bodyGUARD

Game Design Document

2009

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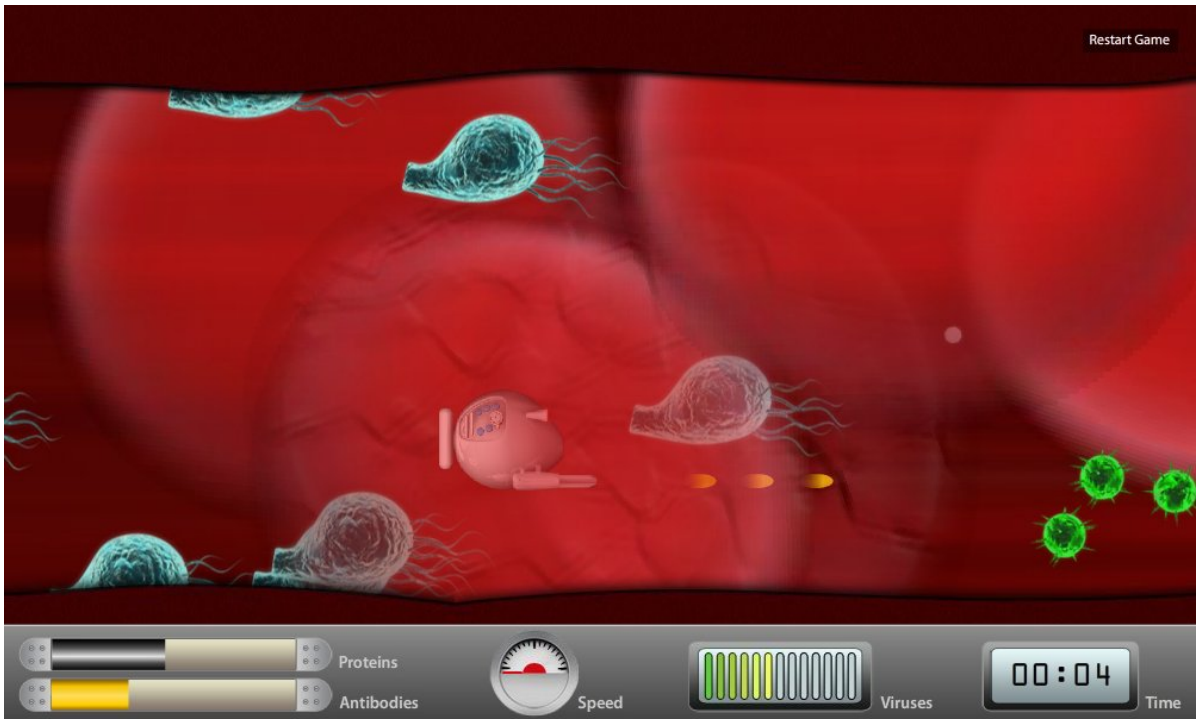

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The Team

Names of multiple contributors for each area:

- Game Designers: Chis Bates, Jack Chang, Elizabeth Crosbie, Jake Enfield, Austin Lord
- Creator/Producer: Jack Chang
- UI Designer/2D Artist: Elizabeth Crosbie
- 3D Artist: Austin Lord
- Visual Effects Designer: Jake Enfield
- Sound & Music Designer: Chris Bates
- Programmers: Jack Chang, Jake Enfield

Executive Summary

bodyGUARD is a “medical action” game with novelties in both game mechanics and presentation. Using the idea of the immunization process, the player can switch the mode of the player-character (PC) to work with either of its allies or enemies. The PC also gets to experience the inner world of inside a human body through original art and sound.

bodyGUARD is a casual Flash game for speedy players at all skill levels, but targeted for ages 9 and up . Players navigate a side-scrolling, multi-dimensional environment inside a human body with biological challenges of increasing complexity through the control of an artificially designed cell (the nanoSHIFTER) that has double the power of a regular human cell, including camouflage capabilities. Through various levels of gameplay, players must restore the immunity system in an immune deficient boy’s body.

Players access the game online at: medicalactiongames.com/bodyguard

bodyGUARD is played in a browser-based window. It is a speed-based, single-player, side scrolling, multi-dimensional “medical action” game.

Game Mechanics

- Overview -

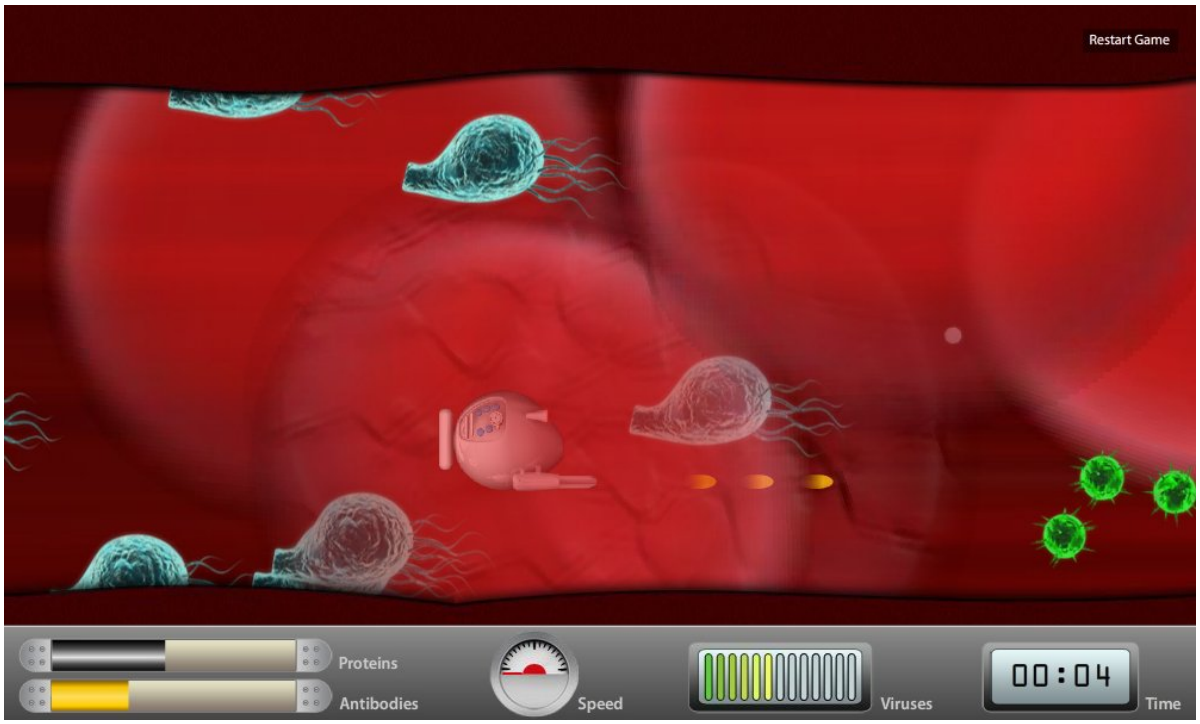
Navigating through a multi-dimensional environment inside the human body, the player views the game from a 3rd perspective point of view: the nanoSHIFTER on the screen set against muscle tissue, blood cells, viruses, and proteins. The content will scroll from left to right and right to left, mostly controlled by the player, but with some push from the natural current of the vein. The player must be able to identify the nanoSHIFTER, viruses, white blood cells, proteins, all of which will be clearly marked by shapes and vibrant colors contrasted with a monochromatic background of the interior of the human body.

The 2D game user interface will include a HUD (Head-Up Display) that will display several pieces of information for the player to use during gameplay, such as the nanoSHIFTER's health and an indication of game progression. All biological objects are created and animated with Maxon Cinema 4D, Adobe Flash CS4, and Action Script 3.0. The game is presented at a resolution of 1000 x 600.

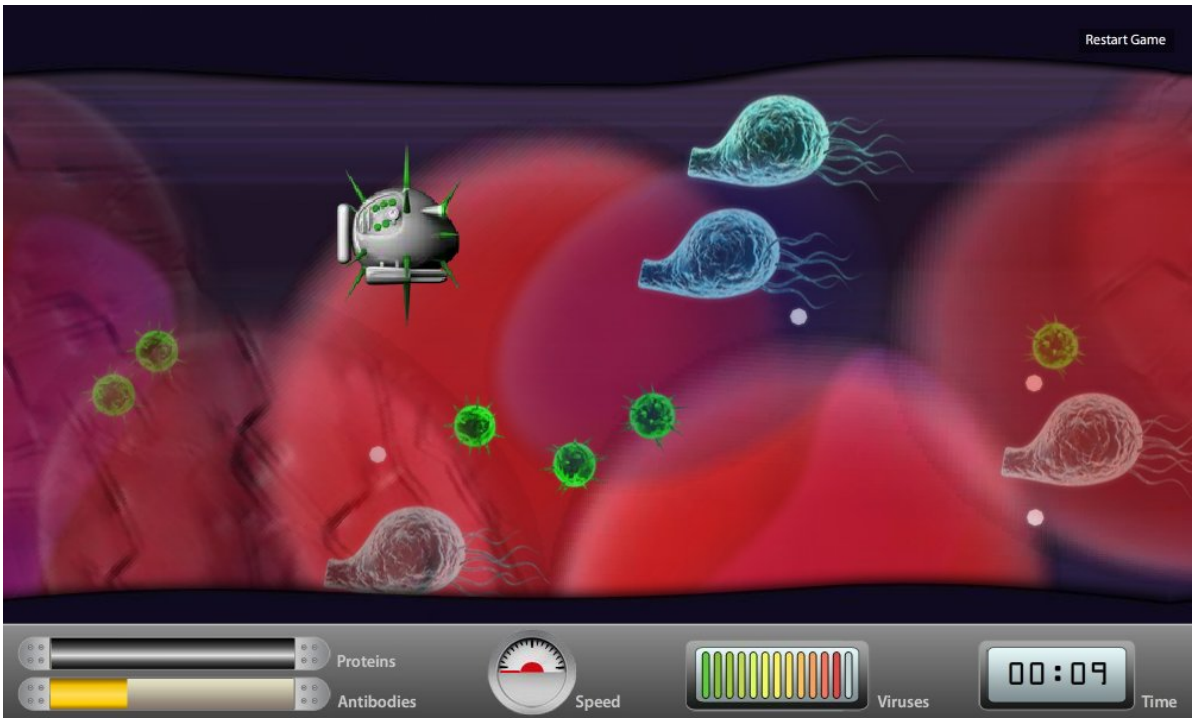
Immunization is one of the critical functions of the human body. It's also a very unique function. Perhaps it can be summarized as, "People need to get sick first in order to have long-term health." Vaccination, for example, is an artificial procedure that embodies this mechanism.

Therefore, incorporating this notion into the gameplay, the essence of the game's fun is switching between the "relationships" — the player will have to work with antigens (in the context of viruses) to generate antibodies while trying to avoid being devoured by the leukocytes. Later, s/he will be working with the leukocytes by using the antibodies as ammunition to eliminate the antigens.

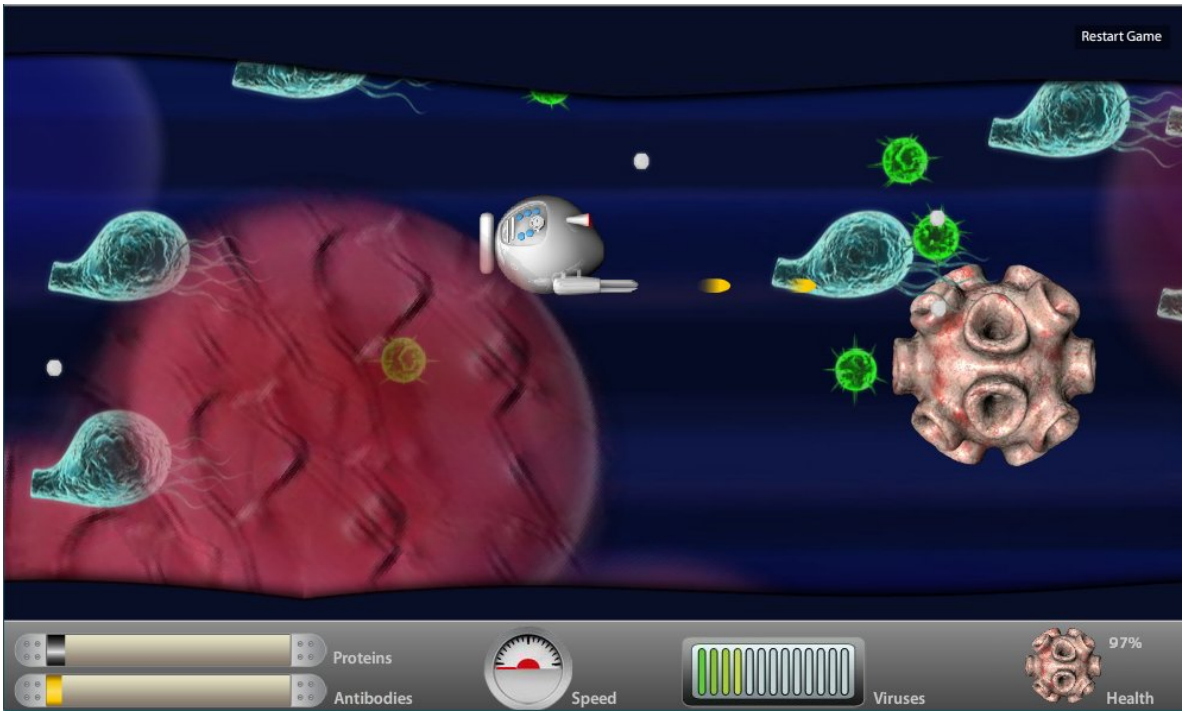
The game has 3 levels. The goal of the game is to kill the "boss" which is producing the viruses in a particular part of Tobe's body (unnamed). The first and the second level have a 60- second limit for play time. The third level, where the boss emerges, has no time limit. In each level, the player fails the game if the Virus Meter fills to critical mass.



Level 1



Level 2



Level 3

- Game Rules -

- The player controls the nanoSHIFTER by moving it around and switching its modes.
- In Virus mode, the nanoSHIFTER can “befriend” virus(es) by approaching and engaging them. When the nanoSHIFTER engages a virus(es), it generates antibodies.
- In Good-Cell mode, the nanoSHIFTER can shoot at the viruses by using the antibodies as ammunition.
- In Virus mode, the nanoSHIFTER’s speed decreases if it hits any of the leucocytes; in Good-Cell mode, its speed decreases as it hits any of the viruses.
- In either mode, the nanoSHIFTER can restore its speed by collecting proteins.
- The nanoSHIFTER crashes when it hits a leukocyte while engaging a virus(es). The

game still continues but the nanoSHIFTER will be rendered a span of time in which the player has no control over the nanoSHIFTER.

- User Interface -

Accessed through a Web browser window, the player's screen will be partially dominated by a HUD, rendered in 2D Flash, in an aesthetic similar to the look of the nanoSHIFTER and is located at the bottom of the screen.

The nanoSHIFTER navigates through the human body among viruses, blood cells, and proteins, all of which will be clearly marked by shapes and vibrant colors contrasted with a monochromatic background of the interior of the human body.

Occupying approximately a small space at the bottom left of the HUD, two test tubes keep the PC status visible but unobtrusive, focusing attention on Inventory of Antibodies and Inventory of Proteins.

Inventory of Antibodies is indicated by a test tube with yellow liquid while the Inventory of Proteins is indicated by a test tube with gray liquid.

Centered in the HUD, sits a Speed Gauge that tells the player how fast or slow s/he is moving the PC.

To the right of the Speed Gauge, sits the Virus Meter, which tells the player the amount of viruses in the particular area of Tobe's body where the PC is fighting viruses and producing antibodies.

Occupying a small area at the bottom right of the HUD, a Time Clock keeps track of time allotted for each level.

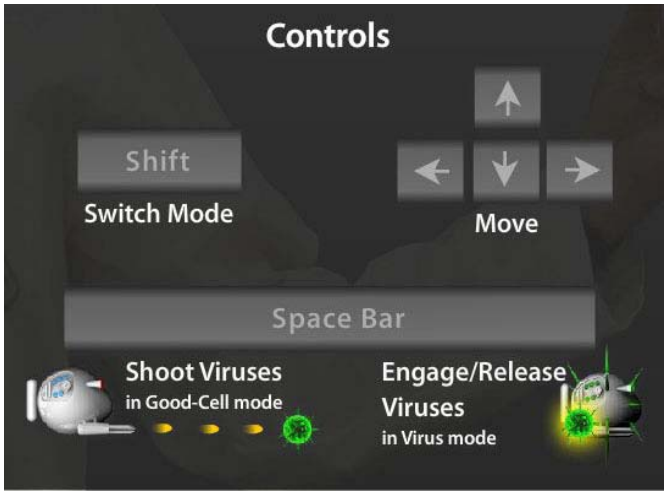
- Controls -

You will successfully save Tobe when you get to beat the boss (which is producing all the viruses) before the viruses reach critical mass.

Arrows Keys: Control the movement of the nanoSHIFTER. (Picking up the white proteins increases the nanoSHIFTER's speed.)

Shift Key: Switches between nanoSHIFTER's mode. (In Good-Cell mode, viruses will hurt you by decreasing your protein count. When in Virus mode, leucocytes will hurt you by decreasing your protein count. Loosing proteins means nanoSHIFTER can not move as agile.)

Space Bar: Engage/disengage viruses in Virus mode (antibodies will be generated when engaging viruses). (The nanoSHIFTER crashes for a while if you are caught by a leucocyte engaging viruses.) In Good-Cell mode, tapping space bar will eliminate viruses by shooting antibodies at them.



Extra-Game Interfaces

- Entry & Exit -

Enter Screen: Players access the game at: medicalactiongames.com/bodyguard

Exit Screen: Player can exit gameplay at any time by closing the browser window.

Gameplay Interface

- Avatar/POV -

The player's avatar is the nanoSHIFTER, a highly sophisticated artificially designed cell developed through nanotechnology from scientists in a advanced biology research lab represented on-screen by an octagon shaped cell with interior segments reserved for protein storage/protectant coating (visible in all conditions).

- Communication -

All communication in the game occurs through visuals and text. Story delivery and dialogue is limited to quick statics scenes providing rests between levels and any necessary information for the player as they advance to the next level.

- Status Bar -

The test tubes displaying the Inventory of Antibodies and Inventory of Proteins serves as the nanoSHIFTER's inventory. These two status levels are clearly marked by their individual colors and labels.

- Art & Animation Style -

bodyGUARD's story elements are based on biological facts, but its aesthetic style is not overly boring or mundane like that of the visual examples in a biology textbook. Using a combination of simple cartoons and photo-realism to create a fictionalized reality, the goal is to combine fantasy and reality. In gameplay, the interior of the human body is designed with Photoshop and Flash CS4 drawing and design tool, some of which are scripted using Action Script 3. The nanoSHIFTER, Viruses, Proteins, and Boss are created and rendered with Maxon Cinema 4D. All other assets are also rendered in Photoshop and Flash CS 4, and again, some of which are scripted using Action Script 3.0, at a resolution of 1000 x 600.

Narrative

story

Tobe is a terribly sick child. It is hard for him to get well because he has a very weak immune system—his body cannot protect itself from the viruses causing his illness.Dr. Olivia Ouch, a creative scientist, designed a robotic cell through the use of nanotechnology to help restore Tobe's health and prevent future viruses from invading his body. This robot is so tiny it can be injected into the human body through a needle. Dr. Ouch named this robot "nanoSHIFTER." It can change forms: from a cell that protects the body or that attacks it.The doctor is asking you to take control of the nanoSHIFTER to fight the viruses attacking Tobe. If you accept this important task, you will be injected in Tobe's left shoulder. Please, you must save Tobe!

- NPC List -

Viruses
Antibodies
Proteins
Boss

Assets

- Art -

nanoSHIFTER (Good-Cell mode and Virus mode)
Viruses
Antibodies
Proteins
Game Logo

HUD components

- Inventory of Antibodies
- Inventory of Proteins
- Speed Gauge
- Virus Meter
- Time Clock

Game environment background

- Muscle tissue
- Muscle wall
- Blood cells

- Sound -

Original theme music – inspired by ambient/environmental sounds with a percussive groove - accompany gameplay at a low level (with a sound off option). Sound effects are used to provide assistance through audio for screen changes, cursor actions, and individual character sound effect-themes for the nanoSHIFTER, Virus(es), Antibodies, and Proteins.

Each level has a different theme and each theme contains two tracks. One is muted and one is not --- depending on the mode of the nanoSHIFTER, the corresponding track is played. The two tracks are based off of the same theme, but have audible differences. For example, the theme for the Virus mode is dark, while the Good-Cell mode is lighter and has a less threatening tone.

- Hardware Requirements -

Hardware: Any PC or Mac computer that has a browser equipped with Adobe Flash v10. The game can be played online or from the player's local machine.

(Instead of using a browser, if you are using a stand-alone Flash Player to play the SWF file in that folder, please make sure you disable the keyboard shortcuts by going to "Control > Disable Keyboard Shortcuts" in your Flash Player, otherwise some control features in the game won't function.)

- Animated Scenes -

TBD

Educational Purpose

- Indiana Academic Standards and Resources -

bodyGuard will be designed primarily for 9- to 10-year-olds in the Fourth Grade. This target demographic was selected based on documentation from the Indiana Department of Education's Indiana Academic Standards and Resources for grades Kindergarten through Eighth Grade. The academic standards for Fourth Grade Science indicate the following for the study of biology and cells at this level:

"The Living Environment"

4.4 Students learn about an increasing variety of organisms - familiar, exotic, fossil, and microscopic. They use appropriate tools in identifying similarities and differences among them. They explore how organisms satisfy their needs in their environments.

The academic standards for Fourth Grade Science also indicate the following requirement for the study of germs and infection at this level:

4.4.10 Explain that if germs are able to get inside the body, they may keep it from working properly. Understand that for defense against germs, the human

body has tears, saliva, skin, some blood cells, and stomach secretions. Also note that a healthy body can fight most germs that invade it. Recognize, however, that there are some germs that interfere with the body's defenses.

- Learning Objectives -

bodyGUARD will attempt to educate the following through gameplay:

(Resource: Tortora, from G. J., Funke, B. R., Case, C. L., Microbiology: An Introduction, Pearson Higher Education, 9th Edition, May 2006.)

- B cell – lymphocyte (white blood cell) play a big role in humoral immunity, HIR (see below).

- The Humoral Immune Response (HIR) is the aspect of immunity that is mediated by secreted antibodies (as opposed to cell-mediated immunity which involves T lymphocytes) produced in B cells. Secreted antibodies bind to antigens on the surfaces of invading microbes (such as viruses or bacteria), which flags them for destruction.

- The principal functions of B cells are to make antibodies against antigens, perform the role of Antigen Presenting Cells (APCs) and eventually develop into memory B cells after activation by antigen interaction. B cells are an essential component of the adaptive immune system.

- T cells belong to a group of white blood cells known as lymphocytes, and play a central role in cell-mediated immunity.

- When B cells and T cells are activated by a pathogen, memory B-cells and T- cells develop. Throughout the lifetime of an animal these memory cells will “remember” each specific pathogen (infectious agent - germ) encountered, and are able to mount a strong response if the pathogen is detected again. This type of immunity is both active and adaptive because the body's immune system prepares itself for future challenges. Active immunity often involves both the cell-mediated and

humoral aspects of immunity as well as input from the innate immune system. The innate system is present from birth and protects an individual from pathogens regardless of experiences, whereas adaptive immunity arises only after an infection or immunization and hence is "acquired" during life.

- Antibodies (also known as immunoglobulins} are gamma globulin proteins that are found in blood or other bodily fluids of vertebrates, and are used by the immune system to identify and neutralize foreign objects, such as bacteria and viruses.

- Although the general structure of all antibodies is very similar, a small region at the tip of the protein is extremely variable, allowing millions of antibodies with slightly different tip structures to exist. This region is known as the hypervariable region. Each of these variants can bind to a different target, known as an antigen. This huge diversity of antibodies allows the immune system to recognize an equally wide diversity of antigens. The unique part of the antigen recognized by an antibody is called an epitope. These epitopes bind with their antibody in a highly specific interaction, called induced fit, that allows antibodies to identify and bind only their unique antigen in the midst of the millions of different molecules that make up an organism. Recognition of an antigen by an antibody tags it for attack by other parts of the immune system. Antibodies can also neutralize targets directly by, for example, binding to a part of a pathogen that it needs to cause an infection.

- An antigen is a substance that prompts the generation of antibodies and can cause an immune response. Antigens are usually proteins or polysaccharides. This includes parts (coats, capsules, cell walls, flagella, fimbrae, and toxins) of bacteria, viruses, and other microorganisms. Lipids and nucleic acids are antigenic only when combined with proteins and polysaccharides.