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Serum Phosphatase Activity in Seventeen Cases of Osteoporosis Circumscripta of the Skull.

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The term osteoporosis circumscripta was introduced by Schüller¹ to describe a peculiar affection of the skull characterized radiographically by a marked decrease in density of large areas of the calvarium, the borders of the affected areas being irregular but sharply demarcated from the contiguous normal bone. The decrease in bone density in these cases is not due to bone destruction but rather to a localized osteoporosis, as post-mortem studies have shown.^{2, 3, 4} It would appear that osteoporosis circumscripta of the skull, as defined roentgenographically, is identical with the abnormality of the skull described pathologically by Schmorl⁵ as "hemorrhagic infarction of the bone."⁶ The disease is quite distinct, however, and readily differentiated from xanthomatosis, cholesteatoma, multiple myeloma, metastatic neoplasm, and the like.

Osteoporosis circumscripta is of particular interest because, despite the dissimilarity in gross morphology, it appears to be closely related to Paget's disease. The majority of cases described thus far have also had typical Paget lesions in the skull or elsewhere in the skeleton. Where osteoporosis circumscripta was the only abnor-

¹ Schüller, A., *Brit. J. Radiology*, 1926, **31**, 156.

² Sosman, M. C., *Radiology*, 1927, **9**, 396.

³ Schellenberg, W., *Frank. Z. f. Path.*, 1931, **41**, 423.

⁴ Schüller, A., *Wien. klin. Wchenschr.*, 1931, **44**, 1577.

⁵ Schmorl, G., *Verh. deut. Path. Ges.*, 1930, **25**, 205.

⁶ Details in Kasabach, H. H., and Gutman, A. B., in preparation.

mality in the skull, follow-up studies in several instances have revealed the development of "cotton-wool" lesions typical of Paget's disease within 3 to 10 years. Most observers in the field have concluded that osteoporosis circumscripta is, in fact, a form of Paget's disease, probably an early, predominantly osteolytic phase initiating the more familiar stage of excessive bone formation.^{2, 7, 8, 9}

Whether or not this is an over-simplified view of the matter, as might be inferred from Schmorl's observations,^{5, 10} it seemed desirable to investigate the serum phosphatase activity in this disease. In polyostotic Paget's disease the serum phosphatase is consistently elevated, the increase being regarded by most investigators as a result of excessive bone formation.^{11, 12, 13} Since in the related bone condition, osteoporosis circumscripta, over-production of bone does not take place, it was of interest to determine whether or not the serum phosphatase was elevated. No data relating to this subject could be found in the literature.

TABLE I.
Blood Analyses in 17 Cases of Osteoporosis Circumscripta of the Skull* (Associated with Typical Paget Lesions in 10 Instances).

Age	Sex	Skeletal lesions associated with O.c of skull	Serum			
			Phosphatase Bodansky units per 100 cc.	Ca mg. %	Inorg. P mg. %	N.P.N. mg. %
35	♂	none	1.6	8.9	4.2	52
60	♂	"	2.0	10.6	3.6	32
45	♀	"	4.5	11.0	3.4	30
38	♂	"	4.6	—	2.7	—
63	♂	"	5.4	9.7	2.6	29
31	♀	osteofibroma (?) maxilla	7.8	9.6	3.0	—
40	♂	cyst tibia	14.9	10.8	3.7	42
59	♂	polyostotic Paget's d.	23.0	10.8	3.6	29
48	♀	" " "	31.4	12.8	1.9	29
74	♀	" " "	32.1	10.5	3.2	32
64	♂	" " "	32.5	11.5	3.2	31
54	♀	" " "	34.6	10.2	3.8	32
58	♀	" " "	36.5	10.1	3.8	36
70	♀	" " "	40.1	—	3.8	44
43	♂	" " "	45.7	10.8	3.5	—
36	♂	" " "	52.5	10.2	3.2	31
37	♀	" " "	57.9	9.8	3.6	25

* Six reported by Kasabach and Dyke⁹; the other to be published by Kasabach and Gutman.⁶

⁷ Weiss, K., *Fort. a. d. Geb. Roentgenstr.*, 1930, **42**, 376.

⁸ Meyer-Borstel, H., *Fort. a. d. Geb. Roentgenstr.*, 1930, **42**, 589.

⁹ Kasabach, H. H., and Dyke, C. G., *Am. J. Roentgen.*, 1932, **28**, 192.

¹⁰ Schmorl, G., *Virchow's Arch. f. Path. Anat.*, 1932, **283**, 694.

¹¹ Kay, H. D., *Physiol. Rev.*, 1932, **12**, 384.

¹² Bodansky, A., and Jaffe, H. L., *Arch. Int. Med.*, 1934, **54**, 88.

¹³ Gutman, A. B., and Kasabach, H. H., *Am. J. Med. Sci.*, 1935, in press.

Our results (Table I) indicate that in uncomplicated osteoporosis circumscripta of the skull the serum phosphatase activity is within normal limits or is only slightly increased (cases 1-5). When associated with typical Paget involvement of the skeleton, however, considerable increases in serum phosphatase activity occur (cases 8-17), of the same order as those seen in Paget's disease not associated with osteoporosis circumscripta. Our results are in accord with, and may be regarded as further substantiation of the view that increased phosphatase activity of the blood in bone disease is an expression of an increase in cellular processes leading to bone formation.¹⁴

Serum phosphatase was determined by A. Bodansky's method;¹⁵ serum calcium by Clark and Collip's modification¹⁶ of the Kramer and Tisdall method; serum inorganic phosphorus by the Kuttner-Lichtenstein method,¹⁷ with corrections for deviations from Beer's law.¹⁸

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Distribution of Blood Groups and Agglutinin M Among Indian "Blackfeet" and "Blood" Tribes.*

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The early work on the distribution of blood groups among the various races led to the hope that results would indicate clear-cut racial relationships, but the significance of this line of investigation has been overestimated.¹ This was the conclusion of Grove,² who

¹⁴ Robison, R., *The Significance of Phosphoric Esters in Metabolism*, New York University Press, New York, 1932.

¹⁵ Bodansky, A., *J. Biol. Chem.*, 1933, **101**, 93.

¹⁶ Clark, E. P., and Collip, J. B., *J. Biol. Chem.*, 1925, **63**, 461.

¹⁷ Kuttner, T., and Lichtenstein, L., *J. Biol. Chem.*, 1930, **86**, 671.

¹⁸ Bodansky, A., *J. Biol. Chem.*, 1932, **99**, 197.

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¹ Wiener, A. S., *Blood Groups and Blood Transfusion*, 1935, C. C. Thomas, Springfield, Ill.

² Grove, E. F., *J. Immunol.*, 1926, **12**, 251.