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An Economic Assessment of the Cost of Cancer in Texas and the Benefits of the Cancer Prevention and Research Institute of Texas (CPRIT) and its Programs: **2013 Update**

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Introduction

Investments in cancer research and prevention/screening can reduce the severity of the disease's effects, both in terms of human health and the economy. Treatment costs can be decreased through earlier detection, and improving treatment outcomes benefits society through enhancing productivity of those affected by cancer. In addition, research activity can serve as a catalyst for business development in related industries (such as biomedicine).

The Cancer Prevention and Research Institute of Texas (CPRIT) has helped attract leading cancer research scientists to Texas, including members of the prestigious National Academy of Sciences. Funded research projects have resulted in hundreds of publications and several new patents. Grants for screening and related education are improving access to lifesaving testing for some of the state's most vulnerable populations. While a temporary suspension of grant activities by the Texas Legislature reduced the benefits of CPRIT programs in Fiscal Year 2013, its impact continues to grow and promises to accelerate in the future.

CPRIT is an Important Resource for Cancer Prevention, Screening, and Research

In addition to their positive effect on health and wellbeing, these activities generate sizable economic benefits. The Perryman Group (TPG) has quantified the cost of cancer in Texas and the economic benefits of CPRIT for several years. This report updates the findings from TPG's analysis utilizing the most recent data regarding cancer incidence and results to date from CPRIT grants.

- The **cost of cancer in Texas as traditionally measured was about $30.4 billion in 2013, with total losses (including spinoff effects) of an estimated $74.4 billion in output and almost 750,000 jobs.**
- The current total impact of all CPRIT prevention/screening and research programs (including initial outlays and downstream effects) includes $230.9 million in output (real gross product) in 2013 as well as 3,210 jobs. When all secondary benefits are considered, these values rise to $2.4 billion in output and over 24,500 jobs.
- This incremental business activity generates taxes for the State and local governments. For **Texas, annual tax receipts associated with CPRIT grants and programs total $129.9 million in 2013; local public entities receive $60.3 million**. Over the ten-year life of the current commitment, these incremental taxes are expected to total $1.6 billion for the State and $713.9 million for local governments.
- These benefits are explained more fully in subsequent sections and the Appendices to this report.

Summary of Economic Benefits

Every Dollar Invested Through CPRIT Returns:

(Including Initial Outlays and Secondary (Downstream) Effects)

$7.09	**In Treatment Cost Savings and Resulting Economic Benefits through Earlier Detection from Prevention/Screening Activity in 2013**
$37.61	**In Economic Activity (Total Expenditures) in 2013**
$18.47	**In Output (Real Gross Product) in 2013**
$11.11	**In Personal Income**
$5.19	**In Retail Sales**
$1.34	**In State Tax Receipts as of the 10th Year of Operation (assuming stabilized levels of awards)**
$0.62	**In Local Government Tax Receipts as of the 10th Year of Operation (assuming stabilized levels of awards)**

Source: The Perryman Group

Report Approach

An approach consistent to prior years was used where possible in this 2013 update. One significant change is that at this time, the first CPRIT grants have been in place for more than three years and others have been in place one or two years. Recipients have reported progress, hiring, matching funds, and other key performance metrics. This information was used in assessing the economic impacts related to research to the extent possible and, for the first time, were used to validate model results. The major components of The Perryman Group's analysis include the following:

The **economic cost of cancer** in terms of Texas business activity including losses stemming from treatment, morbidity, and mortality as well as the associated spillover effects was initially estimated. Data regarding the numbers of Texans with cancer and the associated costs for direct medical expenses, morbidity costs, and mortality are the subject of reports by entities such as the National Institutes of Health, the American Cancer Society, the National Cancer Institute (Centers for Disease Control (CDC)), and the Texas Cancer Registry (Texas Department of State Health Services).

The **overall effect of CPRIT operations** on business activity in Texas (including multiplier effects) was estimated using input data regarding direct expenditures and operations employment at the Institute.

The **positive economic benefits of CPRIT-supported cancer prevention and screening programs** were also assessed, including both the increase in business activity due to the screenings themselves and the associated benefits from improved health. The effects of matching funds generated by CPRIT programs were also included.

Economic returns on research supported by the Institute (including the effects related to the specific outlays, actual and anticipated recruitment efforts for high quality scholars in relevant areas, typical returns on medical research investments, and spinoff companies that surface from such endeavors) were also evaluated. Again, associated matching funds were also incorporated into the analysis.

Some illustrative scenarios related to **potential economic development and social gains** stemming from the Institute's role as a catalyst for incremental business activity as well as social gains such as the economic value of increased quality of life, longevity, and productivity from improved outcomes are similarly provided.

The Economic Cost of Cancer in Texas

Cancer affects the longevity, quality of life, and finances of individuals suffering with the illness. Costs associated with cancer include direct medical outlays for treatment and care as well as indirect costs such as disease-related work disability or premature mortality. Prevention, early detection, effective treatment, and medical advances to minimize the consequences of the disease are vital national and, indeed, global priorities.

The Number of Americans with Cancer is Rising

Despite advances in many aspects of cancer prevention and treatment, the number of Americans diagnosed with the disease continues to rise. One factor in this upward trend is the aging of the US population, as cancer incidence increases among older age groups.

- The American Cancer Society estimates that there will be about 1,660,290 million new cases of cancer and 580,350 deaths from cancer in the US in 2013, slightly higher than in 2012.[1]
- In Texas, a total of 117,371 new cases of cancer are expected in 2013 (62,740 male and 54,632 female), with 41,362 cancer deaths projected.[2] Like the nation, cancer is the second leading cause of death in the state after cardiovascular disease.[3]

Cancer Costs are also Rising

Apart from the extremely high human cost, cancer causes economic harms to affected individuals, businesses, and society as a whole through shortened life spans, lost productivity, increased health care expenditures, and premature mortality.

- Although incidence rates are modestly improving, **direct medical costs and morbidity and mortality losses (as traditionally measured) in the state totaled an estimated $30.4 billion in 2013**, up from $29.2 billion in 2012 and $28.1 billion two years ago (according to TPG's update of existing information from the National Institutes of Health[4] and a study of costs in Texas.[5]

[1] *Cancer facts & figures 2013*. (2013). American Cancer Society.
[2] *Expected new cancer cases and deaths by primary site, Texas, 2013*. (January 31, 2013). Texas Department of State Health Services Center for Health Statistics.
[3] *Cancer facts & figures 2013*. (2013). American Cancer Society.
[4] The National Institute of Health (NIH) estimated the total overall cost of cancer in 2010 (the latest year for which such information is available) to be $263.8 billion including direct medical costs of $102.8 billion (including the total of all health expenditures), indirect morbidity costs (the cost of lost productivity due to illness) of $20.9 billion, and indirect mortality costs (the cost of lost productivity due to premature death) of $140.1 billion. See *Cancer facts & figures 2011*. (2011). American Cancer Society.
[5] A study directed by the Texas Department of State Health Services (DSHS) and conducted by scholars at the University of Texas Medical Branch (UTMB) found that the total cost of cancer in the state was roughly $21.9 billion in 2007, with $10.0

The Cost of Cancer Goes Beyond Initial Effects

Most studies clearly portray the very large losses associated with cancer. However, they fail to capture numerous "multiplier" effects associated with the disease and, thus, represent only a portion of the overall toll on business activity (only the initial effect of the various categories of cost).

- Several years ago, The Perryman Group developed a more comprehensive measure of the cost of cancer which includes losses stemming from treatment, morbidity, and mortality as well as the associated foregone spillover effects.
- Most studies of cancer costs reflect only the initial effect of direct medical outlays for treatment and care and indirect costs such as disease-related work disability or premature mortality various categories of cost. However, these losses, in turn, generate further reductions in business activity. This more comprehensive measure is quantified in the approach utilized by The Perryman Group.

billion in direct medical costs and $11.8 billion in indirect costs from lost productivity due to cancer morbidity and mortality. See Philips, B.U., et al. (2009, March). *The cost of cancer in Texas 2007*. Department of Preventive Medicine and Community Health; Texas Medical Branch at Galveston.

Measuring Economic Impacts

Any economic stimulus, whether positive (such as direct spending, investments, or corporate activity) or negative (such as lost productivity due to disease) generates multiplier effects throughout the economy. In this instance, economic costs of cancer include not only the initial incidence of costs, but also the subsequent rounds of economic activity which are forgone. Economic benefits of cancer research and prevention/screening activities include increased research spending, commercialization of discoveries, enhanced screening programs, higher productivity stemming from better health outcomes, and more. (These channels of benefits are described within the report and the accompanying Appendices.) Once the direct stimulus was quantified, the associated multiplier effects were measured.

The Perryman Group's input-output assessment model (the US Multi-Regional Impact System, which is described in further detail in the Appendices to this report) was developed by The Perryman Group some 30 years ago and has been consistently maintained and updated since that time; it has been used in hundreds of analyses for clients ranging from major corporations to government agencies. The system uses a variety of data (from surveys, industry information, and other sources) to describe the various goods and services (known as resources or inputs) required to produce another good/service. This process allows for estimation of the total economic impact (including multiplier effects) of CPRIT programs and related activity. An associated fiscal model allows for estimation of tax receipts to state and local entities. The submodels used in the current analysis reflect the specific industrial composition and characteristics of the Texas economy and its various counties, metropolitan areas, regions, and legislative districts.

These total economic effects are quantified for key measures of business activity:

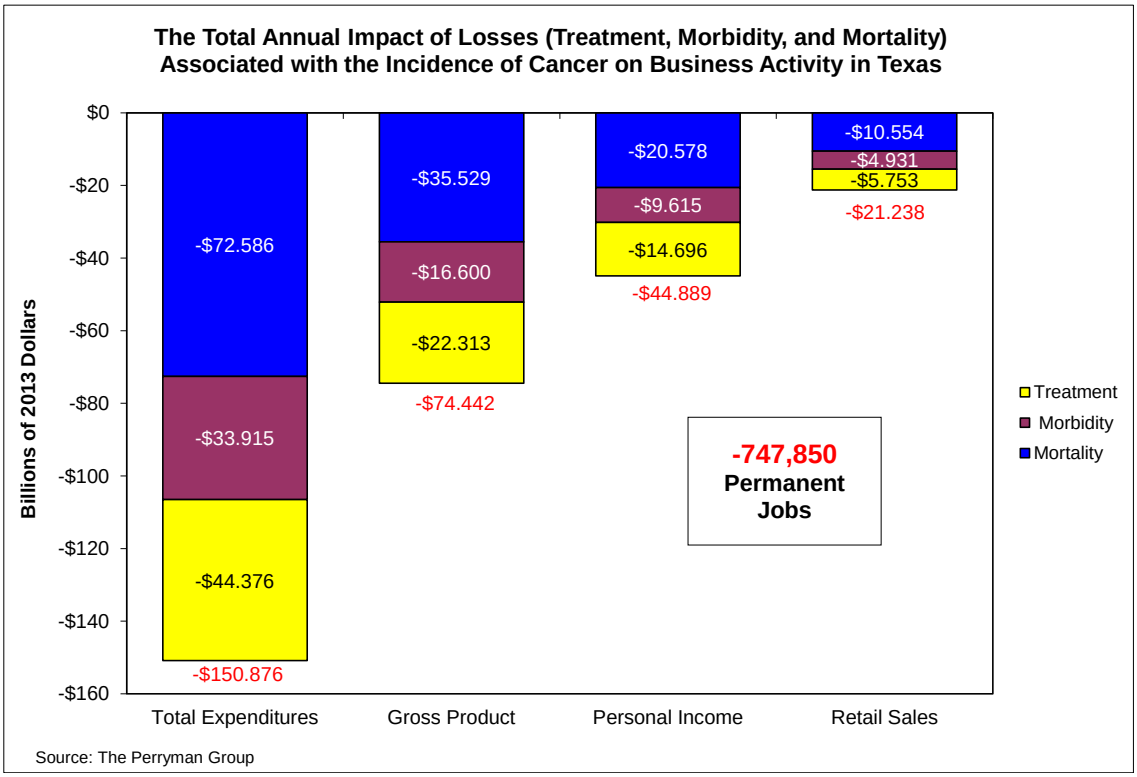
- **Total expenditures** (or total spending) measure the dollars changing hands as a result of the economic stimulus.
- **Gross product** (or output) is production of goods and services that will come about in each area as a result of the activity. This measure is parallel to the gross domestic product numbers commonly reported by various media outlets and is a subset of total expenditures.
- **Personal income** is dollars that end up in the hands of people in the area; the vast majority of this aggregate derives from the earnings of employees, but payments such as interest and rents are also included.
- **Job gains** are expressed as (1) person-years of employment (one person working for one year) for temporary projects (such as construction of a facility) or cumulative assessments over time or (2) permanent jobs when evaluating ongoing annual effects.

Dynamic State and local government revenue reflect tax receipts stemming from the increase in total economic activity. Monetary values were quantified on a constant (2013) basis, which eliminates inflationary effects and allows comparison across various time periods. See the Appendices to this report for additional information regarding the methods and assumptions used in this analysis.

Cancer Costs the Texas Economy $150.9 Billion per Year

The Perryman Group's analysis indicates a total cost to the Texas economy of some $150.9 billion in reduced annual spending, $74.4 billion in output losses per annum, and 747,850 lost jobs from cancer treatment, morbidity, and mortality and the associated spillover effects.

- These amounts are up from last year's estimated total cost of $146.5 billion in spending, $72.2 billion in output, and 747,825 jobs. These totals represent **about 5% of the total Texas economy.**
- **The yearly loss in State fiscal revenues is about $5.7 billion** (up from $5.6 billion last year), while losses to **local governments include about $2.4 billion per annum**.
- **Losses are spread across all regions of Texas, and are concentrated in the state's most populous areas.**



COST OF CANCER BY COUNCIL OF GOVERNMENTS REGION:

ECONOMIC COST OF CANCER INCLUDING DIRECT MEDICAL EXPENSES AND PREMATURE MORBIDITY AND MORTALITY

ANNUAL EFFECT ON BUSINESS ACTIVITY		
	GROSS PRODUCT	EMPLOYMENT
	(Billions of 2013 Dollars)	*(Person-Years)*
Panhandle	$(1.366)	(13,870)
South Plains	$(1.273)	(13,520)
North Texas	$(0.995)	(10,196)
North Central Texas	$(18.311)	(179,357)
North East Texas	$(1.087)	(12,185)
East Texas	$(3.659)	(37,613)
West Central Texas	$(1.408)	(14,492)
Upper Rio Grande	$(2.333)	(24,151)
Permian Basin	$(1.287)	(12,538)
Concho Valley	$(0.592)	(6,038)
Heart of Texas	$(1.413)	(15,265)
Capital	$(3.873)	(40,805)
Brazos Valley	$(0.856)	(9,152)
Deep East Texas	$(1.596)	(17,761)
South East Texas	$(1.586)	(17,250)
Gulf Coast	$(17.626)	(161,501)
Golden Crescent	$(0.737)	(7,612)
Alamo	$(7.072)	(74,490)
South Texas	$(0.539)	(5,739)
Coastal Bend	$(2.072)	(20,813)
Lower Rio Grande Valley	$(2.330)	(26,070)
Texoma	$(0.815)	(9,057)
Central Texas	$(1.195)	(13,618)
Middle Rio Grande	$(0.422)	(4,760)
		-
Border Region	$(5.627)	(60,746)
		-
TOTAL STATE	**$(74.442)**	**(747,854)**
Source: The Perryman Group		

Screening and Prevention Can Yield Substantial Savings

It is far less expensive to screen for cancer and treat it in its early stages.

- Detecting and treating cancer in earlier stages not only improves outcomes, but can also cost less compared to treating cancer in its latter stages.
- Not only are treatment expenses likely to be lower for early-stage diagnoses, but also morbidity and mortality losses are reduced.
- The Perryman Group's analysis indicates that every $1 spent through CPRIT for screening/prevention leads to more than $7 in treatment cost savings and resulting economic benefits through earlier detection.

The Economic Impact of CPRIT and its Programs

Job creation from CPRIT operations occurs not only directly through the scientists and staff in the research facilities, but also indirectly through the provision of business services needed by those institutions and other multiplier effects.

CPRIT Investments Generate Economic Activity as Well as Progress toward New Discoveries

Even beyond the potentially life-changing influence of spending to reduce the incidence and severity of the disease, this **investment in research, screening, and related activities generates substantial economic impacts**. Moreover, the investment has the potential to reduce the cost of cancer through improving outcomes.

- Returns on investments in medical research include jobs created in the private sector, health care costs saved, the value of increased longevity, the value of reduced morbidity and disability, and the benefits of newer medicines and therapies.
- Job creation occurs not only directly through the scientists and staff in the research facilities, but also indirectly through the provision of business services needed by those institutions and other multiplier effects.
- Many studies over an extended period of time support the conclusion that investing in medical and cancer research can yield returns far in excess of initial outlays. Texas is already beginning to see tangible job gains and other benefits such as attracting top-tier research talent.

CPRIT Operations Were Linked to 3,210 Jobs in Texas in 2013

The direct outlays and related "multiplier" effects emanating from CPRIT operations and programs generated a sizable increase in business activity in Texas including $230.9 million in output (gross product) and 3,210 jobs during fiscal year 2013.

- These economic benefits stem from operations, prevention and screening, and research programs.
- Fiscal benefits were also significant, as noted in the table below.

The Current Impact of CPRIT Direct Operations, Prevention and Screening, and Research Programs on Texas Business Activity and Tax Receipts (Monetary Values in Millions of Constant 2013 Dollars)				
ECONOMIC BENEFITS				
	Operations	**Prevention & Screening**	**Research**	**TOTAL**
Total Expenditures	$16.5	$50.7	$375.4	**$442.6**
Gross Product	$8.4	$27.6	$194.9	**$230.9**
Personal Income	$5.7	$19.3	$135.0	**$160.1**
Retail Sales	$2.2	$7.2	$51.4	**$60.8**
Employment (Permanent Jobs)	80	340	2,790	**3,210**
FISCAL BENEFITS				
State (Texas)	$0.4	$1.4	$10.0	$11.8
Local Governmental Entities Throughout the State	$0.2	$0.7	$5.9	$6.8
SOURCE: The Perryman Group				

Secondary Benefits Enhance the Positive Effect of the Institute

Even beyond these substantial gains in business activity, CPRIT programs lead to secondary benefits such as improved outcomes stemming from screening and prevention and research.

- Screening can help reduce cancer incidence and severity. TPG estimated the total annual net outcomes-related benefits from screening and prevention supported by CPRIT to be $47.5 million in output (gross product) and 477 jobs in 2013 (on a net present value basis assuming typical outcomes from available academic studies), with the benefits being more than twice as large in a more typical year of CPRIT outlays. (Effects over 10 years are included in the Appendices to this report.)
- The economic benefits of CPRIT-funded research activity also compound over time. Current estimates of these secondary effects stemming from research include $2.1 billion in output and 20, 818 jobs in 2013. These gains are expected to continue to grow substantially in future years with more typical funding levels (as indicated in the Appendices).

The Overall Total Current Impact of CPRIT Operations (including Secondary Effects) Includes a Gain of Over 24,500 Jobs in Texas

Adding the economic benefits of CPRIT operations, prevention/screening programs, research, outcomes-based prevention/screening, and secondary research effects yields a total gross impact of the Institute's operations of almost $4.8 billion in annual spending.

- The current total annual impact of all operations, prevention/screening, and research programs (including initial outlays and downstream effects) associated with CPRIT on Texas business activity was found to be $2.4 billion in output and 24,510 jobs. Fiscal benefits are also substantial, as noted in the table below.
- Because of the cumulative nature of research gains, these benefits increase over time. Even when other potential uses for State funding of CPRIT are considered, the net economic benefits remain substantial (as indicated in the Appendices). Over an extended time horizon, CPRIT and the research funding it provides will likely generate fiscal receipts totaling a substantial multiple of the commitment of public resources (in addition to the notable economic and health benefits).

The Overall Total Impact of CPRIT Operations, Prevention/Screening, and Research Programs on Texas Business Activity and Tax Receipts (Including Direct Outlays with Multiplier Effects as Well as Secondary Effects)
(Monetary Values in Millions of Constant 2013 Dollars)

ECONOMIC BENEFITS*	
Total Expenditures	$4,797.0
Gross Product	$2,369.6
Personal Income	$1,446.8
Retail Sales	$661.3
Employment (Permanent Jobs)	24,510
FISCAL BENEFITS	
State (Texas)	$129.9
Local Governmental Entities Throughout the State	$60.3

*Based on budgeted operations and reported awards in fiscal year 2013.

SOURCE: The Perryman Group

CPRIT's Benefits Extend Beyond these Economic Effects

The ultimate goal of CPRIT is reducing cancer incidence and the associated high human and economic costs, and a major reduction in incidence/severity would yield substantial economic benefits. In addition, the research activity supported by CPRIT can serve as a catalyst for economic development.

- If CPRIT's screening/prevention programs, research advances, and other initiatives reduce the incidence of cancer over time to equal the average of current levels observed in the five states with the lowest incidence and death rates, notable economic benefits would be realized. The Perryman Group estimates that the gains stemming from a substantial reduction in cancer incidence by 2040 would include $15.6 billion in gross product and about 156,800 permanent jobs. Fiscal benefits of such a reduction in cancer incidence include an estimated $874.8 million to the State each year and $394.6 million to local government entities (in constant 2013 dollars). Moreover, these benefits do not include the obvious gains in quality of life and would not be restricted to Texas; they would bring better outcomes throughout the country and, indeed, the entire world.
- CPRIT programs and grants are helping attract key researchers to Texas. The Institute's role as a potential catalyst for development of Texas' biomedical industries can help establish the Lone Star State as a center for such development. The economic gains from such economic development would be significant (as described in the Appendices to this report).

Conclusion

The Cancer Prevention and Research Institute of Texas Plays a crucial role in the War on Cancer

- Through its operations, screening/prevention efforts, and research programs, CPRIT is helping reduce the extremely high human and economic costs of cancer.
- CPRIT is also generating sizable economic stimulus including some $2.37 billion in output (gross product) and more than 24,510 jobs in 2013 (when multiplier and secondary effects are included).
- Moreover, the Institute's efforts stand to improve outcomes related to cancer prevention and treatment can lead to a significant reduction in cancer incidence and severity over time and be a catalyst to biomedical development in the Texas.

The Institute's Positive Impact Represents an Excellent Return on Fiscal Resources

- Research enabled by grants funded through CPRIT is already bearing fruit, with leading researchers coming to the state, matching funds being attracted, and findings being published in leading journals. Empirical evidence shows that medical research and prevention programs can reduce cancer incidence and enhance outcomes.
- Reductions in treatment expenses, morbidity, and mortality stand to bring notable economic benefits.
- The economic activity stemming from CPRIT operations and programs generates tax receipts over time which exceed the investment of resources.
- Despite a difficult transition year in 2013, the significance of CPRIT activities continues to expand and will only accelerate in the future.