blue. The compound was not formed *in vitro* by liver slices, erythrocytes or serum when incubated with trypan blue.

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## Electrolyte Levels of Rat Salivary Secretions.* (25018)

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Recent work on rat salivary glands has revealed differences in levels of sodium and potassium in the 2 gland pairs (submaxillary-sublingual and parotid)(1). Resting submaxillary-sublingual has a high level of potassium and low sodium; resting parotid, on the other hand, exhibits a high sodium and low potassium. Stimulation of these glands over a 20 minute period, by pilocarpine, results in a loss of sodium by the parotid, while the submaxillary-sublingual loses potassium. In view of these differences in gland levels and pattern of behavior on stimulation, the electrolyte levels of submaxillary-sublingual and parotid salivas were investigated for possible correlation between electrolyte levels in the saliva and those of glands.

*Methods.* Adult male Long-Evans rats, weighing approximately 350 g, were fasted for 48 hours, and following light anesthetization with Nembutal, parotid or submaxillary-sublingual ducts were exteriorized, pilocarpine nitrate (2.2 mg) was subcutaneously administered, and the secretions collected from the freed ducts. To avoid contamination by residue in the ducts, the first drops were discarded. The duct was then led into a tared vessel covered with Parafilm. Following a timed collection period, usually 3 minutes, the vessel was reweighed, the secreting gland removed, and weights of both were recorded. Flow is thus expressed as mg/min or mg/min/mg of gland. An alternate collection method involved recovery of saliva from the oral cavity of animals from which one gland pair had previously been removed. Minor glands were found to contribute negligible quantities of fluid during short periods of stimulation. Electrolyte levels of each secretion were similar for the 2 collection methods during the short period of stimulation. Collection from the oral cavity was possible with restrained, unanesthetized animals; hence, this method was employed primarily to investigate possible effects of anesthetic on saliva electrolyte levels. Blood samples were removed from the jugular vein. After proper dilution of serum and salivary secretions, determinations of sodium and potassium were made by flame photometry and are expressed as milliequivalents per liter of secretion or serum.

*Results.* Representative values for electrolyte concentrations as well as flow rate during an initial 3 minutes of collection of submaxillary-sublingual and parotid gland secretions from the appropriate ducts are given in Table I. Sodium levels of submaxillary-sublingual secretions are low (generally less than 1/10 that of serum), and, while there may be as much as a 2-fold variation in Na levels among animals, it is apparent from Table I that such differences, in this time period, are not functions of gland size or secretion flow rate. Potassium levels of this secretion are very high, and again individual variation among animals is not correlated

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TABLE I. Electrolyte Levels of Rat Salivary Secretions* and Serum.

| | Na, meq/l | K, meq/l | Flow rate, mg/min./mg | Total Na + K, meq/l |
|---|---|---|---|---|
| Submaxillary sublingual | 16.3 | 57.5 | .018 (282)‡ | 74 |
| | 12.5 | 45.0 | .056 (324) | 58 |
| | 12.5 | 62.5 | .075 (362) | 75 |
| | 10.0 | 50.0 | .013 (250) | 60 |
| | 7.5 | 50.0 | .052 (298) | 58 |
| Mean | 11.8 | 53.0 | | 65 |
| Parotid | 143 | 19.5 | .075 (188) | 163 |
| | 135 | 17.0 | .047 (256) | 152 |
| | 143 | 22.5 | .110 (208) | 166 |
| | 140 | 16.5 | .048 (142) | 157 |
| | 143 | 17.0 | .079 (240) | 160 |
| | 148 | 18.5 | .029 (278) | 167 |
| Mean | 142 | 18.5 | | 161 |
| Serum† | 143 | 4.9 | | 148 |

* Stimulation by pilocarpine of nembutalized animals; fluid collected for 3 min. from duct.
† Mean values (meq/l serum) for 4 animals.
‡ Numbers in parentheses are gland wt in mg.

with gland size or secretory rate of flow. Although potassium concentration of this secretion is approximately 10 times greater than that of serum, total Na + K concentration of saliva is appreciably less than for serum. Furthermore, even if the reported saliva calcium concentration is included in calculation of electrolyte content of this saliva(2), submaxillary-sublingual saliva is markedly hypo-osmotic to serum. Electrolyte pattern in the secretion of this gland complex generally resembles that of submaxillary secretion of dog (3) and submaxillary and parotid of man(4).

In parotid gland secretion, obtained also by duct collection during an initial 3 minute period of flow, sodium level is relatively high, closely approximating that of serum, and in contrast to flow rate, shows little variation among individual animals. Potassium concentration of parotid saliva is low compared with that of submaxillary-sublingual saliva but nonetheless represents at least a 3-fold increase over potassium level of serum and shows no correlation with gland size or, for this period, fluid flow rate. Total Na + K concentration in each case recorded (Table I) exceeds that of blood serum. Similar results have been obtained for parotid secretion collected from unanesthetized animals. Sodium-potassium pattern of parotid gland secretion of the rat thus bears a certain similarity to that of sheep parotid(5), pancreas(6), human lacrimal gland(7) and, possibly, rabbit parotid gland(8).

*Summary.* Rat submaxillary-sublingual and parotid gland secretions, collected directly from salivary ducts for initial period of 3 minutes during stimulation by subcutaneously administered pilocarpine, exhibit patterns of sodium-potassium concentration that differ markedly from each other. Submaxillary-sublingual saliva is essentially hypo-osmotic to serum, with sodium concentration of 12 meq/l and K of 53 meq/l, while parotid saliva has a total sodium-potassium concentration above that of serum (Na, 142 meq/l; K 18.5 meq/l). A broad correlation between gland sodium and potassium levels, together with changes on stimulation, and levels of these electrolytes in secretions from these glands is indicated.

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