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Research interests

More than 25% of the population suffers from IgE antibody mediated allergies. The molecular, structural and immunological characterization of the disease- eliciting allergens is a major research interest of our laboratory. Recombinant allergens of the most important environmental allergen sources have been prepared and are used in *in vitro* and *in vivo* models to study the pathomechanisms of allergy and to develop novel diagnostic tests and strategies for therapy and prevention of allergy.

Within the PhD program we would like to study if and how an immunological hypersensitivity disease (i.e., IgE-mediated allergy) can co-exist with and influence an acquired immunodeficiency (i.e., AIDS).

Thesis projects: Mutual relationships between allergy and HIV infections

Project 1: Influence of concomitant HIV infection on IgE-mediated allergy

Within this project we plan to investigate the effects of HIV infection and in particular of AIDS with strong reduction of T cell responses on allergic immune responses. The effects of concomitant HIV infection on the profile of allergen-specific IgE and IgG subclass and cellular immune responses will be studied. Furthermore, we will analyze the effects of allergen exposure on rises of allergen-specific IgE responses in allergic patients with HIV infections dependent on the amounts of CD4+ T cells to learn about the role of T cell help in this process. Finally, we are interested to investigate allergen-specific IgE and T cell dependent *in vivo* responses by skin testing of HIV patients with allergy.

Project 2: Micro-arrayed HIV proteins/epitopes to investigate possible associations of Th2 versus Th1-prone humoral immune responses and clinical courses of HIV infections

Aim of this project is to analyze possible relationships between HIV-specific antibody responses which are indicative of a Th2 (e.g., IgG4) versus Th1 (e.g., IgG2) reactivity. For this purpose we will develop a microarray containing a large number of HIV proteins and epitopes made by recombinant DNA technology and synthetic peptide chemistry to investigate the antibody reactivity profiles in HIV patients with different clinical courses (e.g.,

HIV controllers and long term non-progressors vs. fast developers of AIDS). Reactivity profiles to carbohydrate epitopes will be studied towards HIV proteins made in human T cells versus reactivities towards peptide moieties made in *Escherichia coli* or by synthetic peptide chemistry.

Selected publications

1. Edlmayr, J., Niespodziana, K., Popow-Kraupp, T., Krzyzanek, V., Focke-Tejkl, M., Blaas, D., Grote, M., and Valenta R. (2010). Antibodies induced with recombinant VP1 from Human Rhinovirus exhibit cross-neutralization. **Eur Respir J.** 2010 Jun 7. [Epub ahead of print]
2. Valenta, R., Ferreira, F., Focke-Tejkl, M., Linhart, B., Niederberger, V., Swoboda, I., and Vrtala, S. (2010). From allergen genes to allergy vaccines. **Annu Rev Immunol.** 28:211-41.
3. Edlmayr, J., Niespodziana, K., Linhart, B., Focke-Tejkl, M., Westritschnig, K., Scheiblhofer, S., Stoecklinger, A., Kneidinger, M., Valent, P., Campana, R., Thalhamer, J., Popow-Kraupp, T., and Valenta, R. (2009). A combination vaccine for allergy and rhinovirus infections based on rhinovirus-derived surface protein VP1 and a nonallergenic peptide of the major timothy grass pollen allergen Phl p 1. **J Immunol.** 182:6298-306.
4. Linhart, B., Bigenzahn, S., Hartl, A., Lupinek, C., Thalhamer, J., and Valenta, R., Wekerle T. (2007). Costimulation blockade inhibits allergic sensitization but does not affect established allergy in a murine model of grass pollen allergy. **J Immunol.** 178:3924-31