

## Release of Immunoglobulins in different mucosal linings

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The mucosal immune system is presently in automatically and physiologically diverse tissues, including the gastrointestinal tract, nasopharynx, oral cavity, lung, eye and urogenital tract. Although these compartments share many features the mucosal immune systems of the tissues also directly distinct characteristics, probably reflecting the anatomical and functional requirements at diverse mucosal sites [1].

### Ocular mucosal system and its immunoglobulins

Tears contain relatively high levels of secretory Immunoglobulin A, the dominant immune globulin in ocular fluid with small amounts of monomeric immunoglobulin's A and immunoglobulin's G antibodies. Reflecting the dominance of immunoglobulin A antibodies in tears, lacrimal glands contain large numbers of Immunoglobulin A producing cells. The proportion of IgA1-producing cells relative to IgA2-producing cells corresponds to the proportion of IgA1 to IgA2 in tears. Approximately 10% of the Ig-secreting cells produce IgD of unknown functional importance. Importantly lacrimal gland acini and ducts express the polymeric Ig receptor, a key element in the formation of SIgA and its transportation into tears. Induction of antigens in ocular mucosa induces antigen specific SIgA responses in the ocular and nasal cavities, as well as systemic Immunoglobulin G antibody responses [2]. The tear duct associated lymphoid tissues in the conjunctival sac are connected via the tear duct to nasal cavity.

### Oral cavity association with mucosal systems and its immunoglobulins

Saliva consists of fluids derived from large salivary glands, small salivary glands and crevicular fluid. The variable contribution of these tissues and crevicular fluid to the immunoglobulin pool in saliva depends on the periodontal health of the oral cavity. SIgA is dominant in secretions of all salivary glands, with a composition of about 60% IgA1 and 40% IgA2. IgG and IgM are present in small quantities [3]. In contrast, the crevicular fluid contains mainly plasma derived proteins and IgG isotype. In the oral cavity the mucosal and systemic Ig contributions depend on the stage of oral health. In advanced periodontal disease, the proportion of plasma derived IgC antibodies in the Ig pool in whole saliva increases substantially. The local application of antigen to the buccal mucosa, labial mucosa or gingiva stimulates very low antigen specific immune responses.

### Mucosal Layer of Upper respiratory tract and its immunoglobulins

In nasal secretions, which are a major component of the surface barrier in the upper respiratory tract, IgA constitutes about 70% of the Ig pool. Reflecting the dominance of IgA, nasal mucosa contains large numbers of IgA producing cells, particularly of the IgA1 isotype. Approximately, 20% of Ig in nasal secretions is represented by IgG, derived mostly from the circulation with limited local production. Thus, antigen specific IgG antibodies appear in nasal secretions after systemic immunization. In sharp contrast to the predominance of IgA seems to be derived predominantly from the circulation [4].

### Mammary glands mucosa system and related immunoglobulins

Early milk, called colostrum and milk collected at later stages of

lactation contain high levels of SIgA and small amounts of monomeric IgA, SIgM and IgG. The subclass distribution varies between donors and on average the proportion of IgA1 slightly exceeds that of IgA2, resembling the distribution of IgA subclasses in the adult small intestine. Humoral immune responses can be induced by the oral administration of antigens; the effectiveness of intranasal, rectal or sublingual immunization routes in the induction of SIgA antibodies in milk has not yet been evaluated in humans. Interestingly, the injection of antigen into lactating mammary glands in experimental animals induces weak local IgA and usually strong IgG responses. Antibodies in human milk reflects the maternal exposure to orally and intestinally encountered antigens and thus provide an appropriate passive protection for breast feeding infants.

### Urogenital mucosal system and related immunoglobulins

The dominant Ig isotype in secretions of the female and male genital tract and in urine is IgG which is similar to that in secretions of the lower respiratory tract. Thus IgA is the major type of isotype in all mucosal secretions except those of the lower respiratory and genital tracts [5]. In females, the uterus is the most important source of Ig in cervico-vaginal secretions, which explains the profound decrease in genital Igs after hysteraectomy. IgG is the derived locally from numerous antibody-forming cells in the uterine endocervix and from the circulation. Systemic immunization induces IgG in genital fluids; this is consistent with the systemic source of the IgG.

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