Agriculture, and finally president of the University, Dr. Gonzalez raised the standard of the institution to a high plane. A nonbeliever in the idea that Philippine livestock can be improved through the costly importation of standard improved breeds of animals from temperate countries, Dr. Gonzalez has to his credit the development of the Berkjala breed of swine, the Los Baños Cantonese chicken, and the Philamin breed of beef-draft cattle, in addition to a large number of published contributions. He was responsible for the transfer of the University from Manila to Diliman. Owing to his character and his unflinching attitude in a fight for principle, he created enemies but endeared himself to his numerous friends and admirers, colleagues, and students. His fight against the encroachment of politics in the University ended in his untimely retirement from its presidency.

In the College of Agriculture, Dr. Gonzalez became assistant instructor in animal husbandry on December 13, 1913, and then was promoted through successive grades until, in 1923, he was made head of the department. He was appointed acting dean in 1927, and permanent dean the following year. He was the first Filipino and alumnus of the College to occupy this position, which he held until he was appointed president of the University.

At 25, Dr. Gonzalez was the first alumnus regent of the University of the Philippines. He served in this capacity from 1918 to 1921. His appointment to the presidency of the University on April 29, 1939, made him the first alumnus and scientist to become president of the institution. And, at 46, he became the youngest incumbent for the longest period (except during the Japanese occupation) until his forced retirement on April 22, 1951.

Dr. Gonzalez was a member of a large number of organizations. He was a fellow of the AAAS, 1934; vice chairman of the National Research Council of the Philippines, 1934–1935, 1937, chairman from 1938 until his retirement in 1951; and president of the Society for the Advancement of Research in 1935–1936. He held many positions of trust in a large number of public, private, industrial, commercial, and agricultural organizations too numerous to list here.

President Gonzalez was born on March 22, 1893, in Apalit, Pampanga. He was the son of Dr. Joaquin Gonzalez, of Baliwag, Bulacan, and Florencia Sioco Gonzalez, of Bacolor, Pampanga.

On January 1, 1917, Bienvenido Maria Gonzalez married Concepcion Rafols, of Cebu, who survives him. Surviving him also are their five children: Manuel, married, an engineer; Gonzalo, a lawyer; Eva, an instructor in the department of home economics of the University of the Philippines; Lilia, a student in the Conservatory of Music; and Bienvenido, a student in the College of Business administration.

Endocrine Regulation of the Capillary Resistance*

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THE capillary resistance—that is, the capacity of the capillary wall to resist intracapillary pressure or extracapillary suction—was considered heretofore as a local phenomenon, and the factors influencing it were thought to act only locally. Clinical and experimental work done by three research groups during the last 3 yr has brought convincing evidence that capillary resistance is subject to endocrine control. It is of interest that the three research groups have been working in three countries along three different lines.

Robson and Duthie in England found on the basis of clinical observations a direct relationship between capillary resistance and adrenocortical activity. They postulated that cortisone is responsible for this relationship (*1, 2*). Eichholtz, Staab, and Taugner in Germany made a pharmacological study on cortical extract and claimed that desoxycorticosterone is engaged in the control of the capillary resistance (*3*).

The starting point of our work was different. While studying the effect of various forms of stress (cold, forced muscular exercise, prolonged fast, trauma, ether anesthesia, severe emotional upset) upon the capillary resistance of the albino rat, a typical change was found consisting of four phases: (i) initial rise, (ii) sudden drop, (iii) a period of pathologically low level, (iv) gradual restoration to normal. The entire phenomenon, the second and third phases of which were termed *capillary crisis,* lasts approximately 1 mo. The fact that this capillary response was found to be

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rather uniform, irrespective of the type of stress applied, suggested a uniform and nonspecific underlying mechanism and prompted us to study the pituitary-adrenocortical system. In the course of this study, it was definitely proved that the adrenal cortex is intimately connected with the resistance of the capillaries and that cortisone is involved in this function (*4–8*).

An analysis of the capillary crisis elicited by stress showed that cortisone, but not ACTH, is capable of preventing the crisis; hence, it was concluded that capillary crisis cannot be the result of a decreased discharge of ACTH but rather may be due to primary adrenocortical hypofunction. This was demonstrated also by means of Thorn-tests (*9*). Here, however, the following discrepancy was encountered. Whereas the Thorn-test was usually found negative in the first part of the capillary crisis, it soon became positive, often *at a time when the capillary resistance was still extremely low*. Because of this, it was thought possible that another hormone may antagonize cortisone during the later part of the stress response.

In search for an antagonizing hormone, desoxycorticosterone (acetate, aqueous macrosuspension, Bell Pharmaceutical Co.) and the sex hormones (Testosterone Propionate, White Laboratory; Diethylstilbestrol, Lilly) were tested and found ineffective. Next the somatotropic hormone was considered.

Forty mature albino rats (Sprague Daily strain) of both sexes weighing 200 to 300 g and fed Purina Dog Chow were used. Twenty-three of them had been adrenalectomized at least 2 mo prior to the experiments. All animals were carefully trained so that the handling and restraint required for the measurement of the capillary resistance engendered minimal emotional stress. The negative pressure method was used for testing capillary resistance. Our device consisted of a vacuum reservoir that was connected to an electrically powered suction pump in one direction and to a small plastic bell (of an inner diameter of 7 mm) in the other direction. The degree of suction was measured by an intercalated mercury manometer. The test was performed on the abdominal skin surface of the animals. Suction was employed for 60 sec. The least negative pressure (suction) measured in centimeters of mercury, capable of producing one or more punctiform bleedings was taken as the value of capillary resistance. (For details of technique see references *4, 6.*)

When intact rats were given STH (SomaTrofin, Horner Ltd., Montreal, lots No. C-35-39-J and C-35-42-D), the capillary resistance was found to decrease considerably within a few days. When STH was discontinued, the capillary resistance returned to normal. A technical difficulty was, however, encountered in these experiments. Since rats seem not to be very sensitive to STH, relatively large daily doses (2 to 4 mg/100 g body weight) had to be administered. These amounts, when given subcutaneously, showed poor absorption, and gave rise to localized edema. Thus, since daily intramuscular injections also proved impracticable, the intraperitoneal route was chosen. Control experiments showed, however, that any intraperitoneal injection, even that of physiologic saline, may represent a stress and elicit a capillary stress response with its typical four phases as described in a foregoing paragraph. This interfering reaction could not be prevented, even with the most careful previous training of the animals.

The difficulty was overcome in the following way. One group of rats consisting of three trained animals with well-established control level of capillary resistance was given daily intraperitoneal injections of 1 cc physiologic saline (group A). A second group of three similarly prepared rats received the same amounts of saline with STH (group B). The two curves in Fig. 1 represent average values of capillary resistance of these two groups of animals. Group A upon receiving intraperitoneal saline injections alone disclosed a crisis and a prompt restoration of capillary resistance to normal—that is, a typical stress response. No restoration occurred in the animals of group B receiving STH in the same amount of saline. The difference between the two groups was very striking between the 20th and 22nd days of the experiment. The capillary resistance of group A was above 60 cm Hg, whereas that of group B was below 10 cm Hg. On the 23rd day of the experiment, the treatment of the two groups was reversed: group A received the daily injections of STH and group B those of physiologic saline. The result was very spectacular. Whereas the capillary resistance in group A precipitously dropped, that in group B gradually increased to the maximum measurable height. A second administration of STH to group B resulted in a repeated decrease of capillary resistance close to zero level.

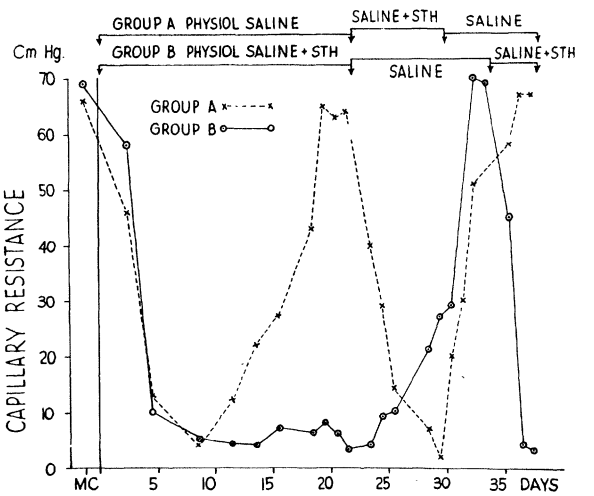

Fig. 1. Effect of somatotropic hormone upon capillary resistance of the normal female rat. Each curve represents the medium capillary resistance values obtained in one group of three rats. Daily intraperitoneal injections of 10 mg STH in 1 cc physiologic NaCl and 1 cc physiologic NaCl without STH were given alternately to these two groups of animals. *MC* = mean value of capillary resistance during control period.

The question arose whether this effect of STH is mediated through the adrenal cortex (by interfering with cortisone elaboration) or occurs because STH antagonizes cortisone at a more peripheral (target organ) level. The following two groups of experiments were made to decide on this question.

1) Female adrenalectomized rats were treated with cortisone. The capillary resistance rose. When STH was added to cortisone, it promptly decreased. When STH was stopped and cortisone was given alone, the capillary resistance again increased (Fig. 2).

2) Female adrenalectomized rats were given cortisone conjointly with STH. Cortisone failed to raise capillary resistance; the rise came only when STH was discontinued (Fig. 3).

The results indicate that the effect of cortisone upon the capillary resistance is antagonized by STH at a peripheral level *without the mediation of the adrenal cortex.*

It was noticed in some experiments that STH also counteracted the cortisone effect on the weight of the animals (Fig. 2) and the number of circulating eosinophils (Fig. 3), although this action was by far not so consistent as that upon the capillary resistance. It should be mentioned that whereas STH readily decreased the capillary resistance of the intact (non-adrenalectomized) rats of both sexes, its antagonizing effect upon cortisone in the adrenalectomized animals was less pronounced in the male. The cause of this sex difference is the subject of current work.

While other factors are undoubtedly involved, these observations show that the resistance of the capillaries depends to a great extent on the combined and antagonizing effects of cortisone and STH. Thus the level of the capillary resistance may reflect the actual balance between these two hormones. It is believed that these observations may have twofold significance. Directly, they contribute to our knowledge of the mechanism that controls the capillary resistance. Indirectly, capillary resistance, when used as a tool, may give us insight into the relationship that seems to exist between cortisone and the somatotropic hormone. In fact, since the new aspect of this test became obvious, it has been employed by another research group of this school (C. M. Wilhelmj and associates) working on other objectives with endocrine relation and found very useful, permitting more insight into the endocrine functions when applied with other methods (*10*). In their experiments in progress, the same antagonistic action of cortisone and STH upon capillary resistance that was found in the rat was demonstrated in the dog. The dog even proved to be a better test object, because of its apparently greater sensitivity to the somatotropic hormone.

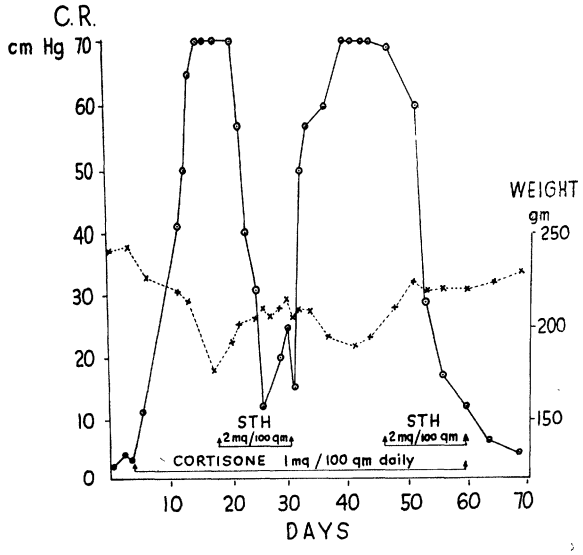

Fig. 2. Effect of somatotropic hormone upon capillary resistance and weight of adrenalectomized female rat treated with cortisone. Solid line, capillary resistance; dotted line, weight. Cortisone 1 mg/100 g, STH 2 mg/100 g daily.

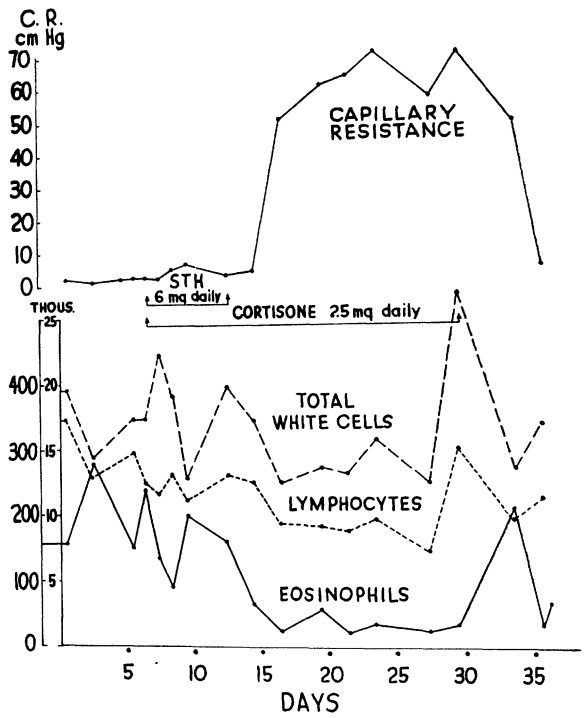

Fig. 3. Effect of somatotropic hormone upon capillary resistance and eosinophil count of adrenalectomized female rat. Cortisone 2.5 mg daily; STH 6 mg daily.

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