

Seeing is Believing

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Sugar levels in tears follow (track) sugar levels in blood. Tears also track many other substances that reflect the health status of a patient. Thus, tears can be used to measure the level of many substances just like blood.

One of the goals of the University of Maryland Biotechnology Institute and each of its centers is to create real world solutions for real problems. MBC's Dr. Chris Geddes hopes he has done just that. Over the last two years, he and his University of Maryland Baltimore collaborators, Dr. Ramachandram Badugu and Dr. Joseph Lakowicz, have developed contact lenses that can "sense" biologically relevant substances in tears through special biosensors incorporated into their matrix. It is these biosensors that Dr. Geddes and his colleagues have created.

Biosensors are more complicated than just chemicals that can detect biological substances. For medical uses, they must operate at physiological levels. These levels are often very dilute. In addition, any sensor used on or in the body must be compatible with the physiological environment and still uniquely detect one specific substance out of all the other substances an organism produces. In addition to all that, the detection of changes in a biosensor must easily be made either mechanically (e.g., with a machine) or sensually (e.g. visually).

One biosensor that many people are familiar with is the testing material for sugar that diabetics use. The current regimen starts with a finger prick to obtain a drop of blood and then the blood is tested for sugar level. The biosensor in this case is an immobilized enzyme that catalyzes a colorimetric reaction in proportion to the amount of glucose in the sample. The color change is read with a special machine. This painful and messy procedure has many drawbacks and patients and doctors have been searching for a less invasive method, especially for very young, old or disabled patients. Dr. Geddes' contact lenses may be just the ticket. Sugar levels in tears follow (track) sugar levels in blood. Tears also track many other substances that reflect the health status of a patient. Thus, tears can be used to measure the level of many substances just like blood. But unlike blood, the biosensor has to get to the tears, rather than have the

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The left lens is in bathing solution without glucose; the right has glucose in bathing solution. The color of the lens changes as glucose in the solution changes. The starting color and sensing color can be varied for personal preference.

In Memoriam

All of UMBI was saddened to learn that Dr. Jim Lovelace lost his battle with cancer on November 6, 2004. Dr. Lovelace served UMBI for many years, first as Assistant Director of CARB and finally as Vice President of Academic Affairs. In his memory, UMBI has established a fund to support a yearly "James Lovelace Lecture on Bioethics." Donations can be made by contacting Jami Kasco in MBC's business office or UMBI Central.

Holiday Party

The Annual Holiday Gala was reinstated for this year. It was held December 17th at the Hyatt Regency in the Inner Harbor. As always it was well attended and the Toy Drive was a rousing success. Thanks to President Jennie Hunter-Cevera and her office, especially Yvonne Cook, for the delightful event.

Regents Visit

As part of the continued Efficiency and Effectiveness review being conducted by the Board of Regents, several regents visited UMBI in Rockville. Dr. Joseph Kao, Associate Director and Timothy Hughes, Assistant Director, represented MBC at the meeting.

Strategic Plan Phase II

UMBI began Phase II for the development of a Strategic Plan. This phase will develop the tactics and metrics for implementing the plan. A committee was formed for each of the five goals. Dr. W. J. Lederer is co-chair (with Yoni Zohar of COMB) of the Goal 2 Committee, with Timothy Hughes and Dr. Mervyn Monteiro as members. Dr. Ilia Baskakov is on the Goal 1 committee and Pamela Wright is on the Goal 5 committee. The first phase plan is available on the web at <http://www.umbi.umd.edu/umbi-wide/plan.pdf>. A draft of the final plan is expected to be available for comment in a few months.

Here We Go Again!

Since an advertisement was placed in *Science* last October, MBC has been flooded with applications for a tenure track Assistant Professorship. As of the end of December, nearly 300 applications have been received. Now the hard part is nearly completed, the search committee read every application and is now finalizing the short list of 5 or 6 candidates to bring in for interviews and seminars by the end of February.

Because of the quality of the applications and the broad interests within the MBC, the task is especially challenging. However, with the quality and quantity of the applications so high, the perfect candidate is sure to be on board by this summer.

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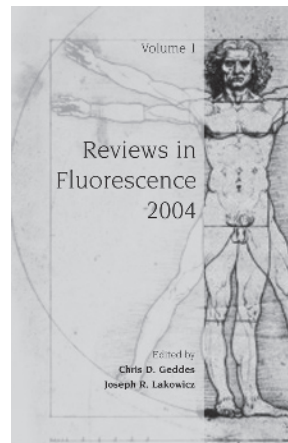
Seeing Continued

tears go to the sensor! Since tears bathe the contact lens, biosensors in lenses could be used to measure substances in tears, you just need the appropriate biosensing material and that is what Dr. Geddes has created.

Using boronic acid-containing fluorescent probes embedded in the common plastic lenses, they have demonstrated that these sensors accurately measure physiological levels of glucose in tears. Dr. Geddes and co-workers have already filed a provisional patent application and are eagerly awaiting the completion of the process. In the meantime, he and his colleagues have published their results and had their work highlighted in *Nature Materials* 3, 76 (2004).

In addition to glucose levels, Dr. Geddes has developed other sensors to track electrolytes or various drugs. While the first lenses they made tracked only one substance, and the entire lens changed color (see figure), Dr. Geddes envisions tailor-made lenses with a series of biosensing spots that can track multiple substances. Changes could be noted either visually or mechanistically by sending light pulses from an external device to the lens and reading the color of the lens.

In addition to his funded research and administrative duties as head of the Institute of Fluorescence at the MBC and as Associate Director of the Center for Fluorescent Spectroscopy at UMB, Dr. Geddes is also active in the fluorescent field as an editor of a variety of publications. He is editor-in-chief of the *Journal of Fluorescence* and *Who's Who in Fluorescence*. This December he founded another publication, *Annual Reviews in Fluorescence*.



First UMBI-MBC Town Meeting

In an effort to open communications even wider, Drs. Marian Jackson, Associate Vice President of Academic Affairs, and Claude Nash, Vice President for Research and Development, held an open forum, town hall meeting for MBC and IHV on November 10, 2004. In addition, Vice President for Operations and Finance, Mr. Daniel Reznikov, joined the meeting.

Agenda topics included shared governance, the Faculty Staff Senate, CUSS and CUSF representation, and the strategic plan. Other topics of interest to the attendees were encouraged and a lively discussion on the lack of access to the fund balance ensued.

The fund balance is the general account that is used for monies not directly linked to sponsored programs. Fund balance sources are diverse and may represent money that is saved from one year to be spent in future years. Though these monies are often earmarked for specific expenses or are assigned to revolving accounts, they are treated differently than grant monies. The University System Administration has frozen all monies in that account as of July 2002. In addition any money left in revolving accounts at the end of each fiscal year is also frozen.

Mr. Dan Reznikov listened to a number of concerns attendees had about the frozen assets, which include MBC revolving accounts and indirect cost recovery monies. He indicated that monies were being made available on a case by case basis and that he would press for specific expenditures as they are requested, though the lead time for such requests is very long (months to a year).



Drs. Marian Jackson and Claude Nash listen to Mr. Dan Reznikov answer a question about the fund balance.



MBC Happenings

Comings and Goings

Dr. Peter Kohl from Oxford University has joined the MBC as an Adjunct Associate Professor. **Dr. Eric Sobie** as left the MBC for New York University; he retains an adjunct appointment.

Grants and Contracts

Dr. W. Jonathan Lederer, NIH, "Calcium Sparks in Heart," 12/1/04, \$371,250, yr 1 of 4.

Publications

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Gryczynski I, Malicka J, Lukomska J, Gryczynski Z, **Lakowicz**

Stop the Presses!

UMBI communication specialist, Alicia Moran, arranged for a "Brown Bag Lunch" with members of the print media in Baltimore on November 10, 2004. Drs. W. Jonathan Lederer, Bruce Vogel and Chris Geddes were on hand to give overviews of their research. The lunch was not as big a success as was expected; a number of reporters who had agreed to come were pulled to cover what was thought to be an act of environmental terrorism in a new home development. A reporter from the Baltimore Sun did come and seemed impressed with the range of topics in which MBC has expertise. As this was just a "get acquainted" visit, there is not going to be a story appearing any time soon. However, Ms. Moran hopes that, as reporters in Baltimore and around Maryland know more about the research at each of the centers, they will come to UMBI for comments and information on breaking science stories.

Prion Paradox

"Why does the mammalian genome encode PrPc, a protein that puts animals and people at risk of prion disease?" This is the question that Dr. Igor Bronstein from the Institute for Animal Health in Compton, UK, addressed in his seminar on December 9, 2004. Prion disease is caused when a normal protein (PrPc) misfolds and accumulates, forming amyloid plaques which ultimately destroys the brain.

While there are no definite answers to the question, Dr. Bronstein discussed some intriguing data on the normal function of the prion protein. It is a membrane protein, but is highly mobile in the cell. It is significantly increased in metastatic cancers, suggesting a role in apoptosis, or cell death, pathways. There is also some evidence that it may be a multifunctional biosensor involved in oxygen homeostasis and antioxidant defense systems, as it is known to have a copper binding domain which is associated with such activities. Clearly PrPc is a fascinating protein which still has scientists perplexed.

JR. Surface plasmon-coupled polarized emission of N-acetyl-L-tryptophanamide. PHOTOCHEMISTRY AND PHOTOBIOLOGY 80 (3): 482-485 NOV-DEC 2004

Talks and Travels

Dr. Iliia Baskakov, Invited speaker, "The First Synthetic Mammalian Prion", Universidade Federal do Rio de Janeiro, Rio De Janeiro, Brazil, November 5, 2004

Dr. Iliia Baskakov, Invited Presentation, "Generation of synthetic mammalian prions *in vitro*" 1st Latin America Protein Society Meeting, Angra dos Reis, Brazil, November 10, 2004.

Dr. Shengyun Fang, Invited Speaker, "RNA interference: mechanisms and applications." Institute of Neuroscience, Anhui Medical University, China, November 23, 2004.