As far as we are aware, high Na_e in SHR rats has not been reported by others. The only report suggesting such a result was that published by Berglund et al.[5] in which a 7-day balance experiment indicated a greater sodium retention in SHR aged 16 weeks than in similarly aged WKY rats.

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Hepatic oxygen consumption, in vivo, in the rat

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Summary. A method is described that quantitates hepatic oxygen consumption, in vivo, in the rat. This method can evaluate hepatic oxygen consumption resulting from chronic conditions that may alter it.

Hepatic oxygen consumption ($\dot{V}O_2$) is an important physiologic measurement whenever hepatic hemodynamic studies are performed. No method for, in vivo, $\dot{V}O_2$ has been evaluated in the rat. This report examines the feasibility for measuring, in vivo, $\dot{V}O_2$ and establishes the $\dot{V}O_2$ values in the rat.

Materials and methods. Male Sprague-Dawley rats (mean b. wt 326 g) were anesthetized with ketamine HCl (100 mg/kg b. wt i.m.). Polyethylene catheters (PE-50) were placed into the left ventricle and left femoral artery. The trachea was intubated with a soft plastic tube (2.8 mm OD) that was connected to a rodent respirator (Harvard Apparatus), set at a rate of 80/min and tidal volume adjusted for body weight. A 4-cm midline abdominal incision was made to the xyphoid and the animal was allowed to recover from the procedures.

Hepatic blood flows – hepatic arterial (HAF), portal venous (PBF) and total hepatic (THBF) – were measured by a left ventricular injection of ^{141}Ce-labeled microspheres (15 ± 3 µm diameter) with a reference sample[3, 4]. After the microsphere injection, the central liver lobe was rotated to the right (fig.). Two separate, 0.3 ml samples of hepatic venous blood were withdrawn into heparinized syringes that were capped with rubber luer lock tips and placed into iced water. Similar samples were obtained from the femoral artery catheter and from the portal vein, through a 21-gauge Butterfly needle, by rotating the duodenal loop to the left. The animal was sacrificed with saturated KCl.

Hepatic blood flows are calculated as previously described[3] and are expressed in $ml \cdot min^{-1} \cdot g\ liver^{-1}$. Arterial, portal venous and hepatic venous blood samples were measured for oxygen content by a total oxygen analyzer (Lex-O_2-Con)[5] and for blood gases (pH, pO_2, pCO_2) by a Corning blood gas analyzer (Model 165). Total hepatic oxygen delivery (O_2 delivery), $\dot{V}O_2$ and hepatic oxygen extraction (% extraction) were calculated from hepatic blood flows and oxygen content[6]. The results are shown as means ± SE and Student t-tests were used for statistical analysis.

Results and discussion. Hepatic blood flows and $\dot{V}O_2$ were evaluated in 8 rats (table). Oxygen content (ml O_2/100 ml blood) was 15.7 ± 0.3 in arterial, 8.1 ± 0.5 in portal venous and 5.2 ± 0.3 in hepatic venous blood samples. Blood gas measurements (pH, pO_2, pCO_2) in arterial blood was 7.40 ± 0.02, 80 ± 4 mm Hg, 34 ± 2 mm Hg; in portal venous, 7.31 ± 0.01, 38 ± 1, 44 ± 2; and in hepatic venous, 7.37 ± 0.01, 26 ± 1, 41 ± 2.

We have also shown that mechanical ventilation does not affect hepatic blood flows since, in 13 nonventilated rats, HAF (0.35 ± 0.04), PBF (1.38 ± 0.11) and THBF (1.73 ± 0.11) were similar (p = NS) to the ventilated rats. Also, rotating the duodenal loop to expose the portal vein

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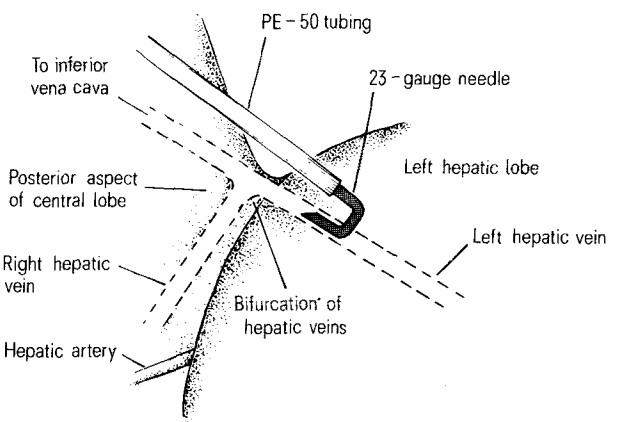
	Mean ± SEM
HAF[a]	0.39 ± 0.05
PBF[a]	1.34 ± 0.10
THBF[a]	1.73 ± 0.09
O_2 delivery[b]	17.1 ± 0.9
$\dot{V}O_2$[b]	8.1 ± 0.8
% extraction	47.3 ± 2.9

[a] $ml \cdot min^{-1} \cdot g^{-1}$; [b] $ml\ O_2 \cdot min^{-1} \cdot 100\ g^{-1}$.



A preshaped, 23-gauge needle is inserted through the liver parenchyma into the left hepatic vein with the aspirating tip placed at the bifurcation of the left and right hepatic veins.

produced no change in intestinal blood flow (1.21 ± 0.11 ml · min^{-1} · g^{-1}, rotated, vs 1.17 ± 0.10, nonrotated; p = NS). Similarly, the ratio of HAF to PBF was 0.31 when the central liver lobe was not rotated, compared to 0.35 (p = NS) when it was rotated. These results indicate that the experimental conditions necessary for this method do not greatly alter hepatic hemodynamics.

An in vivo method for quantitating $\dot{V}O_2$ in the rat is advantageous because the relationship between O_2 delivery and O_2 extraction can be directly evaluated. For example, an experimental setting that increases $\dot{V}O_2$ should be compensated by an increased O_2 delivery or an increased O_2 extraction. By comparison, previous methods that have evaluated $\dot{V}O_2$ in the rat are liver slice preparations or the isolated perfused liver. Liver slice preparations measure liver respiration[7] and cannot evaluate the O_2 delivery-O_2 extraction relationship. The isolated perfused liver has an O_2 delivery above physiologic levels[8], that cannot change according to O_2 demand as happens in the in vivo preparation. It is acknowledged that $\dot{V}O_2$ in the isolated perfused liver cannot be extrapolated to the in vivo setting[6, 9].

The in vivo method described in this report is particularly applicable for evaluating $\dot{V}O_2$ when chronic pharmacologic administration, for instance, might alter VO_2. In this context, in vivo measurement of $\dot{V}O_2$ is the only method that can adequately evaluate the experimental conditions.

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Regulation of foregut motility in the house cricket, *Acheta domesticus* L.

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Summary. The effects of severance of stomatogastric nerves on the contraction rate of the musculature of the crop of *Acheta domesticus* indicates the existence of a stable myogenic rhythm in the foregut muscularis, which is normally masked by nervous influences.

The foregut of insects generally shows a complex, variable and often continuous activity, apparently independent of the rest of the gut[1]. Though evidence from pharmacological studies[1–6], nerve severance[7–11] and direct stimulation of nerves[3, 12, 13] suggests that nervous influences may be important in the control of the foregut muscularis, the variability of foregut activity and the virtual impossibility of producing truly standardized gut preparations have made definite conclusions difficult. In the present investigation, the nervous influence on the activity of the foregut of *Acheta domesticus* has been examined in isolated gut preparations after nerve severance.

Guts of experimental animals were standardized as far as possible by feeding on an exclusive diet of molar sucrose solution and water for 3 days prior to examination. Entire guts, with stomatogastric nervous system and brain attached, were removed, pinned under slight tension onto Silgard in a petri dish base, and vigorously aerated.

The oesophagus and crop of *Acheta domesticus* show peristaltic waves in both forward and reverse directions. These movements may involve the entire musculature of the region, the ventral surface only, or may be localized, apparently disorganized, areas of movement. The most consistently active region is the ventral area bounded by the 2 oesophageal nerves. Rates of contraction were estimated by selecting a point at about the mid-line of the ventral surface of the crop and counting the waves of contraction passing through it. Even after standardization of isolated guts, the rate of contraction varied from 1 per 2 sec to less than 1 per min.

Experiments to determine the extent of nervous influence on muscular activity in this region took the form of progressive denervation of the isolated gut by sequential severance and extirpation as follows: 1. Frontal connective severance; 2. recurrent nerve severance; 3. hypocerebral ganglion removal; 4. oesophageal nerve removal. Operation 4 leaves the gut entirely denervated except for its own intrinsic neurons.

Frequencies of contraction were often altered by the operations, but in an apparently unpredictable way. However, by plotting the change in the rate of contraction caused by each operation against the rate before surgery, a pattern can be seen (fig.). For all operations except recurrent nerve severance there is a significant correlation between the 2 parameters.

In all cases in which the correlation is significant, the regression line crosses the x-axis at a similar value of preoperative peristaltic rate. This suggests the existence of an underlying stable frequency of contraction in the foregut. Above this frequency, denervation tends to decrease the contraction rate; below it, denervation increases the rate.

By dropping a vertical line through the points at which the