



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

September 8, 2005

OFFICE OF
RESEARCH AND DEVELOPMENT

Dr. James H. Johnson, Jr.
Chair, Board of Scientific Counselors
Dean, College of Engineering, Architecture, and Computer Sciences
Howard University
2366 6th Street NW
Washington, DC 20059

Dear Dr. Johnson:

The Office of Research and Development (ORD) would like to take this opportunity to thank you and the members of the Board of Scientific Counselors (BOSC) for the April 2005 progress review of the new National Center for Computational Toxicology (NCCT). We especially thank the members of the Computational Toxicology Subcommittee who conducted the review, Drs. George Daston (Chair), James Clark, and Richard Di Giulio.

We are pleased that the BOSC was very supportive of the NCCT and the direction we are taking in this very important research program. Enclosed with this letter is our response to the comments in your Letter Report of July 20, 2005. Please feel free to contact me if further information is needed.

Again, thank you for your advice to ORD.

Sincerely yours,

A handwritten signature in black ink, appearing to read "William H. Farland".

William H. Farland, Ph.D.
Acting Deputy Assistant Administrator
for Science

Enclosure

cc: Dr. George Daston (Computational Toxicology Subcommittee, Chair)
Dr. James Clark
Dr. Richard Di Giulio

ORD Response to Board of Scientific Counselors (BOSC) Review of the National Center for Computational Toxicology (NCCT) in April 2005

The following is a narrative response to the comments and recommendations of the BOSC review of ORD's National Center for Computational Toxicology. The review was held April 25 – 26, 2005, in Research Triangle Park, NC. The committee considers this to be part of a series of consultative reviews. For this review, the committee concentrated on the NCCT's strategic goals; its collaborations, and connectedness to the rest of the Agency and to outside scientists; its staffing plan; and its thematic choices. They addressed a number of charge questions intended to focus on each of these areas. Generally, the committee was very favorable to the formation of the NCCT and the progress the Center has made since its inception a few months ago. The committee recognized the unique and important role for the Center because of its small size and ability to establish strong collaborations with other groups within and outside of the ORD. The committee emphasized the importance of collaborations and positively commented on the number of collaborations that are already taking place. The committee also commented favorably on the Center's four focus areas of Information Technologies, Prioritization Tools, Biological Models, and Cumulative Risk. The committee highlighted that the first two have the potential to address "significant issues in toxicology..." The committee felt the NCCT has made appropriate choices in bringing together expertise from several related disciplines to fulfill the Center's mission.

Following are specific comments related to the charge questions made by the committee. The committee's comments are written in italics and ORD's response follows in regular type. Attached to this document is a summary table which provides a summary of BOSC comments and proposed ORD actions.

I. The first charge question asked for advice on collaboration with other ORD laboratories and centers and asked for advice to ensure that operations remain integrated with those laboratories and centers. The committee responded:

One challenge will be to transition the Center from a collection of experts in various fields to a center of excellence in applying the broad tools of computational toxicology to address the human health and environmental health issues under the purview of EPA. Experts will need to develop procedures to capture the essence of thought processes and computational tools that can be applied to the diversity of challenges the Agency addresses. Many of the Center staff will be required to shift their focus from finding computational approaches to address a set of specific issues to developing robust tools and procedures that provide computational frameworks that support ORD and Agency programs.

ORD strongly agrees with this comment. The NCCT is writing an implementation plan that will outline the research being conducted over the next several years. In this plan there is a strong commitment to conduct work that addresses specific Agency needs. The plan will recognize the need for providing generic tools that will facilitate the

incorporation of computational methods into the hazard and risk assessment processes. An example of such a current activity is assisting in the compilation and web hosting of a database of parameters that can be used for physiologically based pharmacokinetic modeling across the life stages. The NCCT is also committed to the long term goal of conducting two annual training workshops on topics that will help promote the use of computational approaches in ORD and the EPA. The plan will also discuss the interactions between activities within the Center and other components of ORD. For example, on-going work on using the newest “omics” technologies and bioinformatics to better identify and characterize pathways of toxicity are being conducted in collaboration with scientists from the National Health and Ecological Effects Laboratory (NHEERL). Compounds include endocrine disrupting compounds and pesticides, all of interest and concern to Agency program offices. Similarly, NCCT scientists are working with scientists from the National Exposure Laboratory (NERL) to use computational chemistry methods to better quantify the rates of key biochemical processes that are important in pharmacokinetic and pharmacodynamic modeling being conducted by scientists with the Center and other parts of ORD. Often the models being developed and applied are to address specific needs of the Program Offices such as for pyrethroid and N-methylcarbamate pesticides.

Because of its small size, the Center staff has a good rapport and meets regularly to discuss and share their work and progress. In these meetings there is a free exchange and collaboration and interaction is easily promoted. Similar meetings have also been initiated with colleagues at the National Institute of Environmental Health Sciences (NIEHS). Because of the varied expertise within these groups, problems can be addressed with solutions as the goal rather than from only a specific narrow discipline.

It should also be noted that NCCT scientists work closely with others within the Agency on projects specifically relevant and important to Program Offices. Agency scientists work directly on assessments being performed by the Office of Pesticide Programs (OPP) in support of the Food Quality Protection Act mandated re-registration program, for example. NCCT scientists serve on the Agency Risk Assessment forum as well. These kinds of activities help assure the NCCT will address a broad array of problems relevant to Agency needs.

Not all the modeling expertise within EPA resides within NCCT, let alone the disciplines that rely on computational toxicology. The Center should consider forming an informal “community of practice” within EPA that can serve a networking function for interested scientists. This community of practice would not be an administrative unit, but a virtual professional society within the Agency.

Most of its business can be conducted via electronic media, with occasional meetings.

The NCCT recognizes the need for integration of computational efforts across ORD and has provided leadership for the formation of two Communities of Practice (CoP) within the EPA. One is on chemoinformatics and one is on biological modeling. The goal of the chemoinformatics CoP is to facilitate, coordinate and integrate efforts to address the challenges of chemical structure annotation (or indexing), retrieval, and mining of chemically-related data and documents, including newer toxicogenomics and metabonomics data, across EPA Program Offices, Labs and Centers. The goal of the biological modeling community of practice is to advance the principals for development and application of dosimetry and other biologically based models within the Agency. Dosimetry modeling includes multiple forms of toxicokinetic modeling (e.g., physiologically based toxicokinetic (PBTK) modeling, compartmental modeling), respiratory tract dosimetry modeling (e.g., computational fluid dynamics), and related modeling (e.g., dermal absorption modeling). The working group will also focus on biologically based response modeling with special emphasis on using the newest “omics” information in biologically based models. A further goal is to foster adoption of modeling science by Agency clients in regulatory decision making.

Membership in these CoPs has initially been solicited from within ORD. In the near future this will be extended across the Agency. ORD is considering gaining endorsement for these groups from the Agency’s Office of Science Policy. It is ORD’s belief that this will extend the expertise and more importantly, assure that the CoPs will focus on important issues relevant to current and future Agency problems. These CoPs will operate as the committee has suggested, i.e. electronic media and occasional meetings.

The Subcommittee endorses the Center’s concept of trying to develop various personnel alignments and management tools (e.g., appointing agency/federal/academic scientists as adjunct or associate faculty of the Center) to help recruit or gain input from a broader number of scientists. Those individuals with technical expertise aligned with the Center’s activities can be encouraged to contribute to NCCT activities while being housed in other organizations within ORD, EPA, or outside of the Agency; they will form the nucleus of the community of practice.

The NCCT endorses this recommendation and welcomes the possibility of individuals from outside the NCCT doing rotational details to acquire training and skills in computational toxicology. The CoPs mentioned above will help create networks of individuals working towards

similar objectives. Besides the CoPs, a number of informal alignments have already occurred and resulted in fruitful endeavors. One example is a working relationship between NHEERL scientists and NCCT scientists in working contractually with a private company to investigate the feasibility of that company's capabilities in genomic signature development for screening and prioritization and for toxicity pathway identification. Another example is the aforementioned collaboration between NCCT scientists in computational toxicology contributing to a pharmacokinetic modeling project with NERL scientists. Finally, interactions with the NTP/NIEHS are developing, as both groups have similar goals as identified in the NTP Roadmap and the EPA's Computational Toxicology Framework.

The CTISC [Computational Toxicology Implementation Steering Committee] should be explicitly tasked with identifying possible partnerships and collaborations (and of prioritizing them, if necessary). ORD should continue to hold regular meetings of its Laboratory and Center Directors, at which partnerships among centers, including NCCT, can be explored.

The CTISC had been expanded to include the NHSRC and Program Office Staff; it now contains delegates from OPPTS (2), OW (2), OAQPS (1) and the Regions (1). The topic of interactions between NCCT scientists and those in other components of ORD has been forwarded as an upcoming agenda item for the CTISC.

ORD Laboratory and Center Directors meet on a regular basis, approximately once a month. Many topics including partnerships are regularly addressed at these meetings. In addition, the management team of the NCCT has scheduled monthly meetings with their counterparts in NHEERL and NERL and will hold quarterly meetings with the NPDs for Safe Pesticides and for Human Health Research. A Memorandum of Agreement (MOA) has been established between the NCCT, NHEERL, and NERL to provide administrative support, which has provided a strong partnership amongst the co-located units in RTP.

The internal grant program that supports many of the NCCT collaborations is important and likely to be highly successful. Future grant programs should provide a preference for projects that collaborate with the Center.

The ORD agrees that a program in which the NCCT works with other scientists helps coordinate a great deal of the computational toxicology research is very fruitful in terms of promoting collaborations. While another round of request for proposals has yet to be planned, the NCCT has committed to reserve at least 10% of its available extramural resources in the coming year to be used to augment or initiate

computational toxicology research within other laboratories and centers. Strong preference will be given to those projects in which NCCT staff will be involved.

Finally, NCCT should develop a communications plan to share its accomplishments and capabilities with the rest of EPA and those external to the Agency

A formal communication plan will be prepared in the coming year. At this time, NCCT continues to look for opportunities to informally communicate their capabilities and accomplishments. Recently we established an internet homepage for the research program and have initiated discussions with the communications team in HQ about a broader scale communications effort.

II. The second charge question asked for advice on anticipated staffing. The committee responded:

NCCT may wish to consider adding one or two staff who have expertise in bioinformatics. The planned grant for an external bioinformatics center will cover most of the Center's needs in this area, but having some internal expertise would complement the external bioinformatics efforts and provide a natural point of contact between the external group and NCCT. The Center also should consider whether there are social science applications to computational toxicology, and if so, whether there is a social science expertise that should be represented on the staff.

The NCCT has already advertised for two staff positions with expertise in bioinformatics. Final selection is anticipated within the next month. We have also requested approval to use the new Title 42 hiring authority to attract a more senior level bioinformaticist. In addition, two Environmental Bioinformatic Research Centers are being established through the STAR program to bolster the state of the science of informatic analysis in environmental health sciences. A senior position seeking expertise that can help develop high through-put screening and prioritization methods has also been advertised. Likewise, final selection is expected within the next month.

The NCCT is considering the possibility of hiring a social science expertise in the future. Our short term plan is to provide postdoctoral support to the visual analytic effort looking at children's exposure issues as a first foray into this area. Additionally, ORD may choose to hire such expertise in other programs within the other laboratories or centers. This will be considered in ORD's overall work force planning activities.

Finally, we note that the NCCT recently hired a well known senior scientist as an ST to take leadership in the area of systems biology.

III. The third charge question sought advice on how to best keep apace with new technologies and methodologies. The committee response:

This is a problem that we all face, but is perhaps more severe for an integrating group such as NCCT. Partnerships with other organizations with similar/complementary interests may be the best way to facilitate keeping current. Active collaborations, which already are the stock-in-trade for the Center, publication, and participation in professional meetings will keep the Center staff fresh and well informed. These efforts also will serve to attract the brightest students and post-doctoral fellows, who will bring with them the latest technologies.

The ORD and NCCT agree fully with this comment. The staff are and have been actively engaged in such activities both nationally and internationally (e.g., ILSI, WHO, OECD). They also look for training opportunities. Resources are maintained for travel and training. Recently the Center selected a candidate for the cross-ORD post-doctoral program. This highly qualified candidate will be working with a senior scientist from the NCCT and one from the NERL on a research very relevant to computational toxicology.

IV. The fourth charge question asked if the NCCT articulated a clear rationale for its concept topic areas of research. The committee response:

The Subcommittee members believe that NCCT is on track. It will be important for the Center to prepare a synthesized set of goals/milestones for the numerous projects in which the Center is involved, explaining how each fulfills a need, and how each topic area will provide tools for the Agency. The prioritization process that the Center leadership has developed is a good one, which works well in selecting program areas that are consistent with the Center's mission.

The NCCT appreciates the comments and the staff is currently preparing a research implementation plan that will address goals, rationale, and milestones over the next three years. This plan is expected to be ready for review during September, 2005. An important component of this implementation plan is the launching of the ToxCast program, which is being designed to establish a process for the prioritization of chemicals for toxicological testing, one of the key driving forces for the inception of the computational toxicology program.

V. The next charge question asked the committee to help identify potentially fruitful partnerships with others outside the Agency. The response:

The review provided plenty of evidence that the Center is reaching out to find potential collaborators among a diverse set of U.S. government and private institutions. Many of the collaborations discussed should be formalized in Memoranda of Understanding (MOU), Interagency Agreements (IAGs), and other formal commitments to demonstrate the degree of cooperation, leverage, and interest generated with other partners. Also, NCCT will need to have opportunities to work with scientists and regulatory authorities from countries around the world, as computational toxicology is an area of evolving science with expertise in Europe, Canada, Asia, perhaps Russia, as well as the United States.

One approach to broaden international contacts would be to consider development of ties with U.S.-based academic centers and institutions that have liaisons with international scientists and organizations. Also, Center management may want to specifically reserve some travel allocations to allow attendance at conferences, workshops, or technical exchanges and site visits at leading international sites and organizations around the world. A world-class center will need worldwide perspectives in computational toxicology.

NCCT already is doing a good job of establishing liaisons with other organizations involved in aspects of computational toxicology, such as the National Center for Toxicogenomics at the National Institute of Environmental Health Sciences (NIEHS). Efforts should be continued to partner with private industry in areas of mutual interest.

Since the review in April the NCCT staff has visited programs in Russia seeking opportunities for collaboration. Although not yet fruitful several promising areas were identified and are being pursued.

The recommendation to establish ties with U.S. based academic centers that have liaisons with international scientists is a good one and the Center will investigate such possibilities. Also, the NCCT staff will be working closely with the STAR program Bioinformatics Centers. A one day workshop was held in May 2005 with DOE's Pacific Northwest National Laboratory to develop communication links and begin to identify areas of collaboration between the two organizations.

The NCCT management, as mentioned previously, has been and will continue to be careful about reserving sufficient resources to allow staff the ability to attend and present at conferences, workshops, etc. In addition, the Center is planning a program of specific topic workshops to be conducted at the EPA and at national and international meetings of professional societies. The NCCT scientists are considering formulating and teaching courses in relevant areas. This will serve to show Center capabilities and extend the exchanges between experts from throughout the world and Center staff.

Center staff are also actively involved with a number of activities of ILSI, the WHO and OECD and will have made more than a dozen presentations this year at international meetings specifically related to various aspects of computational toxicology. These presentations have helped communicate the formation of the NCCT to the international scientific community.

VI. The final charge question asked the committee to comment on the depth and breadth of the emphasis areas and whether they recommended other areas for consideration. The responses:

The Subcommittee members believe that the Center is doing a good job of maintaining broad coverage through its collaborations with multiple laboratories. Depth will come from the other laboratories and programs with which NCCT collaborates.

Collaboration with other laboratories and centers is a centerpiece of NCCT's mode of operation and has been discussed in responses to previous comments.

The Center's goal to take advantage of opportunities to broaden and generalize the technical approaches to the diverse scope of Agency issues is an admirable goal, and one that will require a disciplined approach among the technical and managerial team to implement. The Subcommittee realizes that the endocrine disruptor studies offer many concrete examples of the kind of molecular and cellular work the NCCT can provide in the future. It will be important that the Center quickly provides similar services and value to EPA programs that can benefit from these tools applied to non-endocrine disruption issues. Plans to broaden program office representation in the CTISC (to include the Offices of Solid Waste and Emergency Response and Homeland Security, and possibly others) should quickly bring these opportunities to the forefront. Discussions should proceed with Agency programs and offices dealing with waste management and issues surrounding remediation of contaminated sites; applications of environmental models to total maximum daily loads (TMDLs); environmental health monitoring programs such as the Environmental Monitoring and Assessment Program (EMAP), various regional Bay programs (Chesapeake Bay, Great Lakes Program, Florida Everglades), as well as the air and water monitoring programs conducted by the states with federal assistance. Understanding the chemical and biological stressors encountered in these environmental health studies will broaden the types of contaminants and thus computational tools that must be considered by NCCT. It also will challenge applications of the Center's tools to issues with a broad temporal and spatial scale and provide opportunities to assess some dynamic aspects of human and animal populations.

As noted above, membership in the CTISC has been expanded. The Center in particular has extensive work dealing with pesticides and high production volume chemicals that include substances other than endocrine disruptors. Discussions with parts of the Agency recommended by the committee have begun and will be expanded and continued in the coming year. At this time however it is not clear what role the NCCT itself will take in some of the more ecologically related areas mentioned by the Committee. Given the small size of the NCCT and the fact that some of those activities are well represented in the other laboratories and centers these areas may be addressed through collaborative efforts and temporary assignments of those scientists to the NCCT. However, this needs further discussion within ORD.

Based upon the urgent needs to develop a prioritization and categorization process for evaluating the large numbers of chemicals for which standard toxicological studies are not available, the NCCT will soon be launching the ToxCast project. This effort, to some extent, builds on the activities of the EDC proof of concept projects in that it will be using a variety of computational and molecular tools to collect biological activity patterns using high throughput screening devices. If successful, this concept will provide multiple programs offices with a solution to a vexing problem. We are now involved in a number of briefings and presentations across ORD, the Program Offices (e.g., OPPTS and OW) in order to build a consensus about the overall program and to fine tune the directional details. Completion of our staffing targets that are scheduled for this year will greatly facilitate our ability to broaden beyond the efforts presented to the BOSC during the April review.

Recognizing that this review was a progress review early in the life of the NCCT it is expected that subsequent reviews by the Committee will take place. The next progress review is expected late 2006 or early 2007.

**Computational Toxicology Program
Summary of BOSC Comments From July 2005 Letter Report and Proposed ORD
Actions**

Recommendation	Action Items	Timeline
Charge Question 1, Advice on Collaboration:		
<p><i>Shifting focus from finding computational approaches to address a set of specific issues to developing robust tools and procedures that provide computational frameworks that support ORD and Agency programs</i></p>	<p>An Implementation Plan for the NCCT is being written that incorporates all facets of the Computational Toxicology Program including research, outreach, and operations. The plan will recognize the need for providing generic tools that will facilitate the incorporation of computational methods into the hazard and risk assessment processes.</p> <p>The NCCT is also committed to the long term goal of conducting two annual training workshops on topics that will help promote the use of computational approaches in ORD and EPA.</p>	<p>September, 2005</p> <p>Current and on-going</p>
<p><i>Form an informal “community of practice” within EPA that can serve a networking function for interested scientists</i></p>	<p>The NCCT recognizes the need for integration of computational efforts across EPA. Two such Communities of Practice have been initiated – one for chemoinformatics and one for biological modeling.</p>	<p>Expect first meetings by October 30, 2005</p>
<p><i>Develop various personnel alignments and management tools to help recruit or gain input from a broader number of scientist</i></p>	<p>The NCCT welcomes the opportunity for staff from other units of ORD or EPA to have rotational details for the purpose of acquiring training and experiences in computational methods. The Communities of Practice offer other means of gaining input from a broader range of scientists. The weekly work in progress meeting with the NTP/NIEHS offers yet another input function</p>	<p>Current and on-going</p>
<p><i>The CTISC should be explicitly tasked with identifying possible partnerships and collaborations (and of prioritizing them, if</i></p>	<p>The CTISC had been expanded to include the NHSRC and Program Office staff. The topic of interactions between NCCT scientists and those in</p>	<p>Late FY 2005/early FY 2006</p>

Recommendation	Action Items	Timeline
<i>necessary</i>	other components of ORD has been forwarded as an upcoming agenda item for the CTISC.	
<i>ORD should continue to hold regular meetings of its Laboratory and Center Directors, at which partnerships among centers, including NCCT, can be explore</i>	ORD Laboratory and Center Directors meet on regular basis approximately once a month. In addition, the management team of the NCCT has scheduled monthly meetings with their counterparts in NHEERL and NERL on a monthly basis, and has agreed to hold at least quarterly meetings with the NPDs for Safe Pesticides and for Human Health Research.	On going
<i>Future [internal]grant programs should provide a preference for projects that collaborate with the Center.</i>	The NCCT has committed to reserve at least 10% of its available extramural resources in the coming year to be used to augment or initiate computational toxicology research within other Laboratories and Centers. Strong preference will be given to those projects in which NCCT staff will be involved.	FY 2006 and beyond
<i>NCCT should develop a communications plan to share its accomplishments and capabilities with the rest of EPA and those external to the Agency</i>	Formal communications plan for NCCT to be developed and implemented; an internet homepage has been established.	FY 2006
Charge Question 2, advice on anticipated staffing:		
<i>NCCT may wish to consider adding one or two staff who have expertise in bioinformatics</i>	Two such positions have been advertised and selection process is on-going. We have also requested approval to use the new Title 42 hiring authority to attract a more senior level bioinformaticist.	Final selection by October 1, 2005
<i>The Center also should consider whether there are social science applications to computational toxicology, and if so, whether there is a social science expertise that should be represented on the staff</i>	The NCCT recognizes the importance of this research activity and it will be considered by NCCT and others in ORD's overall work force planning activities. The short term plan is to provide postdoctoral support to the visual analytic effort looking at children's exposure issues as a first	FY 2006

Recommendation	Action Items	Timeline
	foray into this area.	
Charge Question 3, advice on how to keep apace with new technologies and methodologies:		
<i>Consider partnerships with other organizations with similar/complementary interests to facilitate keeping fresh; , publication, and participation in professional meetings will also keep the Center staff fresh and well informed</i>	Staff are actively engaged in National and International activities (ILSI, WHO, OECD) and meetings – resources are set aside for such activities	On-going
Charge Question 4, has NCCT articulated a clear rationale for topic research areas:		
<i>Prepare a synthesized set of goals/milestones for the numerous projects in which the Center is involved, explaining how each fulfills a need, and how each topic area will provide tools for the Agency</i>	NCCT is developing research implementation plan. This plan will articulate the particular directions and expected milestones of the research program over the next three years.	First draft – September, 2005
Charge Question 5, identification of fruitful partnerships with others outside the Agency		
<i>NCCT will need to have opportunities to work with scientists and regulatory authorities from countries around the world, as computational toxicology is an area of evolving science with expertise in Europe, Canada, Asia, perhaps Russia, as well as the United State</i>	The NCCT staff are involved in a number of ongoing international efforts, including those with ILSI, the WHO and OECD. In addition, NCCT staff recently visited Russia to develop potential working partnerships and we are now working through OSP/ORD and ISTC/Russia to develop several research proposals in computational toxicology	Ongoing Continued discussions with collaborative proposals developed early in FY 2006
<i>Consider development of ties with U.S.-based academic centers and institutions that have liaisons with international scientists and organization</i>	The newly established STAR Centers for Environmental Bioinformatics should provide a logical starting place for interactions with academic institutions. A one day workshop was held in May 2005 with scientists from PNNL looking to develop a collaborative relationship.	Immediate and continuing; selection for new staff for bioinformatics expected by Oct 1, 2005.
<i>Center management may</i>	NCCT agrees and has and will	On-going

Recommendation	Action Items	Timeline
<p><i>want to specifically reserve some travel allocations to allow attendance at conferences, workshops, or technical exchanges and site visits at leading international sites and organizations.</i></p>	<p>continue to reserve sufficient resources to allow staff participation at conferences, workshops, etc. With our current budgetary situation, we do not foresee any difficulty in supporting this function.</p> <p>NCCT is also preparing a program of specific topic workshops</p>	<p>Expected in 2006 and then continuing</p>
<p>Charge question 6, depth and breadth of emphasis areas and other possible areas of consideration:</p>		
<p><i>The Subcommittee members believe that the Center is doing a good job of maintaining broad coverage through its collaborations with multiple laboratories. Depth will come from the other laboratories and programs with which NCCT collaborates</i></p>	<p>The NCCT appreciates the positive feedback and will continue to develop collaborations that will allow delivery of important products to the Agency over the next 3-5 years.</p>	<p>Ongoing</p>
<p><i>The Subcommittee realizes that the endocrine disruptor studies offer many concrete examples of the kind of molecular and cellular work the NCCT can provide in the future. It will be important that the Center quickly provides similar services and value to EPA programs that can benefit from these tools applied to non-endocrine disruption issues.</i></p>	<p>Launching of the ToxCast concept that builds on the activities of the EDC proof of concept projects in that it will be using a variety of computational and molecular tools to collect biological activity patterns using high throughput screening devices to prioritize and categorize chemicals for more standard toxicological evaluation.</p>	<p>FY 2006</p>