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Title of Presentation: **Generation of a novel rodent model for autoimmune hair loss disease alopecia areata via cultured cell transfer**

Abstract

Alopecia areata (AA) is believed to be a cell-mediated, inflammatory, autoimmune disease that results in circular patches of hair loss. Both CD4 and CD8 T cells have been found to be important for the onset and progression of AA both in humans and rodent AA models. Various animal models for AA are available and one of the most well-defined is the inbred C3H/HeJ mouse strain. C3H/HeJ mice spontaneously develop AA-like symptoms but at a low population rate. Currently, grafting full thickness skin tissues from AA affected mice to healthy recipients is the most popular method to generate a large quantity of AA mice. However, skin grafting is an invasive procedure requiring anesthesia of the mice and training for rodent surgery. Skin grafting can have unpredictable outcomes within and between different litters potentially depending on the graft donor's characteristics and the graft survival rate. In our investigation, we isolated skin-draining lymph nodes from AA affected or normal haired C3H/HeJ mice and processed the lymph node cells (LNCs) to a single-cell suspension. The LNCs were cultured in the presence of magnetic beads coated with anti-CD3 and anti-CD28 crosslinking antibodies for unspecific stimulation and cell expansion. At the end of five-day expansion period, 10 million of either AA or control LNCs were transferred into the dorsal skin of healthy mice by intradermal injection. Within a 20 week observation period, 9/10 AA mice receiving LNCs from AA donors developed AA while 9/10 mice receiving LNCs from control mice stayed fully haired. H&E staining showed the typical clustering of lymphocytes around the dystrophic hair follicles in the skin of AA mice similar to mice that have developed spontaneous AA or skin graft induced AA. By tracing the injected LNCs with CM-DiI dyes, it was found that the cultured AA LNCs did not participate in the inflammation of hair follicles in the lesion. This observation suggested more complicated cascade of events were facilitated by the transferred cells via interactions with the host immune system. Nevertheless, this result still confirmed the cell-mediated mechanism of AA pathogenesis and demonstrated a novel, simplified way to generate AA mice for research.