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● *REVIEW ARTICLE* ●

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Avian egg immunoglobuline and its biological importance

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In 1969, Leslie and Clem reported the existence of an immunoglobulin (Ig) G-like molecule in chickens. It was the predominant serum immunoglobulin, or antibody; however, its structure was slightly different than that of the mammalian serum antibody IgG, and therefore was termed IgY. It has since been found to be the principal serum antibody of birds, reptiles, and amphibians (Marchalonis, 1977). Although functionally similar, there are several important differences between mammalian IgG and avian IgY (Sharma, 1997) and the use of avian antibodies offers many advantages over mammalian antibodies. The production of specific IgY against many different antigens has been studied, and its application as an immunotherapeutic agent, including its use for the oral passive immunization against enteric pathogens, has been extensively reported. Due to its distinctness from IgG, IgY has also been found to be advantageous in several immunodiagnostic techniques, as well as in immunoaffinity purification, in many cases replacing IgG. Traditionally, commercially available polyclonalantibodies have been produced in mammals such as mice, rats, rabbits, sheep, goats, and horses, and are generally obtained from sera after immunization of these animals (Schade *et al.*, 1996). However, these antibodies cannot be prepared on an industrial scale because of the difficulty in obtaining large quantities of blood, and concerns about animal welfare. The use of hybridoma technology has been used for the preparation of monoclonal antibodies; however, it is still far from the successful commercialization of therapeutic monoclonal antibodies due to the expensive cost (Wang and Imanaka, 1995). Bovine colostrum or colostral antibodies have also been examined (Crabb, 1998), however their quantity and antibody specificity have limitations. Some of the real or potential applications of antibodies, especially for immunotherapeutic purposes, will require kilogram quantities of highly purified antibody, therefore, cost-efficient methods of producing large quantities of specific antibodies are required. Recently, the chicken has attracted considerable attention as an alternative source of antibodies. IgY is deposited in the egg yolk in large quantities (Janson *et al.*, 1995), and it can be easily purified from the yolk by simple precipitation techniques (Gassmann *et al.*, 1990), making chickens an ideal source for specific polyclonal antibodies.

Avian egg formation:

An egg is composed of three main parts, the shell, albumen and yolk. The yolk is surrounded by an albumen layer and compartmentalized by an eggshell. The formation of an egg involves the conversion of the feed into egg constituents through a number of intricate and highly coordinated steps as a storehouse of nutrients. It takes 24 ±27 hours for this development. Under modern husbandry conditions, a chicken can lay an average of 250± 280 eggs per year. The hen normally starts laying at 16± 26 weeks of age. The reproductive system of the hen, shown in Fig. 1, consists of the ovary and oviduct (Romanoff and Romanoff, 1949). The ovary, which is the site of assembly of the yolk, is a small organ. When the chicken becomes mature (about 150 days old), the ovary has grown to about 7 g, and rapidly increases to about 40 g (around 170 days old) (Epple and Steson, 1980). A mature ovary contains many oocytes, and at least 600±700 of them will become mature yolk. Each oocyte becomes a follicle after being covered with a granular layer. The follicles in the ovary are surrounded by the hen's veins (Burley and Vadehra, 1989). Yolk constituents are synthesized in the liver and they are transported to the follicular walls in the blood. The follicle undergoes a rapid development during which most of the yolk is deposited 6 ± 10 days prior to ovulation,

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