Adenomata of the salivary glands are rare, and the actual existence of such tumors has been questioned by McFarland (1). In a review of the literature he found 14 tumors called adenoma, and 30 referred to under a variation of the name adenoma. In view of his experience with mixed tumors of the salivary glands, he concluded that all these cases formed a series, at one end of which were the mixed tumors, and at the other the adenomata. He further concluded that nearly all, if not all, of the reported adenomata were in reality mixed tumors of unusual appearance. One criticism, which does not in any way invalidate his conclusions, is that of the group of 30 cases which he mentioned, 5 have been shown to belong to an entirely distinct class, namely, adenocystoma lymphomatous, and to have, most probably, no relation to mixed tumors (2).

Evidence of the soundness of McFarland’s views may be found in personal experience and in the publications of other authors. For example, in a study of 25 salivary gland tumors, Fry (3) found 16 typical mixed tumors, and 9 which he called atypical. Of the latter, 3 resembled the more cellular parts of the former, and of them he said: “It is impossible to exclude them from the group of adenomata.” Although it is presumptuous to diagnose unseen the tissues which another has studied, it would seem more logical to consider these three growths as merely atypical mixed tumors.

Lang (4) accepted as adenomata the parotid tumors of Lambret and Pelissier, Nasse, Lecène, Ribbert, Kaufmann, Schutz, and Czierer; the sublingual tumors of Wagner, Niccoladoni, and Zeissl; and the submaxillary tumors of Talazac, and Duplay. McFarland reviewed the cases of Lambret and Pelissier, Nasse, Lecène, Schutz, Talazac, and Duplay, but did not mention the others.

McFarland (1) reported a case which he thought was possibly a parotid adenoma. It occurred in a man of seventy-one years, and was of three years’ known duration. Application of radium caused so much swelling that the tumor was excised. It measured 4.5 × 4 × 2 cm., was soft, solid, and dark reddish-brown. Presumably it was encapsulated. The cells were arranged in lobules, but acinus formation, if present, was obscured by the irradiation. Only one duct was seen. McFarland did not describe the tumor in much detail, but pointed out that it bore little resemblance to normal parotid tissue, and said that it was probably as much like salivary gland and as much like adenoma as any of the other reported cases, although really very little like either. He said further: “It does not aid in proving or disproving the contention that there are or are not adenomas of the salivary glands.” From McFarland’s illustrations it seems probable that the cells closely resembled
or were identical with the "onkocytes" of Hamperl (5, 6). They also resemble the cells in the tumor to be described here.

Since the publication of McFarland's paper additional reports of salivary gland adenoma have appeared. Hückel (7, 8) described briefly three parotid tumors composed of parathyroid-like cells, and Franssen (9) recorded a fourth. Steinhardt (10) reported a solid adenoma which he felt was derived from cells which were related to the transition forms between normal cells and the onkocytes of Hamperl. Whether any or all of these are in reality atypical mixed tumors we are not prepared to say.

![Image](image_url)

**Fig. 1.** Salivary gland tumor showing admixture of normal acini and tumor cell masses

Some of the tumor masses are small. In the right lower corner is a nodule composed entirely of tumor cells. The normal acini are lightly stained. Phloxine methylene blue. × 48.

In a study of the uvula, and sublingual and submaxillary glands in 85 individuals ranging in age from infancy to ninety-six years, Hamperl (5) found a type of cell which he named the onkocyte. In 1897 Schaffer had described these as granular swollen cells, and in 1926 Zimmermann called them pyknocytes. They found these cells in the serous glands of the tongue, and in the mucous glands of the tongue, floor of the mouth, uvula, pharynx, esophagus, trachea, and sublingual glands (5). Hamperl found none before the age of twenty years. They occurred with increasing frequency up to the age of seventy, and thereafter were nearly always present. Hamperl thought they arose as a result of dedifferentiation, and described transitions between them and normal mucous and serous cells of the glands and the cells lining the ducts. The cells were enlarged and had darkly staining nuclei. Many of the nuclei were indented. According to the stain employed, the cytoplasm
Figs. 2 and 3. Photomicrographs showing the intimate relation of small groups of tumor cells to the ducts.

The ducts in these fields are normal. Phloxine methylene blue. × 225.
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3

appeared finely reticulated or finely granular, both granules and reticulum being acidophilic. Mallory's aniline blue was found to be the best stain. With it the granules were red, and sometimes a bluish-red network was also seen, the granules lying in the interstices. Mitoses were not seen. Hamperl considered the nuclear change more characteristic than the cytoplasmic one. In places the onkocytes formed fairly solid cell masses, which contained a few small lumina. Although the cells about the lumina were disposed radially, the others showed no orderly arrangement. At the periphery of these masses the onkocytes formed ducts which connected with the ducts of the glands. In some cases the onkocytes lined tortuous, closely packed tubules. The lumina were in places wide and in places narrow. Between the tubules was a scanty connective-tissue stroma with scattered lymphocytes. None of these structures was encapsulated, and Hamperl never saw tumors arising from them.

FIGS. 4-6. THREE CONSECUTIVE SECTIONS OF SALIVARY GLAND TUMOR

The upper half of the duct in the center of the field in the first two photographs is lined by tumor cells, and the lower half by normal cells. In the third section the duct has divided, the lower branch being lined entirely by normal cells, and the upper one forming a solid mass of tumor cells. Normal acini are seen above and to the left. Phloxine methylene blue. × 465.

Gruenfeld and Jorstad (11) have recently described a tumor apparently identical with the one to be reported here. Their patient was a sixty-eight-year-old white woman who had had a parotid tumor for three years. The tumor lay in the lower half of the gland, was completely encapsulated, and was surrounded by a thin layer of normal parotid tissue. It was brownish-red, and composed of nodules of differing sizes. The tumor cells were of high cuboidal type, with eosinophilic, spongy cytoplasm, and small, clear, regular nuclei. In the centers of the larger nodules the cells were arranged in solid cords resembling liver-cell cords. Elsewhere lumina were seen. Tubule formation was especially pronounced in the smaller nodules. The individual tumor nodules were separated by collagenous tissue or by masses of normal salivary gland parenchyma. The appearance was that of a benign tumor with multicentric origin of the cells from ducts. In one of the small nodules emergence of tumor cell groups from a secretory duct was demonstrated by serial sections. The statements that this tumor was completely encapsulated and that it contained normal salivary gland parenchyma seem contradictory, for if normal tissue were present, the nodule should not have
The numbers on the corresponding diagrams show the position in the series. The diagrams indicate ducts to which particular attention is to be paid. A few normal acini are seen above and to the left of nearly all photographs. The remaining cells are tumor cells. The upper left outlined branch of the duct seen in Section 1 joins with normal acini in Sections 9 and 10, and the upper right branch joins with normal acini in Sections 17 and 18. The left lower branch joins a normal acinus in Section 15. The right lower branch joins with tumor cell masses in Sections 20 and 23. Phloxine methylene blue. × 90.
DIAGRAM 1 (FIGS. 7-15)
See legend for Figs. 7-15.
been completely encapsulated unless it represented an accessory salivary gland. These authors state that an identical tumor was described by Blair and Olch in their chapter on "Diseases of the Salivary Glands" in Lewis' *System of Surgery*, and consider both these tumors as arising from onkocytes.

**Report of a Case**

A seventy-year-old white man had had a tumor at the angle of the right jaw for more than a year. At operation no line of cleavage could be found between the palpable tumor and the parotid gland. The gland was excised, but a small amount of tissue was left in
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the region of the facial nerve and high under the mandible. Radon seeds were implanted and a course of x-ray treatment given. A year and a half later, there had been no recurrence.

The surgical specimen consists of a mass of firm, reddish-brown tissue measuring $3 \times 4 \times 4$ cm. The surface is nodular and covered in part by a thin capsule. Section reveals many rounded, dark brown lobules, 2 to 6 mm. in diameter, separated by gray trabeculae.

Sections contain ovoid or polyhedral neoplastic lobules 1 to 3 mm. in diameter surrounded by a very small amount of collagenous tissue. Most of these form rounded aggregates ranging up to 12 mm. in diameter surrounded by a greater amount of collagenous tissue. The neoplastic tissue is obviously displacing the normal tissue, and at the periphery...
of many of the smallest lobules are foci in which normal parotid acini persist. Depending upon the orientation of these acini, islands of normal tissue may be seen in the centers of the larger tumor lobules. In many places complete replacement of the normal tissue has occurred. Ducts are less numerous in the tumor lobules than in normal tissue. Some of these ducts are normal and others are lined by tumor cells.

The tumor cells are arranged in occasionally branching cords, usually two cells but sometimes only one cell wide. In many lobules the peripheral cords run circumferentially, in places extending as far as one third around the circumference. Some of the cords are solid and resemble cords of liver cells. The vast majority of the cells have a tendency to form glands. A few of these have large lumina, but for the most part the lumina are small, although larger than those of normal parotid acini. No secretion is present.

The nuclei differ from those of normal acini in that the latter stain more deeply and are usually crenated. They resemble those of normal duct cells in size and shape, have one or occasionally two nucleoli, usually stain with only moderate intensity, and have a small amount of chromatin about the nuclear membrane. However, many cells have darkly staining nuclei. No mitoses are seen.

The cytoplasm is acidophilic, dense, homogeneous, and contains many highly refractile, small granules of uniform size. These granules are stained bright red by phloxine and by acid fuchsin. The normal duct cells stained by Mallory's aniline blue contain a few red granules even smaller than those of the tumor cells. In addition to a light orange-red, the cytoplasm often takes on a diffuse light blue tint.

A few tumor cells contain fairly large, pale brown cytoplasmic granules. In some regions the cells are swollen to as much as half again the average size and the cytoplasm is aggregated into coarse granules.

Some tumor cells are shrunken and have pyknotic nuclei and highly acidophilic cytoplasm. Some are isolated, and others form entire glands and cords. Although apparently necrotic, they show no leukocytic invasion.

Within many of the lobules of normal tissue are small masses of tumor cells arranged in solid cords or acini. These are nearly always closely associated with ducts. The appearance is such as to suggest strongly a multicentric origin from the ducts, and growth is evidently by expansion of small groups of acini with envelopment or lateral displacement of normal acini.

Study of serial sections has been enlightening. In some regions in which some normal tissue persists there is an increase in the number of ducts. Some of these are entirely normal. Others appear normal for a variable distance, and then one or more tumor cells appear. The duct may now be lined by tumor cells as far as it can be traced, or normal cells may reappear and the duct be lined by a mixture of tumor cells and normal cells. In some ducts several alternate segments of normal and tumor cells are seen. It is not always possible to classify every duct cell as a normal cell or a tumor cell, since transitions occur. In several places masses of tumor cells are seen connecting with the tumor cells in the walls of the ducts, but no communication of duct lumen with tumor acinus lumen has been seen. While this is not incontrovertible evidence that the tumor cells arise from the ducts, it is strong presumptive evidence, and bears out the impression of multicentric origin.

In one instance in which the branches of a single normal duct can be traced to their terminations, three branches are lined throughout by normal cells and join with groups of normal acini. Two other branches terminate without joining acini, presumably because the acini with which they were originally connected have been displaced by tumor tissue. A sixth branch soon becomes lined by a mixture of normal cells and tumor cells and joins with two different masses of tumor cells, one at its termination and one just proximal to this.

The stains employed in this study are hematoxylin-eosin, Mallory's aniline blue, and phloxine-methylene blue. Phloxine-methylene blue gives the most striking and clear cut picture except in the transition forms, in which the aniline blue stain is useful because of the more sharp definition of cytoplasmic granules by fuchsin. The tissue was fixed in Zenker's solution.
A most important question is whether this gland is the seat of a tumor or of hyperplasia of an abnormal type of cell. Unfortunately, this is a matter of opinion. The manner in which the abnormal cells grow and displace the normal cells inclines us toward the conviction that it represents a tumor. In this we have been upheld by several other pathologists.

Although in some important characteristics the cells concerned in this tumor differ from Hamperl’s onkocytes, we believe that it is probably derived from the onkocyte or from a closely related cell. In any case, it manifestly arises from the duct cells and bears no relation to mixed tumors.

The only reported cases which resemble this tumor are those of Gruenfeld and Jorstad (11), Blair and Olch (11), and McFarland (1). One cannot be sure that McFarland’s case really belongs in this group since his description was apparently intended to show only that the specimen was not a normal gland, as it has been originally diagnosed.

Gruenfeld and Jorstad state that Stöhr and Risak (12) reported two onkocyte tumors. One of the tumors of Stöhr and Risak is not described at all, but is diagnosed as a tubular adenoma. The other may resemble McFarland’s case. The cells are not described in detail, and the accompanying illustration gives no clear conception of the cell type. One is not even warranted in saying that the tumor is probably composed of onkocytes.

Gruenfeld and Jorstad call their tumor an onkocyte tumor, and after mentioning the tumors of Hückel and Franssen, say “... they are not identical with the onkocytomas,” presumably implying that the name “onkocytoma” may appropriately be applied to their tumor. In view of the fact that Jaﬀé has suggested the name “onkocytoma” for the adenocystoma lymphomatous, this name should not be given to any other tumor, for it is an accepted principle of biological nomenclature that a name once applied, even though incorrectly, is not to be reapplied to another object. In order to avoid possible confusion, it seems better to reject, also, the name onkocyte tumor as being too similar to onkocytoma. Inasmuch as the onkocyte has also been named pyknocyte, this tumor could be called pyknocytoma, but the need for any such name is not apparent.

SUMMARY

A rare type of probable parotid gland adenoma arising from the ducts is described, and its relation to the onkocytes of Hamperl and to two other reported parotid gland tumors is discussed.

BIBLIOGRAPHY