pH Decline in the Two Layers of the Panniculus Adiposus

THE post-mortem *p*H decline in a tissue has been accepted as an indication of the underlying, concomitant physical and chemical changes[1,2]. The relationship of this acidity development to subsequent tissue processing and organoleptic properties has also been established[3,4]. Although such investigations with muscle tissue have received considerable attention[5–9], similar investigations have not been undertaken with adipose tissue. Consequently, this investigation was conducted to determine the rate and extent of *p*H decline, if any, in adipose tissue.

Ten experimental animals (*Sus domesticus*), averaging 120 kg and similar in genetic and nutritional backgrounds, were used in this investigation. Samples of the panniculus adiposus were excised from the lumbar region of the right side of the carcass immediately after exsanguination and at 30 min, 1, 2, 3, 4 and 24 h *post mortem*. The *p*H values of the outer and inner layers of this subcutaneous adipose tissue were measured with a Beckman 'Zeromatic' *p*H meter equipped with a combination probe-electrode. The *T*-test of significance and the simple correlation coefficients were calculated by the methods outlined in Steel and Torrie[10].

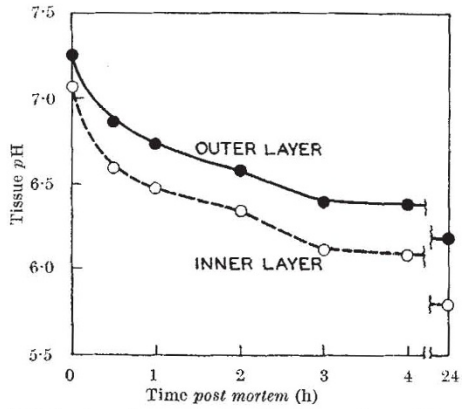

Fig. 1. Post-mortem changes in the *p*H of the outer and inner tissue layers of the panniculus adiposus

The results in Fig. 1 show the features of the post-mortem *p*H decline in the outer and inner layers of the panniculus adiposus. These data demonstrate that a gradual acidification does occur in adipose tissue following death. Further (Table 1), the two layers of this tissue are noted to differ significantly in *p*H values.

The outer layer of the panniculus adiposus always exhibited a higher *p*H regardless of the time *post mortem* at which it was measured. It can also be observed (Table 1) that the rate of *p*H decline (in 24 h) and its extent (ultimate *p*H) were more marked in the inner than in the outer layer.

Table 1. POST-MORTEM *p*H AND HYDROGEN ION CONCENTRATION (MOLES $\times 10^{-7}$) CHANGES IN THE OUTER AND INNER TISSUE LAYERS OF THE PANNICULUS ADIPOSUS

Panniculus adiposus layer	Initial (0-h) *p*H	Initial (0-h) H^+	Ultimate (24-h) *p*H	Ultimate (24-h) H^+	Difference *p*H	Difference H^+
Outer layer	7·25	0·62	6·18	8·99	1·07	8·37
Inner layer	7·07	0·92	5·79	17·53	1·28	16·60
Difference	0·18*	0·30*	0·39†	8·54*	0·15	8·23*

* $P < 0.05$.
† $P < 0.01$.

Table 2. CORRELATION COEFFICIENTS BETWEEN THE POST-MORTEM *p*H MEASUREMENTS IN THE OUTER AND INNER TISSUE LAYERS OF THE PANNICULUS ADIPOSUS

Inner tissue layer / Outer tissue layer	0-h *p*H	0·5-h *p*H	1-h *p*H	2-h *p*H	3-h *p*H	4-h *p*H	24-h *p*H
0-h *p*H	0·95†	0·84†	0·63*	0·64*	0·54	0·49	0·54
0·5-h *p*H	0·93†	0·97†	0·93†	0·83†	0·84†	0·80†	0·64*
1-h *p*H	0·79†	0·84†	0·97†	0·71*	0·83†	0·80†	0·61
2-h *p*H	0·53	0·51	0·62	0·84†	0·85†	0·84†	0·53
3-h *p*H	0·37	0·47	0·64*	0·57	0·86†	0·88†	0·39
4-h *p*H	0·24	0·39	0·57	0·53	0·84†	0·86†	0·34
24-h *p*H	0·35	0·18	0·09	0·18	0·20	0·20	0·48

* $P < 0.05$.
† $P < 0.01$.

Although these data demonstrate the *p*H differences between the two layers of the panniculus adiposus, the simple correlation coefficients (Table 2) suggest a metabolic relationship in the development of post-mortem acidity in this adipose tissue.

The problem remains to relate these observations to the actual physical and chemical events occurring in the tissue.

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Studies on Spermatozoa and Fluid collected directly from the Testis of the Conscious Ram

RAM spermatozoa require 12 to 15 days to traverse the epididymis[1] and during this time undergo changes which have been called maturation. In order to investigate these a technique has been developed for the continuous collection of spermatozoa before they enter the epididymis so that their *in vitro* metabolism may be compared with that of ejaculated spermatozoa from the same ram. The technique has also enabled a continuous collection of the fluid which is secreted by the testis and in which testicular spermatozoa are carried to the head of the epididymis. To our knowledge this investigation represents the first evaluation of testicular fluid and spermatozoa collected from conscious animals.

Nine adult merino rams kept in a climate room at 21° C were used. Under general anaesthesia and aseptic precautions, the head of the epididymis was dissected off the tunica albuginea and raised until the efferent ducts were located and severed. A ring of silicone rubber, with a plug fitting into the top, was sewn to the tunica albuginea so that it included the cut efferent ducts in the space so formed. The fluid from the efferent ducts flowed into this space, then down one of two tubes sealed into the wall of the ring, and was collected in a receptacle attached to the scrotum; samples for chemical analysis were collected into a receptacle surrounded by solid carbon dioxide. The other tube was occluded and used for daily flushing (Fig. 1).

The testicular fluid obtained was turbid and flowed at a rate of $1{\cdot}0 \pm 0{\cdot}11$ ml./h/100 g of testis (range 0·76–1·45; five rams) or at a rate of about 50 ml./day from a testis of average size. Spermatozoa were present at a concentration of $67{\cdot}2 \pm 17{\cdot}8 \times 10^6$/ml. (range $14–123 \times 10^6$; five rams). The total daily production was $1{\cdot}6 \pm 0{\cdot}43 \times 10^9$ spermatozoa/100 g of testis or $3{\cdot}3 \times 10^9$ spermatozoa from an average-size testis. These figures agree with the calculated sperm production of Ile-de-France[2] and Suffolk rams[3].