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GCOE RA →
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Autoimmune bullous diseases

1-Development of NC1 and NC2 domains of type VII collagen ELISA for the diagnosis and analysis of the time course of epidermolysis bullosa acquisita patients. (Journal of dermatological science 2011).

Epidermolysis bullosa acquisita (EBA) is an acquired autoimmune mechanobullous disease. EBA patients possess autoantibodies against type VII collagen. We developed ELISAs using recombinant NC1 and NC2 proteins of type VII collagen produced by mammalian and bacterial expression systems. The results showed that 38/49 sera (77.5%) reacted with NC1 domain only, 7/49 sera (14.2%) reacted with both NC1 and NC2 domains, and one serum (2%) reacted with NC2 domain only. Therefore, to increase the sensitivity of the assay, we developed an ELISA coated with a mixture of recombinant NC1 and NC2 domains, resulting in 93.8% sensitivity and 98.1% specificity. This ELISA is a practical assay for the diagnosis and follow up of EBA patients.

2- Pathogenic anti-desmoglein 3 mAbs cloned from a paraneoplastic pemphigus patient by phage display. (Journal of investigative dermatology 2012).

Paraneoplastic pemphigus (PNP) is an autoimmune blistering disease associated with lymphoproliferative neoplasms. Anti-Desmoglein 3 (anti-dsg3) antibodies play an important role in blisters of PNP. We used phage display to clone monoclonal anti-Dsg3 antibodies from a PNP patient to further characterize their pathogenicity. We isolated 20 unique Dsg3-reactive mAbs, which were classified into four groups according to the heavy-chain complementarity-determining region 3 (CDR3). Three antibodies displayed pathogenic activity in blister formation with different potencies in in vitro keratinocyte dissociation assay and human skin organ culture injection assay. These pathogenic mAbs bound Ca2t-dependent conformational epitopes in the middle portion of the extracellular region of Dsg3 (EC2 and EC3 domains), in contrast to most previously characterized pathogenic pemphigus vulgaris antibodies, which bound to the EC1 domain of Dsg3. These mAbs represent an important tool for detailing the pathophysiological mechanisms of blister formation in PNP.

Impressions as a G-COE research assistant:

I worked as a research assistant through the GCOE program for 4 years which ended by my Ph.D. degree in Dermatology. I believe that the GCOE program was a valuable program. The COEX meetings were well-organized monthly events held for the GCOE members. All the presentations in the COEX meetings were in English. As a foreigner it was easier for me to follow the English presentations in comparison with the Japanese ones. Listening to the presentations of other researchers in those meetings was very inspiring for me. Preparing for my own presentation in the meeting helped me practice summarizing my data and organizing them into graphs and charts. In addition to other researchers' critical thinking and suggestions about my research helped me improve my work. Moreover, presenting my work in front of other esteemed scientists and researchers helped me acquire self-confidence as well as practice for international conferences.
The GCOE program supported financial expenses for local as well as international conferences. Participating in the conferences and interacting with other research groups was very motivating for me. Valuable discussions often arise on meeting colleagues who share the same field of interest. These high-level discussions always result in innovative ideas on handling research challenges.
I am very grateful for the GCOE program for providing crucial financial support for my life in Japan. Through this funding I was able to concentrate intensely on my studies and devote all my time to research rather than worrying about money. I am deeply indebted to the GCOE program which provided me with the scientific as well as the financial resources that helped me complete my Ph.D. degree.