ide and oxygen by the method of Van Slyke and Neill. The respiratory quotient of the intact animal was determined on samples of expired air collected before the blood was drawn.

In Table I are presented typical observations of a group which are summarized in Table II. 38 observations of the brain were made in 14 dogs and the average of the respiratory quotient was 1.00.

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The Meaning of Bier's Spots.

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By vital staining with highly diffusible dyes we have found that sudden reductions of the blood volume lead to readjustments whereby the organs essential to the maintenance of life and to recovery continue to be well served by the circulation but at the expense of unessential ones, both visceral and peripheral.[1] The animals studied were white cats, rabbits and rats. The heart and lungs, the alimentary tract throughout its length (inclusive of the tongue and the gall bladder), the liver, pancreas, red bone marrow, and the respiratory muscles suffer practically no deprivation, even when the depletion has been pushed so far as to endanger life; whereas the skin and the voluntary muscles in general, the omentum, fat depots and urinary bladder are greatly neglected. One would expect the effective circulation through the spleen to cease, as does indeed happen. All the other neglected organs develop an ischemic patching except the bladder, which suffers as a whole. That in the skin resembles the so-called Bier's spots, blanchings noted in engorged human skin deprived of circulation. Our further work indicates that it is identical therewith.

Bier's spots appear gradually and enlarge by peripheral extension and coalescence. The ischemic patching of animals also develops gradually in skin from which the blood supply has been not quite all cut off; and the patches appear and spread as do Bier's spots. These latter are pallid, irregular, sharply outlined blotches on a congested skin, while the ischemic patches occur as similar areas devoid of stain, though scattered through a tissue which becomes well colored despite the reduced circulation. These differences are incidental to

[1] Reported at the Association of American Physicians, May, 1928.

the differing methods of demonstration. Bier's spots are far more frequent where gravity or other influences act to empty the vessels *in stasis* than where they remain full. The patching in animals is also favored by these influences. Bier's blanchings develop far more frequently in the "red spots" which are still fed by a trickle of arterial blood from the marrow collaterals than where the skin is violet with stagnant blood. The combination of nearly empty vessels and a slight, inadequate blood flow is precisely that which leads to the ischemic patching of animals.

Bier's spots tend to recur where they appeared previously, and so too with the ischemic patching. The various local influences above mentioned go far to explain this for both. Those spots which become most completely blanched often persist for a brief period after the circulation is restored to the arm.[2] The ischemic patching tends to last longer, sometimes for a half hour or more, after the blood volume has been made up and the original blood pressure restored to the previous level or a higher one. In man the occlusion which gives rise to the spottings can be maintained but for a short while, and hence evidently their failure to endure.

The blanching in man is caused by a contraction strong enough to drive blood out of the small vessels even when the intravascular pressure has been so greatly raised in the region studied that punctate ecchymosis is occurring. The contractile impulse dominates over that which gives rise to vascular dilatation next cutaneous abrasions, fresh and old, the purple of the injured skin being replaced by pallor. On the other hand it is not effectual against histamine dilatation.

There can be no doubt that the cells involved in Bier's spots are abnormally irritable. Tapping the congested skin, or a light stroking which would elicit no response normally, causes a pronounced local reaction of dilatation or contraction when the cutaneous circulation has been cut off for some minutes. Usually the response is contractile, white patches appearing. Often they are situated at a distance from the point stimulated.

The slowly developing vascular contraction which is responsible for Bier's spots and for the ischemic patching of animals acts to narrow the circulatory bed when the blood volume has been reduced and thus tends to conserve the flow to vital organs.

[2] Lewis, T., "The Blood Vessels of the Human Skin and Their Responses," Shaw and Sons, Ltd., London, 1927.