50 µg/100 ml. medium, was added to duplicate flasks. The oxygen uptake of the leucocytes was examined by the direct method of Warburg using air as the gas phase. Readings were taken every 15 min. The results were expressed as the uptake of oxygen in µmoles/h/10⁷ leucocytes.

Table 1. UPTAKE OF OXYGEN BY LEUCOCYTES (µMOLES/h/10⁷ LEUCOCYTES)

Control	µgm TRIAC/100 ml. medium	50
1. 0.088	0.090	0.089
2. 0.100	0.103	0.100
3. 0.112	0.107	0.112
4. 0.084	0.077	0.079
5. 0.073	0.078	0.098

The results are shown in Table 1. Each value is the average of 2 readings. Patients 1-4 were receiving no therapy. Although they were hypothyroid, the uptake of oxygen by their leucocytes failed to show the stimulation produced by TRIAC which is usually found in patients with primary hypothyroidism. Patient 5, however, although he was also hypothyroid, was receiving maintenance treatment with cortisone. Unlike the other patients, there was a significant increase in the uptake of oxygen by his leucocytes as a result of incubation with TRIAC. It is possible that, in this patient, cortisone facilitated the access of the thyroid hormone to the site of action. The absence of the expected stimulation of oxygen uptake by TRIAC in patients with untreated secondary hypothyroidism may therefore, in part at least, be related to the secondary adrenal deficiency. Our findings at present do not permit further speculation, but once more emphasize the importance of the inter-dependence of the endocrine glands.

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I. PROVAN C. MURRAY
SHEENAH K. BISSET

University Department of Medicine,
Royal Infirmary,
Glasgow.

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Stimulation of Secretion of Insulin by Adenosine-triphosphate

In previous papers¹⁻⁴ we showed that different metabolites, both *in vivo* and *in vitro*, produce insulin secretion which we measured by the method of the epididymal fat of the rat. In view of some of these results we decided to ascertain whether the intravenous injection of ATP was a stimulant to insulin secretion; although we are aware that the point of view actually held is that the metabolic processes affected by this nucleotide are intracellular.

Animals from our rat colony (140-160 g) were intravenously injected with ATP 1.7×10^{-2} M (total volume 0.25 ml., pH 7) and killed immediately after the injection (10-20 sec.). The evaluation of the plasma insulin effect and glucose uptake of the diaphragm and epididymal fat were carried out following the method already described³. As control of the effect of the ATP injection, we injected

the same quantity of hydrolysed ATP (1.0 hydrochloric acid for 10 min at 100°C) and other experiments were also realized with hydrolysed ATP versus control.

As is shown in Table 1, the injection of ATP produces secretion of insulin, which shows itself by a greater plasma insulin effect and the increase of the glucose uptake of the diaphragm and of the epididymal fat. This action is similar to, although much speedier than, that obtained when we used glucose and *L*-leucine injections. On the other part, the hydrolysed ATP has no effect. The results obtained show the need to know the mechanism of action implied by possible extra-cellular activity of this nucleotide.

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J. L. R-CANDELA

M. C. GARCIA-FERNANDEZ

Instituto 'G. Marañón',
Velazquez 138,
Madrid, 6.

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Transport of Potassium Ions in the Rat's Intestine

THE transport of sodium ions across the epithelium of the small intestine of the rat seems to be an active process (for a review of the evidence see Durbin, Curran and Solomon¹). This active transport of sodium ions may be responsible for the potential difference existing across the gut wall, the mucosal side of which is negative with respect to the serosal side. In the jejunum the amplitude of this potential reported in the literature ranges from about 8 mV (refs. 2, 3) to 12 mV (ref. 4); the potentials in the ileum are smaller³.

Evidence for the active transport of ions other than sodium across the epithelial membrane is slight and the possibility has frequently been discussed that many cations and anions move passively along their electrochemical gradients^{1,2,5,6}. We have been interested in the transport of potassium ions by the epithelial cells of the rat's jejunum and ileum. From measurements of the concentration of this ion on both sides of the cellular barrier between mucosa and serosa, together with determinations of the transcellular potential, we have come to the conclusion that the total electrochemical potential of the potassium ions is the same on both sides of the epithelial membrane. This provides experimental evidence for the suggestion that the transport of potassium ions is a passive process and there is no need to postulate an active transport mechanism.

The rat's small intestine was divided into 'jejunal' and 'ileal' portions and the lumen was perfused *in vitro* by the method described by Gilman and Koelle⁷. The perfusion fluid was Krebs's bicarbonate solution gassed with 95 per cent oxygen and 5 per cent carbon dioxide, at pH 7.4 and at 37°C. It flowed at a rate of 5-7 ml./min; this provided

Table 1. MEANS OF INSULIN ACTIVITY OF BLOOD PLASMA, GLUCOSE UPTAKE BY DIAPHRAGM AND ADIPOSE TISSUE AFTER ATP INJECTION

Injection	Insulin activity of blood plasma mg/100 of tissue *	Glucose uptake by diaphragm mg/100 of tissue *	Glucose uptake by adipose tissue mg/100 of tissue *
ATP (1.7×10^{-2} M)	0.240 ± 0.016 (16)	0.486 ± 0.016 (32)	0.290 ± 0.017 (30)
Control (hydrolysed ATP 1.7×10^{-2} M)	0.157 ± 0.018 (13)	0.382 ± 0.013 (32)	0.202 ± 0.018 (30)
Hydrolysed ATP 1.7×10^{-2} M	0.186 ± 0.017 (18)	0.448 ± 0.008 (66)	
Control	0.189 ± 0.022 (10)	0.456 ± 0.015 (35)	

* All values are means ± S.E. The values in parentheses represent the number of experiments.