Topical chicken protein to treat type 1 diabetes? The immunological basis explained ...

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Background

At a conceptual level, food antigen exposure to damaged skin can result in an immune response producing food allergy.[1–4] Food antigen exposure to HEALTHY skin can produce a tolerogenic response, protecting against food allergy.[5] Animal antigen exposure to damaged skin can result in an immune response producing autoimmunity due to molecular mimicry (protein sequence homology) between human and animal proteins.[6,7] Therefore animal antigen exposure to HEALTHY skin can be a route to produce a tolerogenic response protecting against autoimmunity.

Mechanism of action

Peanut protein patch applied to HEALTHY skin is a treatment for peanut allergy.[8,9] One of the ways such epicutaneous immunotherapy (EPIT) works, is the generation of antigen-specific regulatory T cells (Tregs).[10]Tregs regulate/moderate the immune system's reaction to peanut exposure.

One of the causes of type 1 diabetes (T1D) is a reduction in the number and or alteration of Treg function in the pancreas. This allows autoreactive CD8+ T cells to destroy the islet cells with little inhibition, resulting in T1D.[11,12]

Why chicken protein?

As described previously[6,7], chicken proteins in chick embryo cell culture contaminated vaccines are the most likely source of antigens for the activation of autoreactive CD8+ T cells in T1D. Therefore expansion of chicken antigen-specific Tregs will be most effective in inhibiting the activity of these autoreactive T cells.

An effective immune response against an antigen requires suppression of Treg function associated with that antigen. So chicken protein contaminated vaccines that immunize against chicken antigens can be expected to suppress the function of antigen-specific Tregs associated with chicken epitopes and cross-reacting self epitopes.

Why topical and not ingested chicken protein?

Tregs are trained to migrate to certain parts of the body.[10] Ingested chicken proteins generate Tregs that home to the gut. Topical chicken protein generates Tregs that home to the skin.

As described previously[6,7], the CD8+ T cells that destroy islet cells, express skin homing receptors. This is evidence that the pancreatic tissue also secrete ligands that are chemoattractants for skin homing receptors. Therefore skin homing Tregs produced by topical chicken protein will also migrate to the

pancreas just like the autoreactive CD8+ T cells. Once they migrate to the pancreas, they are able to suppress autoreactive T cells.

Source of chicken protein

The source could be as simple as chicken broth applied to healthy skin. Commercial products could be similar to the Viaskin peanut patch for peanut allergy. Commercial products can of course choose to restrict the chicken proteins to known T1D autoantigens such as GAD65, IA-2, etc. and include T1D autoantigens from other animal proteins that contaminate vaccines (guinea pig, pig, bovine, African green monkey, Madin Darby Canine, etc. proteins)[13].

Cancer and autoimmunity prevention

The immune system navigates a fine line between cancer protection and autoimmunity. The type of immune response is especially important for animal protein derived peptides that mimic self peptides. Upregulated Treg function will result in a weak response against cancer. Suppression of Treg function will increase risk of autoimmunity.

So if this treatment works, a caveat is that Treg levels should not go too high as to risk lower protection against cancer.

This further emphasizes the need to clean up our vaccines by removing ALL non-target proteins. Once mis-programmed, it is extremely difficult to reprogram the immune system and maintain this fine natural balance. Vaccines have been good at “prevention is better than cure” for infectious diseases. Prevention is obviously better than cure for non-communicable diseases as well.
For decades, vaccinologists have been reluctant to understand the immunological mechanism of how vaccines work or hurt the body. Pulendran et al.[14] write:

“Despite their success, one of the great iro-nies of vaccinology is that the vast majority of vaccines have been developed empirically, with little or no understanding of the immunological mechanisms by which they induce protective immunity. However, the failure to develop vaccines against global pandemics such as infection with human immunodeficiency virus (HIV) despite decades of effort has underscored the need to understand the immunological mechanisms by which vaccines confer protective immunity.”

Like the vaccinologists, pharmaceutical companies also fail to understand the immunological mechanisms of other products. Monoclonal antibody products produced on Chinese Hamster Ovary (CHO) cells began to fail due to the induction of anti-drug antibodies (ADA) against the animal peptides. The pharmaceutical companies and regulators have ignored immune responses to injected animal proteins for decades. Now with ADA, they have been forced to look at the issue[15].

Dr. Vibha Jawa, a director with Merck commented on the article below (see comments section):

“We are beginning to look at residual proteins and contaminant with vaccines
Depending on animal protein a degree of homology with human self can be evaluated using algorithm to understand the extent of tolerance.
Additionally in vitro human immune cell assays can be run to understand thersholds of these proteins and their adjuvant effects”

https://www.researchgate.net/publication/305628626_Evaluating_Immunogenicity_Risk_Due_to_Host_Cell_Protein_Impurities_in_Antibody-Based_Biotherapeutics

So, immunotoxic effects of non-target proteins in general and animal proteins in particular, that contaminate vaccines, have not been studied or understood thus far. Such poorly designed, poorly understood vaccines have been administered for decades and continue to be administered. Unfortunately, these immunotoxic vaccines have therefore caused the epidemic of allergy[2–4], asthma[3], autism[16,17], autoimmune diseases[6,7,18–27] and require a complete re-design[28].

Conclusion

Going by the peanut patch experience, it could take up to a year to see the effect of the treatment, if this mechanism works.

While the specific case of chicken protein and T1D were described, obviously the concept applies widely to all animal proteins contaminating vaccines[13] and the various corresponding autoimmune diseases they induce.

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