

# Histopathological Bodies in Oral Pathology

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## ABSTRACT

**Introduction:** Histopathological bodies refer to the cell bodies that are associated with the name of the scientist who first described them. The histopathological bodies are either intracellular or extracellular abnormal bodies seen specifically in certain diseases. These structures appear within the cell nucleus, the cytoplasm, or in both.

**Objectives:** This article lists some of the named cell bodies seen in routine histopathological practice with a brief description about their morphology and staining reactions.

**Conclusion:** Histopathological bodies represent peculiar morphological alterations in a tissue giving rise to a highly specific pattern. The presence of these bodies is often an important diagnostic aid in identifying the underlying disease.

**Keywords:** Cell bodies, Histopathology, Morphology.

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## INTRODUCTION

Histopathological bodies are either intracellular or extracellular abnormal bodies seen specifically in certain diseases. These structures appear within the cell nucleus or the cytoplasm or in both, and exhibit characteristic staining properties. The presence of histopathological bodies is often an important diagnostic aid in identifying the underlying disease.<sup>1</sup>

According to etiopathogenesis, histopathological bodies can be briefly classified as:

- Histopathologic bodies in physiological conditions
- Odland bodies
- Weibel–Palade bodies
- Histopathologic bodies in pathological conditions

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(A) Infectious diseases:

- Henderson–Peterson bodies
- Cowdry type I bodies
- Cowdry type II bodies
- Negri bodies
- Toto bodies

(B) Neoplasms:

- Wagner–Meissner bodies
- Verocay bodies
- Russell bodies
- Pustulo-ovoid bodies of Milian
- Kamino bodies
- Dutcher bodies

(C) Autoimmune diseases:

- Civatte bodies
- Schaumann bodies

(D) Blood dyscrasias:

- Heinz bodies
- Howell–Jolly bodies
- Fessas bodies

(E) Inflammatory lesions:

- Rushton bodies

## Histopathological Bodies seen in Physiological Conditions

### *Odland Bodies (Lamellar Body)*

Keratinized stratified squamous epithelium exhibits Odland bodies with sizes ranging from 100 to 2,400 nm. They are secretory organelles found in type II pneumocytes and keratinocytes. Lamellar bodies are also found in the gastrointestinal tract, tongue papillae, oral epithelium, and mucosa cells of the stomach.<sup>2</sup> The granules present in lamellar bodies fuse with the cell membrane and release their contents into the extracellular space. Lamellar body secretion is abnormal in the epidermis of patients with Netherton syndrome, atherosclerosis, and Niemann–Pick disease.<sup>3</sup>

### *Weibel–Palade Bodies*

Weibel–Palade bodies were initially described by the Swiss anatomist Weibel and Palade.<sup>4</sup> Storage granules of endothelial cells are known as Weibel–Palade bodies. They are large cigar-shaped granules. They store and discharge two prime molecules, von Willebrand factor and P-selectin, thereby performing a dual function in inflammation and hemostasis. Additional Weibel–Palade body

components are interleukin 8, eotaxin-3, endothelin-1, and angiopoietin-2.<sup>5</sup>

## Histopathologic Bodies seen in Pathological Conditions

### Infectious Diseases

*Henderson–Peterson bodies:* Henderson–Peterson bodies are inclusion bodies seen in molluscum contagiosum, a disease caused by Pox group of viruses. These bodies are large, ellipsoid, homogeneous intracytoplasmic inclusions seen in the stratum spinosum and stratum corneum of the infected epithelium.<sup>1</sup> They are made of nuclear and cytoplasmic aggregates, usually proteins, and represent the site of viral multiplication.<sup>6,7</sup>

*Cowdry type I and B bodies:* Cowdry type I bodies are droplet-like masses of acidophilic material surrounded by clear halos that are seen within the nuclei. The nuclei also exhibit changes like margination of chromatin on the nuclear membrane. Cowdry type II bodies are similar in appearance to type I bodies, but they do not produce any other nuclear changes. Type I bodies are seen in herpes infection and type II bodies in infection with poliovirus.<sup>1</sup>

*Negri bodies:* Negri in 1903 discovered the bodies contained within the nerve cells of the central nervous system in cases of rabies. Negri bodies are eosinophilic, sharply outlined inclusion bodies found in the cytoplasm of certain nerve cells containing the rabies virus. The size of these bodies varies from 0.25 to 21  $\mu\text{m}$ . With the Van Gieson stain and also with the basic fuchsin modification of it, the bodies take a characteristic pink stain.<sup>8</sup> Ultrastructural studies have shown that Negri body consists of a mass of nucleocapsids surrounded by viral particles budding from intracytoplasmic membranes.<sup>9</sup>

*Toto bodies:* Toto bodies refer to eosinophilic, homogeneous masses present in the superficial prickle cell layer of the surface epithelium. These bodies were identified by Toto as dystrophic complexes of acid and neutral mucopolysaccharides with keratin and were mentioned as “mucopolysaccharide keratin dystrophy”.<sup>10</sup> Through ultrastructural study, Buchner<sup>11</sup> demonstrated that these eosinophilic bodies were found extracellularly in the dilated intercellular spaces. These eosinophilic bodies are commonly found in various oral inflammatory lesions like epulis fissuratum, irritation fibromas, pyogenic granuloma, peripheral giant cell granuloma, and inflammatory hyperplastic gingivitis.<sup>10</sup>

### Neoplasms

*Wagner–Meissner bodies:* Some of the benign nerve tumors show a unique histopathological presentation, the presence of oval aggregates of eosinophilic globules

containing parallel slits observed within the cellular sheets. This peculiar presentation is known as Wagner–Meissner body and is seen in neurofibroma and oral lesions of patients with von Recklinghausen’s disease of skin.<sup>11,12</sup>

*Verocay bodies:* Verocay bodies refer to the peculiar alignment of nuclei into parallel rows and were first described in detail by Jose Juan Verocay in 1910 in a benign nerve tumor called schwannoma. Later investigators defined these bodies as stacked arrangements of elongated palisading nuclei alternating with anuclear zones containing cell processes. These Verocay bodies are typically found in the more densely packed Antoni A regions of schwannoma, rather than in the loose or microcystic Antoni B areas. Some investigators have identified large amounts of laminin associated with cells participating in formation of Verocay bodies. Lysophosphatidic acid, an extracellular phospholipid that regulates Schwann cell adhesion and structure, has been found to induce cluster formation.<sup>13</sup>

*Russell bodies:* Russell bodies are eosinophilic, homogeneous immunoglobulin-containing inclusions usually found in a plasma cell undergoing excessive synthesis of immunoglobulin. Special stains like fuchsin, periodic acid-Schiff, and Grunwald-Giemsa stain are used to demonstrate Russell bodies.<sup>1</sup> They are named after Russell,<sup>14</sup> a Scottish physician.

Russell body formation appears to indicate cellular indigestion due to a failure to eliminate misfolded or incorrectly assembled proteins. They are frequently seen in multiple myeloma, plasmacytoma, *Helicobacter pylori* infection, periapical granuloma, and chronic inflammatory granuloma.<sup>15</sup>

*Pustulo-ovoid Bodies of Milian:* These are round eosinophilic inclusions made of coalescing granules surrounded by a clear halo.<sup>1</sup> These bodies are generated by the gradual accumulation of granules in the interior of the lysosomes and are usually associated with granular cell tumors. Granular cell tumor can develop on any skin or mucosal surface, but occurs predominantly on the tongue.<sup>16</sup>

*Kamino bodies:* In 1979, Kamino et al described dull pink globules in the epidermis of 65% of junctional nevi, 75% of compound nevi, and 25% of intradermal types of Spitz nevi. Kamino body is a feature that may be helpful in the differential diagnosis between nevi and malignant melanoma.<sup>17</sup> Kamino bodies are eosinophilic bodies with scalloped borders and crescent-shaped periphery, which appears as globules or aggregates at the dermal–epidermal junction.<sup>1</sup> Kamino bodies were once believed to have been degenerated basal cells or melanocytes. The main content of Kamino bodies is found to be type IV and type VII collagen.<sup>18</sup>

**Dutcher bodies:** In 1959, Dutcher and Fahey described inclusion bodies that appear to be intranuclear inclusions of immunoglobulin protein, which they named as Dutcher bodies. They are pseudoinclusions formed by cytoplasmic invagination into the nucleus. They are smooth, membrane-bound, and surrounded by clumped chromatin. They exhibit a positive staining reaction to periodic acid-Schiff and Wright-Giemsa stains. They are strongly associated with low-grade lymphomas, particularly lymphoplasmacytic lymphoma, mucosa-associated lymphoid tissue-type lymphoma, multiple myeloma, and chronic synovitis.<sup>19</sup>

### Autoimmune Diseases

**Civatte bodies:** Civatte bodies are also termed as cytooid, hyaline, colloid, or keratin bodies. They are seen as rounded, homogeneous, eosinophilic masses on routine hematoxylin and eosin staining lying in the deeper parts of epidermis and more frequently in dermis/connective tissue. Civatte bodies are believed to be derived from degenerated keratinocytes.<sup>20</sup>

Civatte bodies are associated with lichen planus, lupus erythematosus, actinic cheilitis, acute generalized exanthematous pustulosis, drug reaction with eosinophilia and systemic symptoms, Darier's disease, familial benign chronic pemphigus, and even normal skin.<sup>21</sup>

**Schaumann bodies:** Jorge Schaumann in 1941 first described large concentrically lamellated structures present in the cytoplasm of the giant cells seen in sarcoidosis as "Schaumann bodies." Schaumann bodies are calcium and protein inclusions inside the Langhans giant cells. The ultrastructural studies have confirmed the presence of calcium and phosphorus and small quantities of iron in Schaumann bodies. Sarcoidosis, tuberculosis, hypersensitive pneumonitis, and few other granulomatous conditions are reported to be associated with Schaumann bodies.<sup>1</sup>

### Blood Dyscrasias

**Heinz bodies:** Heinz bodies (also referred to as "Heinz-Ehrlich bodies") are inclusions within red blood cells composed of denatured hemoglobin. They are named after Robert Heinz, who in 1890 illustrated these inclusions in association with hemolytic anemia. Special stains like crystal violet and Wright's stain can be used to demonstrate these bodies.<sup>1</sup> Patients with hemolytic anemias, thalassemia, and glucose-6-phosphate dehydrogenase deficiency may show Heinz bodies. The presence of Heinz bodies may also be a feature of hyposplenism or asplenia, when a damaged or absent spleen cannot remove these damaged cells from circulation.<sup>22</sup>

**Howell-Jolly bodies:** Howell-Jolly bodies are small, round inclusions representing nuclear remnants within the erythrocytes. They are named after William Henry Howell and Justin Marie Jolly. Normally, during an erythrocytic circulation, these inclusions are discarded by the spleen, but will persist in subjects with functional hyposplenia or asplenia.<sup>23</sup> Howell-Jolly bodies are also seen in severe hemolytic anemia, megaloblastic anemia, hereditary spherocytosis, and myelodysplastic syndrome.<sup>24</sup>

**Fessas bodies:** The peripheral blood smears of patients suffering from homozygous type of thalassemia show intracellular inclusion bodies known as Fessas body. Decreased production of  $\beta$ -chain of the hemoglobin occurs, which thereby leads to excessive deposition of  $\alpha$ -chains in the red blood cells.<sup>1</sup>

### Inflammatory Lesions

**Rushton bodies:** The eosinophilic bodies within the epithelium of odontogenic cysts were first described in detail by Rushton and hence are often referred to as Rushton bodies. In hematoxylin and eosin-stained sections, Rushton bodies/hyaline bodies appear as eosinophilic bodies showing varied shapes which are linear, straight, curved, hairpin shaped, circular, or polycyclic forms. According to Rushton, these bodies originated from odontogenic epithelium as a keratin product. Some authors postulated that they were of hematogenous origin or thought that they were formed due to elastotic degeneration.<sup>1</sup> They are usually seen in radicular cyst, residual cyst, and plexiform ameloblastoma.<sup>25</sup>

### CONCLUSION

This article lists some of the named cell bodies seen in routine histopathological practice with a brief description about their morphology and staining reactions. They represent peculiar morphological alterations in a tissue giving rise to a highly specific pattern. The presence of these bodies is often an important diagnostic aid in identifying the underlying disease.

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