



Outline of Testimony

*Senate Subcommittee on Higher Education
Charge #4—Flagship Institutions
July 23, 2008*

Commissioner Raymund A. Paredes

Committee Charge:

Study the need for new higher education institutions and make recommendations for developing a long-term strategy for creating and supporting new institutions, especially additional flagship public research universities. Explore methods for determining where such universities should be located and ensuring that such universities admit a qualified and diverse student body. Consider the state's allocation of and need for resources for medical education, including graduate medical education, geographic distribution of those resources, and the value of associating a medical school with a top-tier academic campus.

Overview:

- I. **For Texas' size and national prominence, establishing the next national research university is a logical step.**
 - a. Texas currently has only 2 public institutions that are members of the Association of American Universities—the gold standard for top-tiered research institutions in the nation.
 - b. In comparison, our chief competitor in both population and economy—California—boasts 6 public institutions that are members of AAU.
 - c. For Texas to remain competitive, the state must carefully and methodically employ its limited resources to establish another

national research university while simultaneously nurturing its existing research institutions.

II. The Association of American of Universities (AAU) and the Center for Measuring University Performance (CMUP) are national clearinghouses for evaluating top-tiered research institutions.

- a. They examine slightly different criteria to evaluate such institutions.
- b. The CMUP's criteria include total research expenditures, endowment assets, memberships in the National Academies of Sciences, Engineering and Medicine, and doctoral awards.
- c. The AAU looks at faculty quality rating, undergraduate education, and research funding, among other criteria.

III. The Coordinating Board has not identified specific criteria by which an emerging research institution should be evaluated to determine whether it is well-positioned for national research status.

- a. Coordinating Board staff has started some initial analysis to see where Texas' emerging research institutions stack up on some key measures against national peers.
- b. The Coordinating Board staff pulled key criteria that are shared by both the AAU and CMUP and applied them to Texas emerging research institutions, as well as to UT-Austin and TAMU.
- c. Additionally, we identified a small number of national research institutions that are generally considered peers and applied these same criteria.
- d. These institutions include: University of Kansas, University of Arizona, University of Missouri, and the University of Nebraska.

IV. Criteria #1: Federal Research Expenditures

- a. Research expenditures are always a key component of any evaluation of a national research university.
- b. For FY 2006, the University of Arizona led the pack among select peer universities with more than \$207 million in federal research expenditures, which was far greater than the Texas

institutions or other national peers. As an example, the University of Kansas had \$62 million in federal research expenditures.

- c. By comparison, the University of Houston had the highest level of federal expenditures among our emerging research institutions in FY 2006, with \$40 million.

V. Criteria #2: Number of Doctoral Degrees Awarded

- a. Doctoral degrees awarded indicate the relative strength of graduate education at a institution and is paramount for cultivating research at top-tiered institutions. For this reason, this criteria is shared by both AAU and CMUP.
- b. The University of Arizona awards approximately 400 doctoral-level awards each fiscal year.
- c. The top two emerging research institutions in Texas for this category (University of Houston and Texas Tech University) both award approximately half that amount (236 and 199, respectively in FY 2006).
- d. UT-El Paso and UT-Arlington award fewer than 100 degrees annually, with UT-San Antonio awarding only 21 total degrees in FY 2006.

VI. Criteria #3: Doctoral Degree Programs Awarding Degrees Annually

- a. Again, the relative strength of a national research university is the breadth and depth of graduate education, which is why both AAU and CMUP examine the number of doctoral degree programs that award degrees in a given year.
- b. Interestingly enough, there is not much separation between our selected peer institutions and Texas' emerging research institutions—most have approximately 20 degree-conferring doctoral programs each year.
- c. However, based on the number of degrees actually awarded at the selected peer institutions, it appears they are far more productive in graduating doctoral students.

VII. Criteria #4: National Academy members and faculty awards

- a. The vigor and prominence of both faculty achievement and university performance relative to peers can be measured qualitatively by examining the number of national academy members in science, engineering, and medicine, as well as the number of prestigious faculty awards received annually.
- b. There is clear disparity between most of our select peer institutions and Texas' emerging research institutions in this area.
- c. The University of Arizona faculty won 18 national awards in FY 2006.
- d. Comparatively, the University of Houston and Texas Tech University totaled 7 such awards between them.
- e. In FY 2005, the University of Arizona and the University of Kansas had 38 National Academy members on faculty, while the University of Houston and Texas Tech University had 10 National Academy members.

VIII. Other considerations for evaluating position of next major research institution.

- a. Regional and statewide needs for population and economic development should be part of the evaluation process.
- b. The Metroplex, Central Texas, South Texas, the Gulf Coast, and the Upper Rio Grande (specifically El Paso) are expected to see the highest population growth in Texas over the next decade.
- c. Local and regional business and industry also provide natural advantages for establishing a nationally prominent research institution

IX. The Coordinating Board staff is preparing to systematically evaluate and recommend a process and criteria by which policymakers can identify where the next national research university in Texas should be established.

- a. It is important to recognize that whatever the state decides in this regard, it will require significant investment to elevate such an institution to the moderate level of achievement some

reasonable peer institutions have reached, as illustrated in this presentation.

- b. It is also critical that we continue to invest in our existing major research institutions as they also have much room for improvement to achieve parity with some of the premier institutions in the nation.
- c. And finally, we must continue to remember that undergraduate teaching institutions still play the most critical role in helping the state achieve the goals of *Closing the Gaps by 2015*.



Outline of Testimony

Senate Subcommittee on Higher Education
Charge #5—Research
July 23, 2008

Commissioner Raymund A. Paredes

Committee Charge:

Study research funding and assess the research infrastructure and capabilities at higher education institutions. Make recommendations for streamlining the various sources of funding (Texas Competitive Knowledge Fund, the Research Development Fund, and the Advanced Research Program) and for developing a statewide strategy for increasing research at higher education institutions, including ways to improve research commercialization.

Overview:

- I. ***Closing the Gaps* established a specific target for federal science and engineering R&D occurring at Texas universities.**
 - a. Increase overall federal obligations from 5.5 percent to 6.5 percent by 2015.
 - b. Increase overall research expenditures from \$1.45 billion to \$3 billion.

- II. **Texas has slipped in federal research obligations and is below targets for meeting goals of *Closing the Gaps*.**
 - a. Texas' federal research obligations have increased by \$561 million since 1999.

- b. However, because obligations in other states have increased at a faster rate, Texas has slipped from 5.6% of all federal obligations in FY2004 to 5.5% of obligations in FY2005 (the most recent data available).
- c. We experienced significant growth in obligations early in *Closing the Gaps*, but since 2003 our obligations have only grown by 0.8 percent, compared to 9.7 percent in peer states.

III. Most of Texas research funds come from the federal government.

- a. Approximately 55 percent of all funds are from federal sources.
- b. State appropriations and other state sources account for 13 percent, while private and institutional sources account for 16 percent and 10 percent, respectively.
- c. Comparatively, California receives close to 62 percent of their research funds from the federal government and only 4 percent from the state. Institutions also pick up a greater share of their expenditures—approximately 19 percent.

IV. In 1987, the Texas Charter for Higher Education recommended that state research be funded via the following mechanisms:

- a. Research enhancement programs
- b. Advanced Research Program
- c. Advanced Technology Program
- d. Direct appropriations (e.g. special items)
- e. Indirect cost recovery for research overhead

V. The Advanced Research and Advanced Technology programs were created by the Texas Legislature in 1987.

- a. The ARP is designed to support basic faculty research at Texas' institutions.
- b. The ATP is designed to support applied research in targeted areas to facilitate commercialization.
- c. Funding for these programs has dropped significantly in recent biennia.
- d. ATP has not been funded since the 78th Legislature, and while ARP funding was enhanced last session to \$16.4 million, it was

far short of the Coordinating Board's LAR request for \$75 million.

VI. The Research Development Fund (RDF) helps expand and enhance research capacity at Texas' institutions.

- a. The RDF is the result of consolidation between the Texas Excellence Fund and the University Research Fund and has been operational since FY 2006.
- b. This biennium it was funded at \$80.9 million.
- c. Funds are available to all public institutions via a set allocation formula, with exception of UT-Austin, TAMU, and Prairie View A&M.
- d. These funds are designed to support facility and equipment associated with research, as an example.

VII. The Emerging Technology Fund is designed to fund applied technology research that will facilitate commercialization.

- a. The Fund was created and trustee to the Office of the Governor in 2005.
- b. It is designed to support research and related activities that result in job creation or scientific breakthroughs that will spur commercialization and economic development.
- c. The Fund is directed in three specific areas: 1) support public and private collaborative research; 2) provide matching grants to innovative projects; and 3) attract top research talent to Texas.
- d. During the current biennium, the Fund was appropriated \$117.3 million, for a total of \$317 million since the Fund's establishment.

VIII. The Competitive Knowledge Fund was established by the 80th Texas Legislature to enhance support of faculty for instructional excellence and research.

- a. The Fund is restricted to UT-Austin, TAMU, the University of Houston, and Texas Tech University.
- b. The Legislature appropriated \$93.2 million this biennium.

IX. The Cancer Prevention and Research Institute was created by the Texas Legislature and funding was approved by state voters in 2007.

- a. The Institute is authorized to utilize up to \$3 billion in general obligation bonds over ten years—\$300 million annually.
- b. The bonds will be used as matching grants to institutions and other research organizations starting in 2010 that are dedicated to finding medical breakthroughs related to cancer.

X. The Legislature, from time to time, authorizes direct appropriations for special items related to research and research-related activities.

- a. Last session, the Legislature appropriated approximately \$260.3 million for in special items for research.
- b. An example of such an item is the McDonald Observatory at the University of Texas.

XI. Finally, in 2003 the Texas Legislature adopted the Texas Charter's recommendation to allow institutions to utilize 100% of indirect cost recovery.

- a. Prior to the 78th Legislature, institutions could only utilize 50 percent of their indirect costs.
- b. Since FY 2004, the Coordinating Board estimates that this change has resulted in an additional \$230-\$290 million for additional research investment.

XII. Texas has been conscious of the need to increase institutional research for many years. However we are not keeping pace with peer states which could affect our global economic competitiveness.

- a. We are well below our *Closing the Gaps* targets for research despite the fast start we had earlier this decade.
- b. Texas needs to continue investing in both applied and basic research at all levels in a more concerted and aggressive way if we are to keep up.
- c. Texas must continue to strengthen research capacity at our existing national research institutions so that they remain competitive.

- d. Texas must invest in targeted research excellence at our regional institutions.

XIII. Investment in research pays demonstrable benefits to the state.

- a. A recent analysis of the Advanced Research Program specifically found direct economic benefits such as licensing revenues and commercialization benefits that resulted in more than \$900 million in economic returns for the \$161 million in state investment.
- b. This means Texas gets \$5.70 for every \$1 it invests in research and research-related activities.

Center for Measuring University Performance National Academy Members

National Academy Members
National Academy of Sciences
National Academy of Engineering
Institute of Medicine

Center for Measuring University Performance has two types of groupings for ranking:

1. National Rank = rank among both public and private institutions
2. Control Rank = rank among all private or all public institutions

Center for Measuring University Performance–National Academy Members FY 2006 PUBLIC Institutions with Over \$20 Million in Federal Research			
	# of Awards	National Rank	Control Rank
Institution Name			
University of Missouri - Columbia	5	93	56
University of Arizona	31	34	17
University of Kansas-Main Campus*	7	79	46
University of Nebraska at Lincoln*	3	112	66
The University of Texas*	61	18	8
Texas A& M University	24	43	24
University of Houston	9	69	38
Texas Tech University	1	148	91

* does not include medical branch(s)

Center for Measuring University Performance

Faculty Awards

Faculty Awards in the Arts, Humanities, Science, Engineering, and Health

American Council of Learned Societies (ACLS) Fellows Beckman Young Investigators BurroughsWellcome Fund Career Awards Cottrell Scholars Fulbright American Scholars Getty Scholars in Residence Guggenheim Fellows Howard Hughes Medical Institute Investigators Lasker Medical Research Awards MacArthur Foundation Fellows AndrewW. Mellon Foundation Distinguished Achievement Awards National Endowment for the Humanities (NEH) Fellows	National Humanities Center Fellows National Institutes of Health (NIH) MERIT (R37) National Medal of Science and National Medal of Technology NSF CAREER awards (excluding those who are also PECASE winners) Newberry Library Long-term Fellows Pew Scholars in Biomedicine Presidential Early Career Awards for Scientists and Engineers (PECASE) Robert Wood Johnson Policy Fellows Searle Scholars Sloan Research Fellows US Secretary of Agriculture Honor Awards Woodrow Wilson Fellows
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Center for Measuring University Performance has two types of groupings for ranking:

1. National Rank = rank among both public and private institutions
2. Control Rank = rank among all private or all public institutions

Center for Measuring University Performance–Faculty Awards FY 2006 PUBLIC Institutions with Over \$20 Million in Federal Research			
	# of Awards	National Rank	Control Rank
Institution Name			
University of Pittsburgh–Main Campus	23	27	13
University of Arizona	18	36	19
University of Kansas–Main Campus*	9	74	46
University of Nebraska at Lincoln*	4	130	87
The University of Texas*	27	19	8
Texas A& M University	16	41	22
University of Houston	5	109	72
Texas Tech University	2	201	127

* does not include medical branch(s)

Center for Measuring University Performance

Center for Measuring University Performance has two types of groupings for ranking:

1. National Rank = rank among both public **and** private institutions
2. Control Rank = rank among all private **or** all public institutions

Total Research Expenditures FY 2005 PUBLIC Institutions with Over \$20 Million in Federal Research			
Institution Name	Total Research x \$1000	National Rank	Control Rank
University of Arizona	530,233	20	13
University of Missouri - Columbia	220,718	72	50
University of Nebraska at Lincoln*	200,287	78	53
University of Kansas-Main Campus*	116,344	117	81
Texas A& M University	479,735	23	16
The University of Texas*	410,981	31	19
University of Houston	80,731	141	101
Texas Tech University	56,623	161	115

Federal Research Expenditures FY 2005 PUBLIC Institutions with Over \$20 Million in Federal Research			
Institution Name	Federal Research X \$1000	National Rank	Control Rank
University of Arizona	292,811	23	12
University of Missouri - Columbia	96,038	94	61
University of Nebraska at Lincoln*	74,660	110	72
University of Kansas-Main Campus*	64,689	117	79
The University of Texas*	254,529	30	16
Texas A& M University	212,923	42	23
University of Houston	37,262	158	108
Texas Tech University	22,071	192	135

* does not include medical branch(s)

Doctorates Awarded FY 2006 PUBLIC Institutions with Over \$20 Million in Federal Research			
Institution Name	Doctorates	National Rank	Control Rank
University of Arizona	395	34	20
University of Missouri - Columbia	277	59	41
University of Kansas-Main Campus*	271	61	43
University of Nebraska at Lincoln*	245	70	50
The University of Texas*	796	1	1
(at Dallas)**	126	n/a	n/a
(at Arlington)**	88	n/a	n/a
(at El Paso)**	33	n/a	n/a
(at San Antonio)**	21	n/a	n/a
Texas A& M University	535	20	14
University of Houston	236	74	51
Texas Tech University	199	81	53
University of North Texas	161	n/a	n/a

* does not include medical branch(s)

** From IPEDS

SAT Scores FY 2005** PUBLIC Institutions with Over \$20 Million in Federal Research			
Institution Name	SAT Range or ACT Range	National Rank	Control Rank
University of Missouri - Columbia	23-28	213	50
University of Nebraska at Lincoln*	22-28	301	70
University of Arizona	500-620/500-630	366	93
University of Kansas-Main Campus*	21-27	403	105
The University of Texas*	540-670/570-690	130	24
Texas A& M University	530-640/560-670	186	39
Texas Tech University	510-600/530-620	355	87
University of Houston	460-580/490-610	554	154

* does not include medical branch(s)

** The Annual Survey of Colleges of the College Board and Data Base, 2006-2007

**National Merit and Achievement Scholars FY 2006
PUBLIC Institutions with Over \$20 Million in Federal Research**

Institution Name	National Merits	National Rank	Control Rank
University of Arizona	96	25	0
University of Kansas-Main Campus*	53	47	20
University of Nebraska at Lincoln*	46	51	22
University of Missouri - Columbia	26	81	37
The University of Texas*	259	4	2
Texas A& M University	139	19	6
Texas Tech University	16	111	52
University of Houston	11	142	64

* does not include medical branch(s)

**Comparison of State-Funded Research Programs
Quick Facts**

Program Elements	Advanced Research Program	Research Development Fund	House -- Competitive Knowledge Fund	Emerging Technology Fund
Funding 2006-07	\$8,381,844	\$42,769,491	New Program – in rider to House CSHB1	\$200,000,000
Funding 2008-09	\$16,698,922	\$80,862,828	\$93,207,615	~\$165,000,000 available (includes \$75,000,000 in new GR & UB from prior biennium)
Proposed Funding Level 2010-11	Staff Recommended Legislative Appropriations Request Baseline: \$16,713,141 Exceptional: \$25,500,000	Unknown	Unknown	Unknown
Focus of Program	Basic research (exploration of new ideas)	Building/enhancing research capacity at public universities	Research (This is the reference in the rider)	Commercialization of research, increasing applied technology research capabilities, and job creation
Total Grant Awards (from inception to present)	1987 to the present 1,520 awards \$186,332,896 Total 2006-07 88 awards \$8,354,300 Total 2008-09 121 awards \$16,542,041	N/A – not a grant program	N/A – not a grant program	2006-09 awards to date (done deals only, does not include deals in the pipeline) Commercialization: 38 awards \$42,534,349 Matching Grants: 12 awards \$20,725,000 Acquisition of Research Superiority: 11 awards \$45,724,000 Total 2006-09 \$108,983,349
Average Grant (for Grant Programs)	Historical Average: \$122,301 Average for 2008-09 awards: \$136,711	N/A – not a grant program	N/A – not a grant program	Commercialization: \$1,119,325 Matching Grants: \$1,727,083 Acquisition of Research Superiority: \$4,156,727
External Funding	1987 to the present ~\$560 million	No data	No data	Data not yet available
Leverage of External Funding	3 to 1 Faculty frequently use ARP awards as seed money to draw down external funding	No data	No data	Data not yet available (External funding or partnerships are expected for most projects)

Program Elements	Advanced Research Program	Research Development Fund	House -- Competitive Knowledge Fund	Emerging Technology Fund
Return on Investment	4.6 to 1 (ROI includes follow-on research funding from external sources; revenues generated from licensing & royalty agreements; commercialization in the form of revenues, venture capital funding, employee salaries, & research & development funding for companies formed in whole or in part from research; & industrial benefits arising from the adoption of a new process, improvement of an existing process, cost savings or cost avoidance.)	No data	No data	Data not yet available (ROI metrics – particularly commercialization benefits – are built into awards. It’s too early for results.)
Source of Funds	General Revenue	Return on investment of permanent HEF plus additional appropriations, if Leg. chooses	General Revenue	Appropriations, benefits from funded projects, investment interest, donations
Determiner of Award	Coordinating Board, based on recommendations of external peer reviewers and Advisory Committee on Research Programs	Legislature	Legislature	Governor, Lt. Governor, and Speaker of the House, based on recommendations of Texas Emerging Technology Committee
Eligible Institutions	All public higher education institutions, including health-related institutions	All general academic institutions, except The University of Texas at Austin, Texas A&M University, and Prairie View A&M	Eligible institutions identified in rider.	All public higher education institutions, including health-related institutions
Amount of Award	Based on grant proposal submitted by researcher; UT & A&M System schools may not receive more than 70% of funds	Based on average amount of restricted research expended by each institution per year for the three preceding years	10% of all research expenditures, based on a three-year average (FY 2003, 2004, 2005)	Based on grant proposal submitted by institution or researcher
Use of Funds	Conduct basic research	Develop/enhance research capacity. Examples: faculty research grants, laboratory	Research	Incentives for entities to collaborate with hi ed institutions on emerging tech projects with an economic

Program Elements	Advanced Research Program	Research Development Fund	House -- Competitive Knowledge Fund	Emerging Technology Fund
		upgrades, travel grants, faculty salary supplements, student research assistantships, sponsored program office operations, proposal development, publications, support for new programs, support for new faculty, and grad student tuition.		benefit, especially commercialization. Match awards from external research sponsors, especially proposals that accelerate commercialization into production. Acquire new or enhance existing research superiority (must have commercialization experience) at public institutions of higher ed.

Comparison of State-Funded Research Programs
Detailed Overview (Providing More Information about the Program Elements Listed in the Quick Facts)

Program Elements	Advanced Research Program	Research Development Fund	House -- Competitive Knowledge Fund	Emerging Technology Fund
Source of Appropriated Funds	General Revenue	A fund outside the state treasury in the custody of the Comptroller. The fund consists of the amount deposited to the credit of the fund under Sec. 62.025 (the total return on investment on all investment assets of the permanent HEF in the preceding state fiscal year). In addition, the Legislature may appropriate or provide for the transfer to the credit of the RDF an amount not less than the amount deposited under Sec. 62.025; and shall appropriate all interest, dividends, and other income earned from investment of the RDF; and gifts or grants.	General Revenue	A dedicated account in the general revenue fund consisting of appropriations, benefits realized from a project undertaken with money from the fund; gifts, grants and other donations; and interest earned on the investment of money in the fund.
Determination of Award	Coordinating Board – based on recommendations from external peer review panels and Advisory Committee on Research Programs.	Statutory methodology for determining each institution’s allocation. Legislative appropriations distributed funding for FY06-07 and 08-09 biennia. Comptroller distributes funding based on Coordinating Board reports of restricted research expenditures. Awards from which restricted research expenditures are claimed are scrubbed by panels of representatives from participating institutions.	Eligible institutions identified in rider. Legislative appropriations distribute funding.	The Texas Emerging Technology Committee “shall make recommendations, through peer review and evaluation processes established by the committee, to the Governor, Lt. Governor, and Speaker of the House of Representatives for the award of money from the fund. The committee may establish advisory panels of knowledgeable individuals from industry, state government, or academic occupations to assist in peer review activities.”
Stated Purpose of Program/Fund	“The advanced research program is established to encourage and provide support for basic research	“The research development fund is established to provide funding to promote increased research	The program is established by rider. The rider states: “The	“To develop and diversify the economy of this state by: (1) expediting innovation and

Program Elements	Advanced Research Program	Research Development Fund	House -- Competitive Knowledge Fund	Emerging Technology Fund
<i>(statutory or rider citation)</i>	conducted by faculty members in astronomy, atmospheric science, biological and behavioral sciences, chemistry, computer science, earth sciences, engineering, information science, mathematics, material sciences, oceanography, physics, environmental issues, affecting the Texas-Mexico border region, the reduction of industrial, agricultural, and domestic water, social sciences, and related disciplines in eligible institutions.” (Chapter 142, Texas Education Code)	capacity at eligible general academic teaching institutions.” (Subchapter E, Chapter 62, Texas Education Code)	amounts listed below for informational purposes are appropriated out of the General Revenue fund elsewhere in this Act in each affected institution's "Texas Competitive Knowledge" strategy and shall be expended to support faculty for the purpose of instructional excellence and research.” (Section 55, page III-240, Special Provisions Relating only to State Agencies of Higher Education GAA HB1)	commercialization of research; (2) attracting, creating, or expanding private sector entities that will promote a substantial increase in high-quality jobs; and (3) increasing higher education applied technology research capabilities.” (Chapter 490, Government Code)
Eligible Institution	Public institutions of higher education. Eligible institutions are those defined by Sec. 61.003(8), Education Code: “‘Institution of higher education’ means any public technical institute, public junior college, public senior college or university, medical or dental unit, public state college, or other agency of higher education as defined in this section.”	“‘Eligible institution’ means a general academic teaching institution, as defined by Section 61.003, other than The University of Texas at Austin, Texas A&M University, or Prairie View A&M University.” (All universities plus the two Lamar State Colleges.)	The rider lists four public universities: Texas A&M University, Texas Tech University, The University of Texas at Austin, and University of Houston	Public institutions of higher education. Eligible institutions are those defined by Sec. 61.003, Education Code: “‘Institution of higher education’ means any public technical institute, public junior college, public senior college or university, medical or dental unit, public state college, or other agency of higher education as defined in this section.”
Determination of Allocation Amount	The program operates on a biennial award cycle. As a peer-reviewed, competitive grant program, ARP uses highly regarded out-of-state academic research scientists and in-state and out-of-state industrial	The total amount of all assets in the research development fund shall be distributed to eligible institutions each year. The amount shall be apportioned among the eligible institutions based on the average amount of	The allocation method is not described in the rider, but the 08-09 amounts were tied to the institution’s research expenditures (requires reconciliation with the	The Emerging Technology Fund is allocated among three programs: 50% for incentives for collaboration between certain entities in Regional Centers of Innovation and Commercialization; 25% for research matching grants; and 25%

Program Elements	Advanced Research Program	Research Development Fund	House -- Competitive Knowledge Fund	Emerging Technology Fund
	<p>research scientists to evaluate and select the most promising projects proposed by Texas faculty researchers.</p> <p>A rider in the Coordinating Board's appropriation specifies that no more than 70% of the program funding shall be designated for The University of Texas and the Texas A&M University Systems.</p> <p>Faculty frequently use ARP funds as seed funding to leverage external funding (each state dollar leverages three external dollars). The Coordinating Board determines the targeted fields (because of limited funds the most recent round of ARP grants were awarded in the fields of Biological Sciences, Chemistry, Computer Sciences, Earth Sciences, Engineering, Materials Science, Mathematics and Physics) and the maximum amount of the awards (the most recent round limited grant maximums) based on recommendations from its Advisory Committee on Research Programs.</p>	<p>restricted research expended by each institution per year for the three preceding state fiscal years. (The amount of restricted research funds expended is the amount of those funds as reported to the Coordinating Board for that fiscal year, subject to any adjustment by the CB in accordance with the standards and accounting methods the board prescribes.)</p>	<p>institutions' annual financial reports).</p>	<p>for the acquisition of research superiority.</p> <p>The funding amount is dependent on the proposal.</p>
Use of Funds	<p>"The funds appropriated for the program may be expended to support the particular projects for which an award is made and may</p>	<p>"An eligible institution may use money received from the research development fund only for the support and maintenance of</p>	<p>Rider specifies that the amount is appropriated for research.</p>	<p>(1) Regional Centers of Innovation and Commercialization – "incentives for private or nonprofit entities to collaborate with public or</p>

Program Elements	Advanced Research Program	Research Development Fund	House -- Competitive Knowledge Fund	Emerging Technology Fund
	<p>not be expended for the general support of ongoing research at an eligible institution or for the construction or remodeling of a facility.”</p>	<p>educational and general activities, including research and student services, that promote increased research capacity at the institution.”</p> <p>In practice, the funding supports a variety of research-related activities including faculty research grants, animal research facilities, laboratory upgrades, travel grants, faculty salary supplements, student research assistantships, sponsored program office operations, proposal development, publications, software, outreach, support for new academic programs, training opportunities, support for new faculty, supplies, equipment, and graduate student tuition. Many of the faculty research grants are typically \$5,000 or less (and in some cases less than \$200) and support a great variety of work in engineering, business, art, music, and the sciences, including social sciences.</p>		<p>private institutions of higher education on emerging technology projects with a demonstrable economic benefit to the state” (including research & development activities that may include initiatives to prove the feasibility of an idea; commercialization of the results of research & development; incubators for new businesses and expansion of existing businesses related to R&D; & workforce training for businesses resulting from R&D).</p> <p>(2) Research Grant Matching – “Funds reserved to match funding from research sponsors other than this state, including federal research sponsors.” (Priority shall be given to proposals that accelerate commercialization into production by targeting programs that: address federal or other major research sponsors’ priorities in emerging scientific or technology fields; are interdisciplinary; are collaborative with a combination of public or private institutions; are likely to result in a medical or scientific breakthrough; or have a demonstrable economic benefit to the state.)</p> <p>(3) Acquisition of Research Superiority – Amounts shall be used “to acquire new or enhance existing research superiority at public institutions of higher ed in this</p>

Program Elements	Advanced Research Program	Research Development Fund	House -- Competitive Knowledge Fund	Emerging Technology Fund
				state” (create new superiority; attract existing research superiority from other states; or enhance existing superiority by attracting researchers or resources from outside Texas) Institutions must document specific benefits that the state expects to gain as a result of attracting the research superiority & funding may be terminated if benefit is not realized.
Proposed Amendments – 81st Legislature	N/A	N/A	N/A	N/A

Research Special Items, FY2008-09

School	Strategy	Total 2008	GR 2008	Total 2009	GR 2009
UT ARLINGTON	Automation and Robotics Research Institute	1,245,064	1,245,064	1,245,064	1,245,064
UT AUSTIN	Marine Science Institute - Port Aransas	605,303	605,303	605,303	605,303
UT AUSTIN	Institute for Geophysics - Galveston	1,048,093	1,048,093	1,048,093	1,048,093
UT AUSTIN	Bureau of Economic Geology	2,856,849	2,856,849	2,856,849	2,856,849
UT AUSTIN	Bureau of Business Research	232,487	232,487	232,487	232,487
UT AUSTIN	McDonald Observatory	4,353,587	4,353,587	4,353,587	4,353,587
UT AUSTIN	Center for Advanced Studies in Astronomy	576,008	576,008	576,008	576,008
UT DALLAS	Center for Applied Biology	546,875	546,875	546,875	546,875
UT DALLAS	Nanotechnology	218,750	218,750	218,750	218,750
UT EL PASO	Inter-American and Border Studies Institute	81,426	81,426	81,426	81,426
UT EL PASO	Center for Environmental Resource Management	217,116	217,116	217,116	217,116
UT EL PASO	Center for Law and Border Studies	413,049	413,049	413,049	413,049
UT PERMIAN BASIN	Center for Energy	262,101	262,101	262,101	262,101
UT SAN ANTONIO	Water Research Center	131,250	131,250	131,250	131,250
TEXAS A&M	Cyclotron Institute	548,155	548,155	548,154	548,154
TEXAS A&M	Sea Grant Program	359,678	359,678	359,678	359,678
TEXAS A&M	Energy Resources Program	551,765	551,765	551,765	551,765
TEXAS A&M	Public Policy Resource Laboratory	41,243	41,243	41,244	41,244
TEXAS A&M	Real Estate Research Center, Estimated	2,661,938	-	2,721,100	-
TEXAS A&M AT GALVESTON	Coastal Zone Laboratory	22,882	22,882	22,882	22,882
TEXAS A&M AT GALVESTON	Texas Institute of Oceanography	469,326	469,326	469,326	469,326
PRAIRIE VIEW A&M	Agriculture Research Center	751,694	751,694	751,693	751,693
TARLETON STATE	Institute for Applied Environmental Research	1,049,956	1,049,956	1,049,956	1,049,956
TARLETON STATE	Tarleton Agricultural Center	246,084	246,084	246,084	246,084
TARLETON STATE	SBDC	100,000	100,000	100,000	100,000
TEXAS A&M - CORPUS CHRISTI	Center for Coastal Studies	252,671	252,671	252,671	252,671
TEXAS A&M - CORPUS CHRISTI	Gulf of Mexico Environmental Lab	249,376	249,376	249,376	249,376
TEXAS A&M - KINGSVILLE	Citrus Center	667,045	667,045	664,373	664,373
TEXAS A&M - KINGSVILLE	Wildlife Research Institute	279,000	279,000	279,000	279,000
TEXAS A&M - KINGSVILLE	INSTITUTE FOR RANCH MANAGEMENT	255,000	255,000	255,000	255,000
WEST TEXAS A&M	Killgore Research Center	41,591	41,591	41,591	41,591
WEST TEXAS A&M	Wind Energy Research	91,854	91,854	99,335	99,335
WEST TEXAS A&M	Agriculture Industry Support and Development	831,250	831,250	831,250	831,250
WEST TEXAS A&M	Integrated Pest Management	124,687	124,687	124,687	124,687
UNIVERSITY OF HOUSTON	Learning and Computation Center	1,935,805	1,935,805	1,935,806	1,935,806
UNIVERSITY OF HOUSTON	Houston Partnership for Space Exploration	349,986	349,986	349,986	349,986
UNIVERSITY OF HOUSTON	Center for Commercial Development of Space	400,901	400,901	400,902	400,902
UNIVERSITY OF HOUSTON	Superconductivity Center	3,607,625	3,607,625	3,607,626	3,607,626
UH - CLEAR LAKE	High Technologies Laboratory	57,546	57,546	57,546	57,546
UH - CLEAR LAKE	Houston Partnership for Environmental Studies	415,626	415,626	415,626	415,626
LAMAR UNIVERSITY - BEAUMO	Gulf Coast Hazardous Substance Research Center	401,907	401,907	401,907	401,907
LAMAR UNIVERSITY - BEAUMO	Air Quality Initiative	581,876	581,876	581,876	581,876
UNIVERSITY OF NORTH TEXAS	Institute of Applied Sciences	58,429	58,429	58,427	58,427
STEPHEN F. AUSTIN STATE	Center for Applied Studies in Forestry	740,606	740,606	740,606	740,606
TEXAS TECH	Agricultural Research	2,283,884	2,283,884	2,283,884	2,283,884
TEXAS TECH	Energy Research	967,789	967,789	967,789	967,789
TEXAS TECH	Emerging Technologies Research	333,305	333,305	333,305	333,305
TEXAS WOMAN'S	Human Nutrition Research Development Program	40,000	40,000	40,000	40,000
TEXAS WOMAN'S	Center for Research on Women's Health	167,005	167,005	167,005	167,005
TEXAS STATE - SAN MARCOS	Edwards Aquifer Research and Data Center	216,266	216,266	216,266	216,266
TEXAS STATE - SAN MARCOS	Texas Long-Term Care Institute	146,832	146,832	146,832	146,832
TEXAS STATE - SAN MARCOS	Semiconductor Initiative	87,500	87,500	87,500	87,500
SUL ROSS STATE	Chihuahuan Desert Research	25,000	25,000	25,000	25,000
SUL ROSS STATE	Center for Big Bend Studies	165,000	165,000	165,000	165,000
	Subtotals	35,366,035	32,704,097	35,430,006	32,708,906
UT AUSTIN	Texas Competitive Knowledge Fund	19,694,386	19,694,386	19,694,386	19,694,386
TEXAS A&M	Texas Competitive Knowledge Fund	20,263,734	20,263,734	20,263,732	20,263,732
UNIVERSITY OF HOUSTON	Texas Competitive Knowledge Fund	4,099,811	4,099,811	4,099,810	4,099,810
TEXAS TECH	Texas Competitive Knowledge Fund	2,545,879	2,545,879	2,545,877	2,545,877
	Subtotal	46,603,810	46,603,810	46,603,805	46,603,805

Research Special Items, FY2008-09

UT Southwestern Medical Ctr Dallas	Institute for Nobel/NA Bio Research	8,246,403	8,246,403	8,245,390	8,245,390
UT Southwestern Medical Ctr Dallas	Innovations in Medical Technology	9,000,000	9,000,000	9,000,000	9,000,000
UT Southwestern Medical Ctr Dallas	Metroplex Medical Imaging Center	7,500,000	7,500,000	7,500,000	7,500,000
UT Southwestern Medical Ctr Dallas	Center for Obesity, Diabetes and Metabolism	18,000,000	18,000,000		
UT Health Science Ctr Houston	Heart Disease and Stroke Research	5,125,000	5,125,000	5,125,000	5,125,000
UT Health Science Ctr Houston	Biotechnology Program	875,000	875,000	875,000	875,000
UT Health Science Ctr Houston	World's Greatest Scientist	5,000,000	5,000,000		
UT Health Science Ctr San Antonio	Mycobacterial-Mycology Research Lab	192,006	192,006	192,006	192,006
MD Anderson Cancer Center	Research Support	2,949,092	1,662,500	3,081,561	1,662,500
Texas Tech Health Science Ctr	Diabetes Research Center	289,140	289,140	289,140	289,140
Texas Tech Health Science Ctr	Cancer Research	4,800,000	4,800,000		
	Subtotal	61,976,641	60,690,049	34,308,097	32,889,036
	Totals	143,946,486	139,997,956	116,341,908	112,201,747
	Total of all items for 2008/2009	260,288,393			
	Total GR funding for all items, 2008/2009	252,199,702			

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UT pathologists believe they have pinpointed Achilles heel of HIV

EUREKALERT

Contact: Robert Cahill

Robert.Cahill@uth.tmc.edu

713-500-3030

[University of Texas Health Science Center at Houston](#)

Human Immunodeficiency Virus (HIV) researchers at The University of Texas Medical School at Houston believe they have uncovered the Achilles heel in the armor of the virus that continues to kill millions.

The weak spot is hidden in the HIV envelope protein gp120. This protein is essential for HIV attachment to host cells, which initiate infection and eventually lead to Acquired Immunodeficiency Syndrome or AIDS. Normally the body's immune defenses can ward off viruses by making proteins called antibodies that bind the virus. However, HIV is a constantly changing and mutating virus, and the antibodies produced after infection do not control disease progression to AIDS. For the same reason, no HIV preventative vaccine that stimulates production of protective antibodies is available.

The Achilles heel, a tiny stretch of amino acids numbered 421-433 on gp120, is now under study as a target for therapeutic intervention. Sudhir Paul, Ph.D., pathology professor in the UT Medical School, said, "Unlike the changeable regions of its envelope, HIV needs at least one region that must remain constant to attach to cells. If this region changes, HIV cannot infect cells. Equally important, HIV does not want this constant region to provoke the body's defense system. So, HIV uses the same constant cellular attachment site to silence B lymphocytes - the antibody producing cells. The result is that the body is fooled into making abundant antibodies to the changeable regions of HIV but not to its cellular attachment site. Immunologists call such regions superantigens. HIV's cleverness is unmatched. No other virus uses this trick to evade the body's defenses."

Paul is the senior author on a paper about this theory in a June issue of the journal *Autoimmunity Reviews*. Additional data supporting the theory are to be presented at the XVII International AIDS Conference Aug. 3-8 in Mexico City in two studies titled "Survivors of HIV infection produce potent, broadly neutralizing IgAs directed to the superantigenic region of the gp120 CD4 binding site" and "Prospective clinical utility and evolutionary implication of broadly neutralizing antibody fragments to HIV gp120 superantigenic epitope."

First reported in the early 1980s, HIV has spread across the world, particularly in developing countries. In 2007, 33 million people were living with AIDS, according to a report by the World Health Organization and the United Nations.

Paul's group has engineered antibodies with enzymatic activity, also known as abzymes, which can attack the Achilles heel of the virus in a precise way. "The abzymes recognize essentially all of the diverse HIV forms found across the world. This solves the problem of HIV changeability. The next step is to confirm our theory in human clinical trials," Paul said.

Unlike regular antibodies, abzymes degrade the virus permanently. A single abzyme molecule inactivates thousands of virus particles. Regular antibodies inactivate only one virus particle, and their anti-viral HIV effect is weaker.

"The work of Dr. Paul's group is highly innovative. They have identified antibodies that, instead of passively binding to the target molecule, are able to fragment it and destroy its function. Their recent work indicates that naturally occurring catalytic antibodies, particularly those of the IgA subtype, may be useful in the treatment and prevention of HIV infection," said Steven J. Norris, Ph.D., holder of the Robert Greer Professorship in the Biomedical Sciences and vice chair for research in the Department of Pathology and Laboratory Medicine at the UT Medical School at Houston.

The abzymes are derived from HIV negative people with the autoimmune disease lupus and a small number of HIV positive people who do not require treatment and do not get AIDS. Stephanie Planque, lead author and UT Medical School at Houston graduate student, said, "We discovered that disturbed immunological events in lupus patients can generate abzymes to the Achilles heel of HIV. The human genome has accumulated over millions of years of evolution a lot of viral fragments called endogenous retroviral sequences. These endogenous retroviral sequences are overproduced in people with lupus, and an immune response to such a sequence that resembles the Achilles heel can explain the production of abzymes in lupus. A small minority of HIV positive people also start producing the abzymes after decades of the infection. The immune system in some people can cope with HIV after all."

Carl Hanson, Ph.D., who heads the Retrovirus Diagnostic Section of the Viral and Rickettsial Disease Laboratory of the California Department of Public Health, has shown that the abzymes neutralize infection of human blood cells by diverse strains of HIV from various parts of the world. Human blood cells are the only cells that HIV infects.

"This is an entirely new finding. It is a novel antibody that appears to be very effective in killing the HIV virus. The main question now is if this can be applied to developing vaccine and possibly used as a microbicide to prevent sexual transmission," said David C. Montefiori, Ph.D., director of the Laboratory for AIDS Vaccine Research & Development at Duke University Medical Center. The abzymes are now under development for HIV immunotherapy by infusion into blood. They could also be used to guard against sexual HIV transmission as topical vaginal or rectal formulations.

"HIV is an international priority because we have no defense against it," Paul said. "Left unchecked, it will likely evolve into even more virulent forms. We have learned a lot from this research about how to induce the production of the protective abzymes on

demand. This is the Holy Grail of HIV research -- development of a preventative HIV vaccine."

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Major contributors to the research from the UT Medical School include Yasuhiro Nishiyama, Ph.D., and Hiroaki Taguchi, Ph.D., both with the Department of Pathology and Laboratory Medicine, and Miguel Escobar, M.D., of the Department of Pediatrics. Maria Salas and Hanson, both with the Viral and Rickettsial Disease Laboratory, contributed.

The journal article is titled "Catalytic antibodies to HIV: Physiological role and potential clinical utility". The research was funded by the National Institutes of Health and the Texas Higher Education Coordinating Board.