TABLE I. $Co^{60}B_{12}$ Binding Capacity of Saliva of Individual Subjects at Intervals of One or More Days.

	mμg $Co^{60}B_{12}$/ml saliva					
Day	LM	RB	KW	IM	JL	RR
1	17	32	16	19	63	43
2	15	43	15	25	58	42

Gyorgy *et al.*(5), reporting on Bifidus Factor, found a frequent correlation between this substance, blood group secretor factor and Castle's intrinsic factor. If salivary binding of vit B_{12} were a result of intrinsic factor activity, a correlation between this binding capacity and secretor factors might have been anticipated. However, the present study showed no such relationship. Grasbeck and others(5,6), moreover, have demonstrated the absence of salivary intrinsic factor activity.

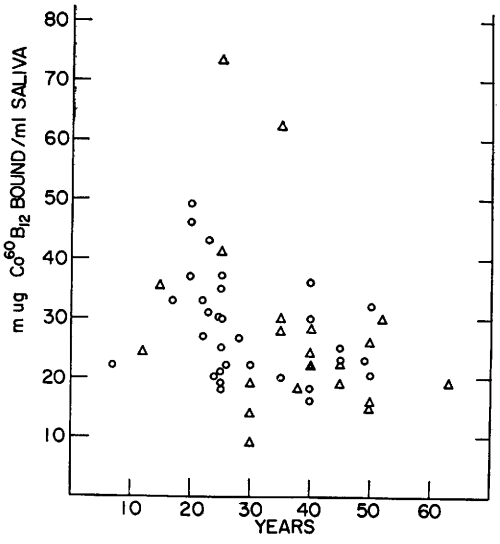

FIG. 4. Correlation of Co^{60} vit. B_{12} binding capacity of saliva with sex and age. ○ = ♀. △ = ♂.

Summary and conclusions. 1) Vit B_{12} binding capacity of normal human saliva has been estimated using Co^{60}vit B_{12} and exhaustive dialysis. It varies from 13 to 80 mμg/ml, with a mean of 31 ± 10.2 mμg/ml. 2) These values appear constant for the individual over a period of hours to days. 3) No correlation was found between vit B_{12} binding capacity and salivary specific gravity, refractive index, optical density at 280 mμ, leukocyte count, ABO blood groups or secretion of ABO substances in saliva.

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Arterial Oxygen Pressure in Dogs Breathing Oxygen at 2,5 Atmospheres Pressure.* (24403)

D. W. RENNIE† AND J. R. PAPPENHEIMER‡
Department of Physiology, Harvard Medical School, Boston, Mass.

In normal men breathing oxygen tensions of 200-760 mm Hg the oxygen pressure in arterial blood is some 30-40 mm Hg lower than in alveolar gas(1). This "A-a" O_2 difference results primarily from admixture of small quantities of systemic venous blood with fully oxygenated pulmonary capillary blood (1,2). There are no theoretical reasons for supposing that A-a difference should increase with further increase in inspired oxygen tensions. However, indirect measurements reported by Lambertsen, *et al.*(3) indicate that this may be the case. In normal men breath-

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† Postdoctoral Life Insurance Medical Research Fellow.

‡ Career Investigator, Am. Heart Assn.

TABLE I. Arterial Oxygen Tension in Individual Dogs Breathing Oxygen at Various Ambient Pressures.

	Measured quantities		Calculated quantities	
1	2	3	4	5
Exp. No.	Ambient press. (±15 mm Hg)	Pa_{O_2} (mm Hg)	A-a O_2 diff. (±10 mm Hg)	Shunt flow / Cardiac output
1	760	580	100	.06
	1900	1680	140	.07
2	760	600	80	.04
	1900	1720	100	.07
3	760	585	95	.06
	1520	1250	190	.09
	1900	1640	180	.11
4	760	475	205	.11
	1290	940	235	.12
	2050	1750	185	.11

ing O_2 at 2650 mm Hg arterial O_2 pressure calculated from O_2 content averaged 2100 mm Hg thus implying an A-a difference exceeding 400 mm Hg. An A-a difference of this magnitude is quite outside the range predicted by current theories of pulmonary gas exchange. We have recently made direct measurements of arterial O_2 tension (Pa_{o2}) in 4 anesthetized dogs breathing O_2 at 2.5 atm. The observations were incidental to a study of kidney oxygen tensions(4) and are incomplete from a respiratory point of view. Nevertheless, they show clearly that A-a O_2 difference remains unchanged as inspired O_2 pressure is increased from 760 to 2000 mm Hg.

Methods. Dogs were anesthetized with Nembutal, placed supine and provided with 100% O_2 via a demand valve and endotracheal tube. Oxygen pressure in arterial blood at 37°C was measured continuously with a polyethylene protected oxygen electrode as described elsewhere(4,5). The overall error of the method was about ±2%, *i.e.* ± 15 mm Hg at 1 atm and ± 40 mm Hg at 2.5 atm. Experiments at high pressure were carried out in the Pressure Chamber of the Univ. of Pennsylvania.§ All measurements were made at least ½ hour after adjusting inspired O_2 pressure.

Results. In 18 dogs breathing O_2 at 760 mm Hg the mean Pa_{O2} was 520, S. E. ± 14 mm Hg. In 3 dogs breathing O_2 at 1900 mm Hg the mean Pa_{O2} was 1680 ± 30 mm Hg and in 1 dog breathing O_2 at 2050 mm Hg the Pa_{O2} was 1750 mm Hg. Data from experiments at high ambient pressure are summarized in Table I. It is clear that O_2 pressure difference between inspired gas and arterial blood was not significantly increased at high ambient pressures. The significance of this result in terms of A-a O_2 difference is discussed below.

Discussion. Alveolar O_2 pressure (P_{AO2}) breathing 100% O_2 is equal to total ambient pressure (P_B) less the sum of the vapor tension (47 mm Hg) and alveolar CO_2 tension (25-45 mm. Hg). Variations of CO_2 are negligible in comparison to total pressure and for practical purposes, within an error of ± 10 mm Hg, $P_{AO2} = P_B - 80$ mm Hg. Using this relation we have calculated A-a O_2 differences as shown in Table I, column 4. There was no significant change of A-a O_2 in each animal as inspired O_2 was increased from 760 to 1900 or 2050 mm Hg. The absolute values of A-a O_2 difference varied considerably from one animal to another at all ambient pressures and were always greater than in normal men breathing O_2 at 1 atm. Thus in 18 dogs breathing O_2 at 1 atm. the mean A-a O_2 difference was 140 ± 15 mm Hg (range 20 to 330 mm Hg) in contrast to values in the range 30-40 mm Hg found in normal men. It is probable that in the lungs of supine, anesthetized dogs there is an abnormally large shunt effect with correspondingly increased A-a difference. Evidence favoring this explanation is shown in Col. 5 of Table I. Here we have calculated the ratio of venous shunt flow to total pulmonary flow (cardiac output) which would give rise to the arterial O_2 tensions observed at each ambient pressure. The calculation was made as described by Bartels and Rodewald(1), assuming that systemic venous blood contained 5 v.p.c. less O_2 than arterial blood. The calculated shunt flow ranged from 4-12% of cardiac output (average 9%)

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in contrast to the average value of 2% found in normal man(1). In any one animal there was no significant change in calculated shunt flow as ambient pressure was increased from 760 to 2000 mm Hg.

It remains to consider possible reasons for the low estimate of Pa_{O2} made by Lambertsen *et al.*(3) on the basis of analyses for arterial O_2 content in normal men breathing oxygen at 2650 mm Hg. If these estimates are correct they would imply a shunt flow of 25% of the cardiac output or alternatively an obscure physical limitation on diffusion of O_2 at 3.5 atm. which we could not detect at 2.5 atm. It seems more likely, on the basis of present results, that the discrepancy is due to a small systematic error in estimation of O_2 pressure by the indirect method. In the experiments of Lambertsen, *et al.*(3) O_2 pressure was calculated from the solubility of O_2 in whole blood and the difference between total and combined O_2 in arterial blood. Total O_2 was estimated manometrically at 1 atm. after anerobic transfer of samples from 3.5 atm.; O_2 capacity was estimated spectrophotometrically. A loss of 5% of the O_2 during transfer or an absolute error of 5% in comparing manometric with spectrophotometric analyses could account for the results. Dr. Lambertsen informs us, however, that in subsequent unpublished experiments using the same technics at 2 atm. he was unable to detect a significant increase in A-a O_2 difference. The possibility remains, therefore, that the original measurements were correct.

Summary. In supine, anesthetized dogs breathing 100% O_2 the alveolar-arterial O_2 difference is unaltered when ambient pressure is increased from 1 to 2.5 atm. The results can be explained in terms of constant admixture of systemic venous blood with fully oxygenated pulmonary capillary blood. It is likely, but not proven, that previous estimates of arterial O_2 pressure at high barometric pressures are too low.

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Effect of Lactation upon Thyroid Secretion Rate in the Rat.* (24404)

CLARK E. GROSVENOR† AND CHARLES W. TURNER
Department of Dairy Husbandry, University of Missouri, Columbia

The role of thyroid gland hormone in influencing lactation has been derived primarily from observing the effects of hypo- and hyperactivity of the gland upon milk production. Few data, however, have appeared in regard to whether thyroid function is altered at this time. There is some evidence thyroid hormone output may increase during lactation in the cow(1), ewe(2), goat(3) and mouse(4), but not in the rat(5). As the latter investigation was conducted during the last third of lactation it seemed of interest to reinvestigate, by use of modern radiobiological technics, thyroid hormone secretion in the rat during the period of intense lactation.

Materials and Methods. Adult primiparous female rats of the Sprague-Dawley-Rolfsmeyer strain weighing 260-300 g were kept under conditions of uniform temperature (78 ± 1°F) in a room artificially illuminated during normal daylight hours for 6 weeks prior to experiments. Some were bred with male rats of the same strain during this time. Each of 16 litters born within 36 hours of each other was reduced to 6 young shortly

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† Postdoctoral Fellow of N.I.H.