

2010 FLL Team # 336 Research Project Solutions to Food Allergy

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TIMEBOTS

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What is Food Allergy?

- Food allergies is when someone's immune system thinks that something the person ate is harmful to the body when it actually is not. To protect the body, the immune system makes IgE antibodies to that food. IgE antibodies turn on the mast cells (allergy cells in the body) to release chemicals into the bloodstream. One of the chemicals made by the mast cells are histamine. Histamine go to the eyes, nose, throat, lungs, or skin, and make allergic reactions.
- Once the body has made antibodies against a certain food, the antibodies remember that food. Each time the person eats the food, the body releases histamine into the bloodstream again, creating allergy symptoms. In severe food allergies, reactions happen even if the person touches or breathes in parts of the food.

Some reactions to food allergies are:

1. **Skin.** Skin reactions are the most common type of food allergy reactions. They can take the form of itchy, red, bumpy rashes (hives), eczema, or redness and swelling around the mouth or face.
2. **Gastrointestinal system** Symptoms can take the form of belly cramps, nausea, vomiting, or diarrhea.
3. **Respiratory system** Symptoms can range from a runny or stuffy nose, itchy, watery eyes, and sneezing to the triggering of asthma with coughing and wheezing.
4. **Cardiovascular system.** A person may feel lightheaded or faint.

Existing Solutions for Food Allergies

Treat

- For example, giving small doses to the person with allergic reaction (
http://kidshealth.org/parent/growth/feeding/food_allergies.html)

Avoid

- Reading labels
- Alerting teachers and friends

We came up with four solutions

- **Treat**

- Anti-food Allergy Filter
- Device to Destroy Allergens

- **Avoid**

- Wireless Food Allergy Sensor/ Scanner
- iPhone with a sensor

Treat Food Allergy Better

Filter to Remove Allergens

Features:

- Filter solids and liquids
- Disposable or reusable
- Able to fold into a box
- Washable

Materials:

- Surgical steel
- Bamboo or Charcoal?

Color/Size/Shape:

- Customized color
- Tennis ball size can fit in lunch box

Price:

- \$100 (reusable)
- 6 pack at \$20

Targeted Customers:

- General Public

Device to Destroy the Allergens

Features:

- Release chemical content to disintegrate the allergic chemicals

Color/size/shape:

“Like microwave” put food inside to kill the allergic ingredients

Price:

- \$200

Benefits:

- Non-contact
- Powerful
- Can process food in large quantities

Avoid Food Allergies Easier

iPhone and Sensor Camera

Features:

- Asks for personal profile information
- Send radio waves to food to detect ingredients
- Download your allergy testing results from your doctor

Price-point possibilities:

- \$75
- \$100
- \$150

Wireless Food Allergy Sensor/Scanner

Features:

Device and sensor connected by

- Wi-Fi
- Bluetooth
- USB wire

Devices can be

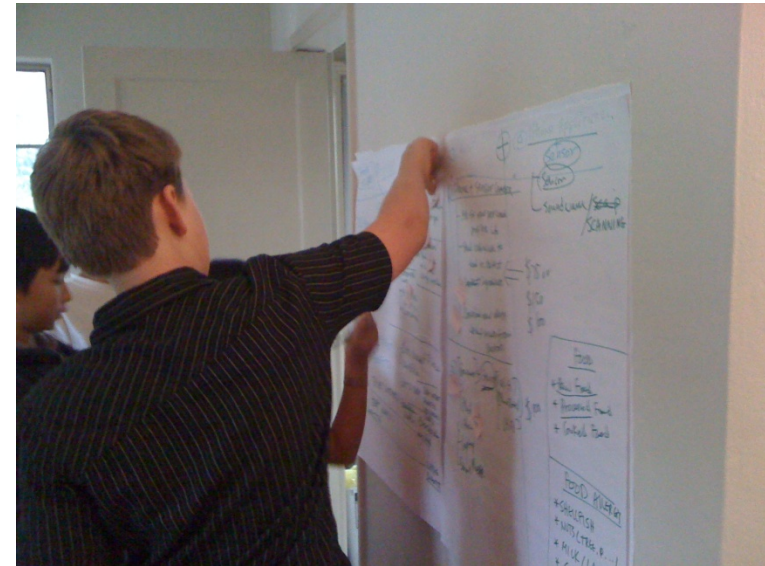
- iPad
- iPhone (or other smart phone)
- Laptop

Price:

\$100

How we analyzed this problem

- **Step 1 - Brainstormed**
 - We thought up ideas from something we've seen or heard of before
 - or we just made up something and fine-tuned the details to make it more realistic



Step 2 - Detailed

Then we wrote down our ideas
And we thought about the details

Step 3 - Voted

When we were done, we voted on the ones we were going to talk about to the doctor

Solution voted as the best – Wireless Sensor





OR



Team Interview # 1 – Dr. Joshua Makower at ExplorAMed

- **Joshua Makower, M.D.**
 - The founder & Chief Executive Officer of ExploraMed
 - Serves as a Consulting Associate Professor of Medicine at Stanford University Medical School and is Co-Founder of Stanford’s Biodesign Innovation Program
- **What we learned from him**
 - He likes the idea of food allergy sensor. Actually his company had evaluated and invested in a food allergy sensor before.
 - “Never Give Up” as inventions don’t always get it right in the first time, even for serial entrepreneurs and professionals
 - He recommended a textbook “Biodesign: The process of innovating medical technologies” he co-authored



Team Interview # 2 – Prof. Jan Benjamin Pietzsch at Stanford Univ.

- **Dr. Jan Benjamin Pietzsch**
 - Consulting Assistant Professor in the Department of Management Science and Engineering at Stanford University
 - co-founder, President and CEO of Wing Tech Inc. a management consulting firm active in the fields of technology assessment, advanced systems analysis, and strategic decision support
- **What we learned from him**
 - [Google Scholar](#) is helpful for research a certain topic
 - We should also consider [Patient Groups](#) to get feedback from the potential users
 - When deciding the price of a piece of medical equipment, you should first think about the cost/benefit to the patients.



Team Interview # 3 – Dr. Robert Bocian at PAMF

- **Robert C. Bocian, M.D., Ph.D., FAAAAI**
 - Doctor in Pediatric, Specialty, Allergy & Immunology Department in Palo Alto Medical Foundation
 - Adjunct Clinical Associate Professor of Pediatrics Stanford University School of Medicine Lucile Salter Packard Children's Hospital at Stanford
- **What we learned from him**
 - 7% of children have symptoms because of food allergies. The other 93% have food-related problems.
 - The percentage of kids with food allergies has increased over the years. No one knows why, but there are lots of theories.
 - Central California is the most allergenic place in the world because there is no "hard freeze" any time. It's spring all year long.
 - There are five types of immunoglobulin: IgG, IgA, IgM, IgE, and IgD.



Thank You!

Questions?