Blood Pressure Studies Among American and Foreign-Born Students

By Nándor Szent-Györgyi, M.D.

The relation of hypertension to race, sex, environment, and geographic origin in a young adult population is analyzed. Of the 3508 university students, 6.7 per cent were hypertensive. Among American men and women the incidence was 8.1 per cent and 3.1 per cent, respectively. The incidence of hypertension in all racial groups is significantly higher among American-born than among foreign-born males. After 10 years of residence in the United States, foreign-born students have the same high incidence of hypertension as those born in the United States and Canada. Detailed study is presented regarding the incidence of hypertension in different age groups among American and foreign-born white, Negro and Asian students.

To contribute to the knowledge of the relationship between essential hypertension and climate, race, nutrition, occupation, and way of life, a selected group of people were investigated. One part of this investigation is presented in this paper. The group examined represents a little condensed world of men and women of various races (white, Negro, Asian, etc.), who are natives of five continents. It is a selected group in so far as they are college and graduate students with an average-average educational level, conducting sedentary lives, practically without any regular physical work. This is a group of the intellectual elite, the future leaders of America and of the other countries all over the world. Therefore, it would seem of importance to evaluate the physical condition and fitness of this group of people. A detailed study dealing with the connection and relationship of essential hypertension to sex, origin, race, climate, and residence is presented.

Scope and Materials

The blood pressure records of 3508 students of the University of Chicago were studied. These students were enrolled in the Summer quarter of 1954. Nobody was included in the study with any evidence of heart disease, diabetes, hyperthyroidism, or hormonal dysfunction. All patients with hypertension who also had albuminuria were excluded from the study, even those with supposed orthostatic albuminuria. All otherwise healthy students who did not have any clinical symptoms and had a grade A health rating were included in the study. In this way the number of investigated cases undoubtedly was reduced a great deal, but one could be sure that all organic diseases with a possible elevated blood pressure were excluded.

The blood pressure was determined at the entrance examination, and when it was found to be elevated, the student was usually recalled for one or more subsequent blood pressure determinations. Diehl and Hessdorfer are of the opinion that young men who have an elevated blood pressure, even though it be transient, are more likely to have high blood pressure after 5 to 10 years than men whose blood pressure at the earlier ages was consistently within the so-called normal limits. Furthermore, Schroeder states that hypertension is not uncommon in young adults in the United States and, according to Page and Corcoran, many of the young people with transitory elevation of arterial tension will sooner or later develop essential hypertension.

The geographic location of the birthplace, the duration of residence in America, and the race were determined from the data furnished by the students themselves. Everybody who was born in the continental United States or in Canada was considered as American born. American citizens born outside the continental United States (e.g., in Hawaii or Puerto Rico) were listed among the foreign born, which is...
quite proper in a paper dealing with influences of climate, origin, and environment upon a disease.

The importance of hypertension in young adult life is emphasized by the fact that the disease is generally more severe in younger patients; they die sooner. According to Palmer and Muench the unfavorable effect of hypertension on mortality is highest in persons in the younger age group and decreases rapidly with advancing age. Palmer’s studies at Harvard University revealed that slightly more than 10 per cent of the young male adults had systolic pressures above 140 mm. Hg. Alvarez, Wulzan, and Mahoney found that “hypertension is very common among young men, 22 per cent having systolic pressures exceeding 140 mm.”

Others, however, like Robinson and Bruce set the limits of the normal blood pressure as low as 120/80 mm. Hg, stating, “blood pressure over 120/80 is abnormal at any age and be-speaks incipient hypertension.” On the other hand, Master, Garfield, and Walters found the upper limits of the normal blood pressure definitely higher than the commonly accepted one, these limits varying with sex and age. According to Master, in males the normal range of systolic pressure at 16 years of age is 105 to 135 mm. Hg. At 19 years of age the range increases to 110 to 140; at 40 years, to 110 to 150, and at 60 years of age, to 115 to 170 mm. Hg. Fishberg has recently expressed the opinion that the upper limit of the normal blood pressure is 140/90 or less. Schroeder also has used the 140/90 limit in his studies.

We have chosen the generally accepted limit of 140/90 mm. Hg in this study, thus avoiding the extremes and recognizing that it may be too high for young women.

In our material most of the elevated blood pressure readings fell in the 140 to 160 mm. range, and out of the 236 hypertensive cases only 7, or 2.9 per cent, had systolic pressures higher than 160 mm.

In the following pages, the role of sex, race, and geographic origin are discussed in detail.

RESULTS AND DISCUSSION

Table 1 shows that 3508 students were examined for hypertension (2715, or 77.4 per cent men, and 793, or 22.6 per cent women). Among the students 3056, or 87.1 per cent, were American born and 452, or 12.9 per cent, foreign born. Among the Americans, 96.4 per cent were white, of whom 77.8 per cent were males and 22.2 per cent were females. American born nonwhite subjects were represented by 3.5 per cent only. In the foreign-born group the ratio was quite different; 71.9 per cent white subjects of whom 76.3 per cent were males and 23.7 per cent were females, and 28.1 per cent nonwhite subjects of whom 79.5 per cent were males and 21.5 per cent were females. The Asian-born population represented 25.4 per cent of the total foreign-born students. The ratio of male to female population was in all 3 groups about the same, in spite of the big differences in absolute numbers.

Table 2 shows that 6.7 per cent of all students were hypertensive; 7.7 per cent were male and 3.2 per cent were female. Boynton and Todd found 7.31 per cent hypertensive men and 1.41 per cent hypertensive women among university students.

Seven per cent of the American students and 4.6 per cent of the foreign-born students were hypertensive. There was no significant difference among the American and the foreign-born female students (3.1 and 3.8 per cent, respectively), but there were far more hypertensives (8.1 per cent) among the American men than among foreigners (4.9 per cent). Expressed in percentages: the incidence of hypertension was about 60 per cent higher among young American men than among foreign born men. If the incidence would be the same (4.9 per cent) as among the foreigners, there would be 116 hypertensive American men instead of the 193, as found. This lower incidence of hypertension among foreign born men is the more striking, since the foreign students were under more stress and tension than the Americans at the beginning of their studies.

The breakdown of the figures according to the race and geographic origin (which includes such factors as climate and nutrition besides race) is given in table 3.

In table 3 there was no difference between American and European whites, both groups having 6.9 per cent hypertensives. The addition of the white Europeans and the white non-Euro-
peans gave 5.8 per cent, which still was not a significant difference. However, the incidence of hypertension among the non-European white men was only 3.2 per cent, which was less than half that of the white Europeans. The percentage of American white hypertensive men exceeded that of the non-European white men by a factor of 2.5. The latter group included—in regard to geographic location and background of civilization—very wide variations (from Israel to Australia, from South Africa to South America). There seems to be a common causative factor responsible for the higher incidence of hypertension in North America and in Europe, which was not observed on other continents.

American Negro men were represented by 15.6 per cent hypertensive students and African born non-whites (Negro) by 14.2 per cent. According to the American Heart Association,\(^\text{12}\) between 1915 and 1950 the death rates from cardiovascular disease for the nonwhite population were invariably higher than for the white. It was stated recently in a panel discussion\(^\text{4}\) that hypertension is more common in

---

**TABLE 1.—Analysis of Material According to Origin, Race, and Sex**

<table>
<thead>
<tr>
<th>Subject</th>
<th>American born</th>
<th></th>
<th>Percentage</th>
<th></th>
<th>Foreign born</th>
<th></th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of Cases</td>
<td></td>
<td></td>
<td></td>
<td>No. of Cases</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>2297</td>
<td></td>
<td>97*</td>
<td></td>
<td>European men</td>
<td>186</td>
<td>53.2†</td>
</tr>
<tr>
<td>Women</td>
<td>652</td>
<td></td>
<td>94.4</td>
<td></td>
<td>European women</td>
<td>60</td>
<td>58.2</td>
</tr>
<tr>
<td>Total</td>
<td>2949</td>
<td></td>
<td>96.5</td>
<td></td>
<td>Non-European men</td>
<td>62</td>
<td>17.7</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Non-European women</td>
<td>17</td>
<td>16.5</td>
</tr>
<tr>
<td>Black</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total</td>
<td>325</td>
<td>71.9</td>
</tr>
<tr>
<td>Men</td>
<td>51</td>
<td></td>
<td>2.1</td>
<td></td>
<td>Men</td>
<td>92</td>
<td>26.3</td>
</tr>
<tr>
<td>Women</td>
<td>31</td>
<td></td>
<td>4.5</td>
<td></td>
<td>Women</td>
<td>23</td>
<td>22.3</td>
</tr>
<tr>
<td>Total</td>
<td>82</td>
<td></td>
<td>2.6</td>
<td></td>
<td>Total</td>
<td>115</td>
<td>25.4</td>
</tr>
<tr>
<td>African American</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>African</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>16</td>
<td></td>
<td>0.7</td>
<td></td>
<td>Men</td>
<td>7</td>
<td>2.0</td>
</tr>
<tr>
<td>Women</td>
<td>6</td>
<td></td>
<td>0.9</td>
<td></td>
<td>Women</td>
<td>1</td>
<td>0.9</td>
</tr>
<tr>
<td>Total</td>
<td>22</td>
<td></td>
<td>0.7</td>
<td></td>
<td>Total</td>
<td>8</td>
<td>1.7</td>
</tr>
<tr>
<td>American Indian</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>South American Negro</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>2</td>
<td></td>
<td>0.00</td>
<td></td>
<td>Men</td>
<td>2</td>
<td>0.6</td>
</tr>
<tr>
<td>Women</td>
<td>1</td>
<td></td>
<td>0.1</td>
<td></td>
<td>Women</td>
<td>2</td>
<td>1.9</td>
</tr>
<tr>
<td>Total</td>
<td>3</td>
<td></td>
<td>0.00</td>
<td></td>
<td>Total</td>
<td>4</td>
<td>0.9</td>
</tr>
<tr>
<td>Total men</td>
<td>2366</td>
<td></td>
<td>67.4</td>
<td></td>
<td>Total men</td>
<td>349</td>
<td>9.9</td>
</tr>
<tr>
<td>Total women</td>
<td>690</td>
<td></td>
<td>19.6</td>
<td></td>
<td>Total women</td>
<td>103</td>
<td>3.0</td>
</tr>
<tr>
<td>Total men and women</td>
<td>3056</td>
<td></td>
<td>87.1</td>
<td></td>
<td>Total men and women</td>
<td>452</td>
<td>12.9</td>
</tr>
</tbody>
</table>

Total subjects: 3508; total men: 2715 or 77.4 per cent; total women: 793 or 22.6 per cent

* In terms of the inclusive numbers of the corresponding American-born groups (2366, 690, 3056, respectively).
† In terms of the inclusive numbers of the corresponding foreign-born groups (349, 103, 452, respectively).

---

**TABLE 2.—Hypertension According to Sex and Origin**

<table>
<thead>
<tr>
<th></th>
<th>No. of Cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertensive</td>
<td>236</td>
<td>6.7 of 3508</td>
</tr>
<tr>
<td>Men</td>
<td>210</td>
<td>7.7 of 2715</td>
</tr>
<tr>
<td>Women</td>
<td>26</td>
<td>3.2 of 793</td>
</tr>
</tbody>
</table>

**Birthplace**

<table>
<thead>
<tr>
<th></th>
<th>No. of Cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>American born</td>
<td>215</td>
<td>7.0*</td>
</tr>
<tr>
<td>Men</td>
<td>193</td>
<td>8.1*</td>
</tr>
<tr>
<td>Women</td>
<td>22</td>
<td>3.1</td>
</tr>
<tr>
<td>Foreign born</td>
<td>21</td>
<td>4.6*</td>
</tr>
<tr>
<td>Men</td>
<td>17</td>
<td>4.9*</td>
</tr>
<tr>
<td>Women</td>
<td>4</td>
<td>3.8</td>
</tr>
</tbody>
</table>

* These differences, 7.0% versus 4.6% and 8.1% versus 4.9%, are statistically significant ($X^2 = 8.19$ and 4.64, respectively; $p = <0.01$ and <0.05, respectively).
Negroes than in Caucasians. Ornstein found the incidence of hypertension in young Negroes higher than in white persons of similar age groups. The ratio of rejection from the Armed Services due solely to hypertension was 3.47 per cent in Negroes as compared to 1.01 per cent in white men. According to Schroeder, hypertension is more common in American Negroes than in white Americans. While the number of Negroes included in this study was too small for any definite conclusions, it was in perfect agreement with the findings of other authors on the higher incidence of hypertension in American Negroes. In our analysis, the same was true for the African-born nonwhite men, and although statistically insignificant, it compared with the findings in American-born Negroes. Donnison reported that over a period of two years at a native hospital in Kenya approximately 1800 patients were admitted, and no case of elevated blood pressure was encountered. Certainly our students from Africa were not primitive but highly civilized individuals, which fact may be important in respect to blood pressure. In this connection reference should be made to Hartnett and Ratcliffe, who quoted from Dubois an incidence of 35.5 per cent for hypertension among 200 Congo natives.

Low blood pressure values have been reported from the Orient, particularly from China. Foster found that the blood pressure of Occidentals living in China, in the majority of the persons studied, was lower in China than it used to be while in America. Blood pressure of Chinese has been shown to be lower than the usual average, and hypertension is rare. This is proved in this study, too, since only 1 per cent of Asian born men were found to be hypertensive as compared with an incidence of 6.9 per cent in European men and 8 per cent in American white men. In this connection, in our material, 6.2 per cent of the American born Asian men have hypertension. This is a striking difference. It seems to indicate that climate and environment have a strong influence on blood pressure. Krakower found the same effect of climate on long-time Chinese residents in Canada; he stated that among these Chinese hypertension is not uncommon.

In table 4, are listed hypertensive cases according to age groups.

It is not surprising that the absolute number of hypertensive cases is higher in the younger age group than in the older one, since the majority of the subjects studied obviously fell in the younger age group. However, the extraordinary difference is surprising, if one compares the incidence among men and women, since the general distribution of men and women according to age groups was about the same. In spite of the fact that the largest part
of the student population was below 30 years of age, the overwhelming percentage of the female hypertensive students fell in the older (above 30 years) age group. This was true whether one analyzed separately the American and foreign-born students, or the total. Of the hypertensive men, 87.6 per cent were below 30 in age and 12.4 per cent were older. The reverse was true for women, with 30.7 per cent of the hypertensive women under 30 years of age, and 69.3 per cent above 30. There was no significant change in the picture if one analyzed the findings for the various racial groups.

Table 4.—Hypertension According to Age Groups

<table>
<thead>
<tr>
<th>Age Group</th>
<th>&lt;20 No.</th>
<th>Percentage</th>
<th>21-30 No.</th>
<th>Percentage</th>
<th>31-40 No.</th>
<th>Percentage</th>
<th>&gt;41 Years No.</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>American born</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White men</td>
<td>72</td>
<td>39.1</td>
<td>93</td>
<td>50.5</td>
<td>17</td>
<td>9.2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>White women</td>
<td>2</td>
<td>9.5</td>
<td>5</td>
<td>23.8</td>
<td>4</td>
<td>19</td>
<td>10</td>
<td>47.6</td>
</tr>
<tr>
<td>Negro men</td>
<td>1</td>
<td>12.5</td>
<td>4</td>
<td>50.0</td>
<td>3</td>
<td>37.5</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Negro women</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>1</td>
<td>100</td>
</tr>
<tr>
<td>Asian men</td>
<td>—</td>
<td>—</td>
<td>1</td>
<td>100</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>American total men</td>
<td>73</td>
<td>37.8</td>
<td>98</td>
<td>50.7</td>
<td>20</td>
<td>10.3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>American total women</td>
<td>2</td>
<td>9</td>
<td>5</td>
<td>22.7</td>
<td>4</td>
<td>18.1</td>
<td>11</td>
<td>50</td>
</tr>
<tr>
<td>Foreign born</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>European men</td>
<td>2</td>
<td>15.3</td>
<td>8</td>
<td>61.5</td>
<td>2</td>
<td>15.3</td>
<td>1</td>
<td>7.7</td>
</tr>
<tr>
<td>European women</td>
<td>—</td>
<td>—</td>
<td>1</td>
<td>25</td>
<td>2</td>
<td>50</td>
<td>1</td>
<td>25</td>
</tr>
<tr>
<td>White non-European men</td>
<td>—</td>
<td>—</td>
<td>2</td>
<td>100</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Asian men</td>
<td>—</td>
<td>—</td>
<td>1</td>
<td>100</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>African men</td>
<td>—</td>
<td>—</td>
<td>1</td>
<td>100</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Foreign born total men</td>
<td>2</td>
<td>11.7</td>
<td>11</td>
<td>64.7</td>
<td>3</td>
<td>17.6</td>
<td>1</td>
<td>5.8</td>
</tr>
<tr>
<td>Foreign born total women</td>
<td>—</td>
<td>—</td>
<td>1</td>
<td>25</td>
<td>2</td>
<td>50</td>
<td>1</td>
<td>25</td>
</tr>
<tr>
<td>Total men</td>
<td>75</td>
<td>35.7</td>
<td>109</td>
<td>51.9</td>
<td>23</td>
<td>10.9</td>
<td>3</td>
<td>1.5</td>
</tr>
<tr>
<td>Total women</td>
<td>2</td>
<td>7.6</td>
<td>6</td>
<td>23</td>
<td>6</td>
<td>23</td>
<td>12</td>
<td>46.1</td>
</tr>
</tbody>
</table>

Table 5.—Foreign Born According to the Years Spent in America

<table>
<thead>
<tr>
<th>I 0-1</th>
<th>II 1-10</th>
<th>III 10 or more yrs</th>
<th>IV 10 yrs. or less</th>
<th>V 1 yr. or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>208 or 46%</td>
<td>150 or 33.2%</td>
<td>94 or 20.7%</td>
<td>358 or 79.3%</td>
</tr>
<tr>
<td>Hypertensive from total</td>
<td>8 or 3.8%</td>
<td>5 or 3.3%</td>
<td>8 or 8.5%*</td>
<td>13 or 3.6%*</td>
</tr>
</tbody>
</table>

* The difference between 3.6% and 8.5% is statistically significant18. (χ² = 4.03; p = 0.02 to 0.05).

Tables 5 and 6 consist of a breakdown of the foreign-born hypertensive students according to the years spent in America prior to the blood pressure readings.

Thirty eight per cent of the foreign-born hypertensive students spent one year or less in America (table 6) and 46 per cent of all foreign-born students lived in the United States less than 1 year (table 5). Thirty eight per cent of the foreign-born hypertensive students resided for 10 years or more in the United States, but only 20.7 per cent of all foreign-born students lived here longer than 10 years. These data
TABLE 6.—Percentage Distribution of the Hypertensive Foreign Born Subjects According to the Length of Time Spent in America

<table>
<thead>
<tr>
<th>I</th>
<th>0-1 yr.</th>
<th>II</th>
<th>1-10 yr</th>
<th>III</th>
<th>10 or more yr.</th>
<th>IV</th>
<th>1 yr. or more</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>38%</td>
<td></td>
<td>24%</td>
<td>38%</td>
<td>62%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

clearly indicate that the factors that raise the blood pressure in the foreign-born must be inherent in the American environment (climate, geographic location, nutrition, way of life, or combined). Furthermore, if we consider that the incidence of hypertension in foreigners with less than one year’s residence was only 3.8 per cent and among those who lived in the United States for more than 10 years the rate was 8.5 per cent, i.e., over double the first group, little doubt remains regarding the importance of modifying factors in the development of hypertension, beyond the role of race.

In an analysis of the five columns of table 5 with regard to hypertension, there was no significant differences between groups I and II; however, the figure jumped to 8.5 per cent after 10 years of residence in America (group III), in spite of the fact that group I included 46 per cent, group II 33.2 per cent, and group III only 20.7 per cent of foreign-born students. The 358 students in group IV included 13 with hypertension (3.6 per cent), a rate which was less than half of the older residents in group III.

SUMMARY AND CONCLUSIONS

Of the 3508 students examined (2715, or 77.4 per cent men and 793, or 22.6 per cent women), 236, or 6.7 per cent, were hypertensive.

Among the students 3056, or 87.1 per cent, were American born and 452 or 12.9 per cent foreign born. Seven per cent of the American and 4.6 per cent of the foreign born were found to be hypertensive. The incidence of hypertension in American born students was significantly higher than among foreign born ones.

Hypertension was noted in 8.1 per cent of the American men and 3.1 per cent of the women; 4.9 per cent of the foreign born men and 3.8 per cent of the women had hypertension. Hypertension was more common in American-born men than women by a factor of 2.5.

The rate of hypertension was 6.9 per cent among the white Americans and Europeans. Eight per cent of the white American men and 3.2 per cent of the women were hypertensive. The rates were 6.9 per cent for the European men and 6.6 per cent for the European women, but only 3.2 per cent for the non-European white men and zero for the women. The incidence of hypertension among American men was significantly higher than among foreign-born men. There was no significant difference in the incidence of hypertension between American and foreign-born women.

There was no difference in the incidence of hypertension between American and European-born white students. However, the percentage among foreign-born non-European white men was less than half that of the American and European white men. American-born and African-born Negro men were represented with rates of 15.6 per cent and 14.2 per cent, respectively.

There was a higher incidence of hypertension in American Negro men than in any other group examined, topping the next highest group, the American white men by a factor of 2. Since the group of African-born Negro men was too small to be statistically significant, these data cannot contribute to the solution of the controversial findings and opinions regarding the incidence of hypertension among African Negroes.

The incidence of hypertension among American-born Oriental men was six times higher than among Asian-born Orientals, but still lower than among American or European-born white men.

Four-fifths of both the American and foreign-born hypertensive men were under 30 years of age. The reverse was true for the women; almost three-fourths of the hypertensive women were above the age of 30 years.

Of the foreign-born students, forty-six per cent had spent one year or less in this country, and the incidence of hypertension was 3.8 per cent among them; 33.2 per cent had spent 1 to 10 years in America and their incidence was 3.3 per cent. Only 20.7 per cent had spent more...
than 10 years here prior to the examination, but they showed an incidence of 8.5 per cent, i.e., the same as among American-born white men.

Among foreign-born residents who had spent less than 10 years here, the incidence of hypertension was less than half of that of the residents who had spent over 10 years in the United States.

One gets the impression that if someone lives in the United States long enough—regardless of birthplace or race—he will stand the same chance of becoming hypertensive as if he had been born here.

American-born men in all racial groups have a higher incidence of hypertension than the corresponding groups of foreign-born men.

**Summario in Interlingua**

Esseva examine in 3508 studentes: 2715 masculos (77,4 pro cento) e 793 femininas (22,6 pro cento). Esseva trovate 236 hypertensivos (6,7 pro cento).

Le total consisteva de 3056 studentes nascite in America (87,1 pro cento) e 452 studentes nascite al estraniero (12,9 pro cento). Septe pro cento del studentes nascite in America e 4,6 pro cento del studentes nascite al estraniero esseva hypertensivos. Le frequentia de hypertension in studentes de nascentia american esseva significativament plus alte que in studentes nascite al estraniero.

Hypertension esseva constatat in 8,1 pro cento del masculos american e in 3,1 pro cento del femininas american. Inter le studentes nascite al estraniero, 4,9 pro cento del masculos e 3,8 pro cento del femininas habeva hypertension. Inter le studentes de nascentia americana, hypertension in masculos esceva hypertension in femininas per un factor de 2,5.

Inter le americanos e europeos de raccia bianc, hypertension habeva un frequentia de 6,9 pro cento. Octo pro cento del american masculos bianc e 3,2 pro cento del american femininas bianc esseva hypertensive. Le procentages corresponde pro masculos e femininas europee esseva 6,9 e 6,6 e pro masculos e femininas non-europee bianc solmente 3,2 e 0, respectivament. Le frequentia de hypertension inter masculos american esseva significa-

tivement plus alte que inter masculos nascite al estraniero. Il non habeva un differentia significativa in le frequentia de hypertension in femininas de nascentia american comparete con femininas nascite al estraniero.

Il habeva nulle differentia in le frequentia de hypertension in studentes blanc nascite in America in comparison con le studentes blanc nascite in Europa. Sed inter le studentes non-europee blanc, le procentage pro masculos esseva minus que un mediate del procentage inter le masculos bianc de nascentia europee e american.

Masculos negre nascite in America e masculos negre nascite in Africa mostrava procentages de 15,6 e 14,2, respectivament.

Le frequentia de hypertension in masculos negre nascite in America esseva plus alte que le frequentia de hypertension in ulle altere gruppo examine. A parte le gruppo de negros nascite in Africa, le negros nascite in America habeva un frequentia de hypertension exceedente per un factor de 2 le frequentia de hypertension inter american masculos bianc (qui constitueva le secunde gruppo in le ordine del frequentias). Proque le masculos negre de nascentia african non esseva satis numerose pro esser statisticamente significative, nostre datos non pote contribuer a un resolution del controversia (de observations e opiniones) relative al frequentia de hypertension inter negros african.

Le frequentia de hypertension inter masculos oriental de nascentia american esseva sex vices plus grande que inter masculos oriental nascite in Asia sed nonobstante plus base que inter masculos bianc de nascentia american o europee.

Quatro quintos del masculos hypertensive, tanto american como etiam de nascentia estranier, habeva minus que 30 annos de etate. Inter le femininas le tendentia esseva le contrario: quasi tres quartos del femininas hypertensive habeva plus que 30 annos de etate.

Le studentes nascite al extero de America includeva 46 pro cento qui habeva passate un anno o minus in iste pais. Pro ille le frequentia de hypertension esseva 3,8 pro cento. Pro le gruppo qui habeva passate inter 1 e 10 annos in America, le correspondent procentages
esueva 33,2 e 3,3. Solmente 20,7 pro cento
habeva habitate America durante plus que
10 annos ante le tempore del examine de lor
pression sanguinee, sed illes mostravava un
frequentia de hypertension de 8,5 pro cento, i.e.
le mesme frequentia etiam constatale inter
masculos blanc de nascentia american.

Inter individuos de nascentia estranier qui
habeva passate minus que 10 annos in iste pais,
le frequentia de hypertension esueva minus que
un medicitate del frequentia de hypertension
inter illes qui habeva passate plus que 10 annos
in America.

On ha le impression que si un subjecto vive
satis longe in le Statos Unite, ille ha—sin
reguardo a loco de nascentia o a racia—le
mesme prospectos de disveloppar hypertension
como si ille habeva nascite in le Statos Unite.

Masculos nascite in America, de non importa
qual agrupamento racial, ha un plus alte
frequentia de hypertension que masculos del
mesme racia nascite al estraniero.

REFERENCES

1 Diehl, H. S., And Hessdorfer, M. B.: Blood
pressure in young men over a 7-year period.
Arch. Int. Med. 52: 948, 1933.
2 Schroeder, H. A.: Hypertensive Diseases. Phila-
delphia, Lea and Febiger, 1933, p. 52.
3 Page, I. H., And Corcoran, A. C.: Hypertensive
Vascular Disease. In, Therapeutics in Internal
Medicine, Kyser, F. A., Ed. New York, Harper
and Brothers, 1953, p. 493.
4 Panel Discussion: Treatment of Hypertension.
Moderator: Wilkins, R. W., American College
of Physicians, 39th Annual Session, Chicago,
1954.
5 Palmer, R. S., And Muench, H.: Course and
prognosis of essential hypertension. J. A. M. A.
153: 1, 1953.
6 ——: Significance of essential hypertension in young
7 Alvarez, W. C., Wulzan, R., And Mahoney,
L. J.: Blood pressures in 15,000 university
8 Robinson, S. C., And Brucker, M.: Range of
normal blood pressure; statistical and clinical
study of 11,383 persons. Arch. Int. Med. 64:
409, 1939.
9 Master, A. M., Garfield, C. I., And Walters,
M. B.: Normal Blood Pressure and Hyperten-
sion, New Definitions. Philadelphia, Lea and
Febiger, 1952.
10 Fishberg, A. M.: Differential diagnosis of high
blood pressure. M. Clin. North America. 38:
753, 1954.
11 Boynton, R. E., And Todd, R. L.: Blood pressure
readings of 75,258 university students. Arch.
12 American Heart Association Statistical Hand-
book: Diseases of the Heart and Blood Vessels
13 Ornstein, L. L.: Hypertension in young Negroes.
War Med. 4: 422, 1943.
14 Donnison, C. P.: Blood pressure in the African
15 Hartnett, W. G., And Ratcliffe, H. E.: Study
in hypertension on Southern Negroes. South.
16 Foster, J. H.: Blood pressure of foreigners in
17 Krakower, A.: Blood pressure in Chinese living
18 Hill, A. B.: Principles of Medical Statistics. New

To study the phenomena of disease without books is to sail an uncharted sea, while to study
books without patients is not to go to sea at all.—William Osler. Aequanimitas and Other Ad-
Blood Pressure Studies Among American and Foreign-Born Students
NÁNDOR SZENT-GYÖRGYI

Circulation. 1956;14:17-24
doi: 10.1161/01.CIR.14.1.17

Circulation is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
Copyright © 1956 American Heart Association, Inc. All rights reserved.
Print ISSN: 0009-7322. Online ISSN: 1524-4539

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://circ.ahajournals.org/content/14/1/17

Permissions: Requests for permissions to reproduce figures, tables, or portions of articles originally published in Circulation can be obtained via RightsLink, a service of the Copyright Clearance Center, not the Editorial Office. Once the online version of the published article for which permission is being requested is located, click Request Permissions in the middle column of the Web page under Services. Further information about this process is available in the Permissions and Rights Question and Answer document.

Reprints: Information about reprints can be found online at:
http://www.lww.com/reprints

Subscriptions: Information about subscribing to Circulation is online at:
http://circ.ahajournals.org/subscriptions/