visual EDSS, mean±SD	3.2±2.2	0.96±1.3	0.00007
Blindness 1 eye, n (%)	10/25 (40)	2/28 (7.1)	0.004
Blindness 2 eyes, n (%)	7/25 (28)	0	0.003
Neuromyelitis optica, n (%)	8/25 (32)	1/28 (3.6)	0.007
	Migrants (n = 59)		
Overall EDSS, mean±SD	4.31±2.4	3.3±1.9	0.18 NS
Visual EDSS, mean±SD	1.75±1.9	0.65±0.8	0.01
Blindness 1 eye, n (%)	2/16 (12.5)	1/43 (2.3)	0.17
Blindness 2 eyes, n (%)	0	0	—
Neuromyelitis optica, n (%)	4/16 (25)	1/43 (2.3)	0.01

EDSS = Expanded Disability Status Scale; NS = Not significant

plementary examinations allowed us to rule out other causes of optical neuropathies: hereditary, infectious, vascular, linked to general illness, toxic, or caused by deficiencies. Two cases of chronic progressive retrobulbar optic neuritis appear in group NM. The average visual acuity is lower in group NM (20/30±20/70) than in group M (20/25±20/125) (p=0.006). The number of patients presenting unilateral or bilateral blindness (visual acuity inferior or equal to 20/200) is greater in group NM than in group M, 12 cases (22.6%) versus 3 cases (5.1%) (p=0.006) and 7 cases (13.2%) versus 0 (p=0.004), respectively. The observation of optical atrophy in the examination of the back of the eye, the campimetric deterioration, and the dyschromatopsia of the red-green axis are also more common in group NM. Two cases of intermediate uveitis and one case of retinal periphlebitis were observed in group NM. The average value of P100 latency was calculated from 98 recordings because it could not be measured in the 14 blind patients. The average value of P100 latency is more elongated in group NM, 133.2±33.1 msec, than in group M, 114.6±26.8 msec (p=0.001). The visual EDSS score is higher in group NM, 2±2.2, than in group M, 0.95±1.3 (p=0.005). Nearly two-thirds of the patients present with a clinical visual impairment: 74 cases (66.1%) in the total population, 38 cases (71.7%) in the group of non-migrants, and 36 cases (57.6%) in the group of migrants. The clinical visual impairment is bilateral in 31 cases (58.5%) in non-migrants and in 23 cases (39%) in migrants (p=0.04). The clinical and infraclinical ocular impairment (clinical ocular impairment and/or abnormal VEP) is 85.7% on average. The bilateral clinical and infraclinical visual impairment is more frequent in group NM (80%) than in group M (60.7%) (p=0.03). The total number of cases of neuromyelitis optica is 14 (12.5%). The proportion of neuromyelitis optica is higher in non-migrants, 9 cases (17%), than in migrants, 5 cases (8.5%). Table III displays the influence of the visual presentation on the overall EDSS score and visual prognosis. The overall EDSS score is less influenced by the type of visual presentation; on the other hand, when MS manifested through an ocular impairment, the visual EDSS is greater, as well as the proportion of monocular and binocular blindness and of neuromyelitis optica. In non-migrants, the EDSS is 3.2±2.2, 40% of patients have monocular blindness, and 28% are blind. In this group, when the first ocular attack did not regress, the visual

TABLE IV - INFLUENCE OF THE REGRESSION OF THE FIRST ATTACK ON THE OVERALL AND VISUAL PROGNOSIS IN PATIENTS WHOSE ILLNESS MANIFESTED THROUGH VISUAL IMPAIRMENT

	Regression: no	**Regression: yes**	**p value**
	Total population (n = 41)		
Overall EDSS, mean±SD	5.93±2.6	4.26±2.7	0.051 NS
Visual EDSS, mean±SD	4.6±1.7	1.53±1.7	0.00002
Blindness 1 eye, n (%)	10/15 (66.6)	2/26 (7.7)	0.0001
Blindness 2 eyes, n (%)	6/15 (40)	1/26 (3.84)	0.006
Neuromyelitis optica, n (%)	7/15 (46.6)	5/26 (19.2)	0.06 NS
	Non-migrants (n = 25)		
Overall EDSS, mean±SD	6.75±2.1	3.84±2.9	0.007
Visual EDSS, mean±SD	5±1.5	1.6±1.5	0.0003
Blindness 1 eye, n (%)	9/12 (75)	1/13 (7.7)	0.0008
Blindness 2 eyes, n (%)	6/12 (50)	1/13 (7.7)	0.02
Neuromyelitis optica, n (%)	6/12 (50)	2/13 (15.3)	0.07 NS
	Migrants (n = 16)		
Overall EDSS, mean±SD	2.66±1.5	4.69±2.5	0.17 NS
Visual EDSS, mean±SD	3±1.7	1.46±1.8	0.06 NS
Blindness 1 eye, n (%)	1/3 (33.3)	1/13 (7.7)	0.35 NS
Blindness 2 eyes, n (%)	0	0	—
Neuromyelitis optica, n (%)	1/3 (33.3)	3/13 (23)	0.6 NS

EDSS = Expanded Disability Status Scale; NS = Not significant

EDSS is 5±1.5, 75% of the patients had monocular blindness, 50% have binocular blindness, and half fit the criteria of neuromyelitis optica (Tab. IV). Table V illustrates the degree of visual deficiency in patients who have a clinical ocular impairment. In non-migrants, 12 cases (31.6%) have a monocular blindness versus 3 cases (8.3%) in the group of migrants (p=0.01). Seven patients (18.9%) have binocular blindness in the non-migrant group and none in the migrant group (p=0.007).

DISCUSSION

As in the majority of studies, we note that the patients are predominately female and young adults (17). Generally, the age at onset of MS is between 20 and 40 years and there are 1.7 afflicted females for every male. Except for the visual characteristics, the general profile of the 112 cases of MS is comparable to that observed in whites, the slight percentage (17%) of secondary progressive forms is the result of the recent character of the MS cases in Martinique. With a length of MS progression of about 10 years, the average age of our patients matches that observed in the literature. The group of non-migrants is comprised of the patients who must have acquired MS in Martinique and the group of migrants are the patients who acquired MS in either Martinique or more likely in metropolitan France considering the much higher prevalence in France (10, 11).

In our study, MS is manifested as an optical neuropathy in 36.6% of cases, which puts it at a higher incidence than that observed in whites. In fact, in the latter, optic neuritis represented 16 to 30% of the first monosymptomatic signs (18-20). However, there are significant differences depending on the probable zone of acquirement of MS; thus, the onset of visual symptoms was observed in 27% of cases in the migrant group and in 47.1% of cases in the non-migrant group. This very high prevalence is similar to that reported in the Asian studies, in particular the Japanese ones, where it was 43%, 11% of which were bilateral forms (21, 22). Although the visual onset appears more frequently in the non-migrant group, nearly all of our patients had presented signs of deterioration of the optic nerve (90/105, 85.7%) in the course of the disease. Such an impairment, whether it is manifested clinically or only detected by the VEP, is observed in 75% of cases in whites (19, 20). But there again the differences between our two groups appear. For the same length of disease duration, the visual impairment is more frequent and more severe in the non-migrant patients. Thus, the non-migrant group is characterized by significantly higher incidences of papillitis (11.3%), monocular (22.6%) and binocular (13.2%) blindness, abnormal PEV (79.5%), bilateral impairment (80%), and neuromyelitis optica (17%). Papillitis, which is the result of the presence of a plaque situated at least a centimeter from the ocular globe, is described in only 10% of white MS cases (23, 24). Furthermore, the atypical forms of ocular impairment, as either chronic progressive retrobulbar optic neuritis or retinal periphlebitis, are only observed in the non-migrant group.

The non-migrants who show the first signs of disease through a visual impairment do not recover their visual function as fully after this first attack (52% full recovery) and present with an overall greater visual handicap. In this group, a visual presentation and the absence of complete recovery from the first attack represent a factor of poor prognosis in visual function. In fact, when the illness manifested by an ocular impairment, it leads to 40% of monocular blindness and 1/3 of binocular blindness and when this first attack did not resolve we observe a monocular blindness of 75% and a binocular blindness of 50%.

The severity of visual impairment in the non-migrant pa-

TABLE V - DEGREE OF VISUAL DEFICIENCY IN PATIENTS HAVING A CLINICAL OCULAR IMPAIRMENT

	Total, n = 74	**Non-migrants, n = 38**	**Migrants, n = 36**	**p value**
Visual EDSS, mean±SD	4.6±2.5	5.5±2.7	3.8±2	0.007
Average visual acuity, mean±SD	20/30±20/70	20/40±20/70	20/25±20/100	0.006
Blindness 1 eye, n (%)	15 (20)	12 (31.6)	3 (8.3)	0.01
Blindness 2 eyes, n (%)	7 (9.5)	7 (18.4)	0	0.007
Bilateral visual impairment, n (%)	54 (73)	31 (81.6)	23 (63.8)	0.09 NS
Neuromyelitis optica, n (%)	14 (18.9)	9 (23.7)	5 (13.9)	0.28 NS

EDSS = Expanded disability status scale; NS = Not significant

tients can be compared to that described in other black populations. Among the 12 patients originating from South Africa and Zimbabwe reported by Dean et al, 6 became blind (25). In a retrospective study of inter-racial comparison, Phillips et al showed that black subjects, after an initial or sudden optic neuritis for the first time in the course of a confirmed case of MS, presented much more often than white subjects with a significant decrease in visual acuity, whether it be at the acute phase (90% versus 36%) or after a year of decline (18% versus 3%) (5). Among the seven black South Americans reported by Ames and Louw, MS initially manifested by retrobulbar optic neuritis in four of them, and six had a visual acuity lower than 20/200 after less than a year after disease onset (26). MS contracted in the geographic areas of low prevalence of the disease, thus characterized by this preferential and severe visual impairment, is similar to Devic's recurrent neuromyelitis optica (27). Devic's disease combines an optical neuritis and a transverse myelitis advanced by attacks, without encephalic determination (28, 29). The prognosis, as much medullar as visual, is very poor. The anatomic lesions are similar to those seen in MS. The recurrent neuromyelitis optica has a particular geographic distribution, but is especially marked in the zones of low MS prevalence: sub-Saharan Africa (30, 31), China (32), and Japan (21). In Modi et al's series, which includes eight African patients with a demyelinating disease of the central nervous system, six fit the criteria of neuromyelitis optica and have a bilateral optical neuropathy (33). Among our eight cases from Martinique, seven had never left the island, where they must have contracted this disease (34). Recurrent neuromyelitis optica could thus represent a form of MS specific to the countries where MS is less frequent and where ocular impairment would be severe.

It is now firmly established that the prevalence of MS is not equal in all the studied countries. The industrialized countries of Northern Europe, America, and Southeast Australia are included for the most part in the high-risk zone, and the African and South American countries in the low-risk zone (35). France is situated in a high-risk zone of MS (prevalence of 30 to 80 cases per 100,000 inhabitants) whereas Martinique is located in a zone of medium prevalence (17.4/100,000 inhabitants) (13). If the observed results in the non-migrant group, like those of the cited studies, suggest a preferential and severe visual impairment in the black MS patients, it does not however suggest that genetic factors are predominantly responsible for such a phenotype. Actually, the visual impairment, as much in its frequency as in its severity, is clearly more subtle in the migrant group, who probably contracted MS in metropolitan France. In fact, the visual phenotype of this group is similar to that of white patients in this sphere of acquisition, at least for the incidence of the initial visual attack. The same observation was made by Elian et al and concerns subjects originating from India, Africa, and the Caribbean who had immigrated to England and live in London. These patients present with a clinical form of MS, particularly ophthalmologic, that is superimposable in every respect to that observed in white English subjects (36). Our results are superimposable to those observed in African Americans: the data from the Optic Neuritis Treatment Trial (ONTT) did not determine that African ancestry is an unfavorable prognosis factor for the final visual status after an episode of optical inflammatory neuropathy (37). The ONTT was concerned with the African Americans living in the temperate 1/3 of the United States, whereas the African Americans living in the lower 1/3 of the United States clearly have a worse visual prognosis than the white subjects (5). The results of our survey of the Martinican population, in terms of ABO Rhesus blood groups, do not favor a genetic heterogeneity between the two groups, which could have accounted for the phenotypic differences. Thus, our results suggest that, more than the genetic factors, it is the environmental factors, like the sphere of acquisition in the case of low or medium prevalence of MS such as in the Caribbean, black Africa, or even Japan, which will significantly influence the visual phenotype in terms of a greater incidence and a poorer prognosis of ocular impairment.

Our study groups together 112 cases of MS observed in black subjects. It is largest series describing the visual phenotype of MS in patients of African origin (Medline, National Library of Medicine). The results confirm the preferential impairment of the optic nerve in the black population in the course of this disease and the influence on the visual phenotype of the migration towards a zone of higher MS prevalence.

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