ECONOMIC CONTRIBUTIONS OF THE OKLAHOMA MEDICAL RESEARCH FOUNDATION

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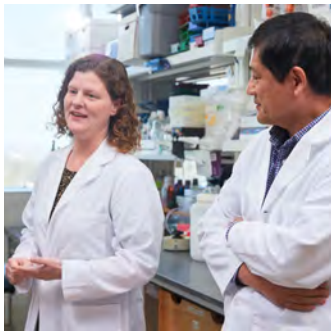
OMRF

1.0 Introduction



The Oklahoma Medical Research Foundation is an independent nonprofit founded in 1946 that conducts laboratory and clinical research to develop new diagnostics and therapeutics that will help people live longer, healthier lives. In FY22, OMRF employed 482 scientists, technicians and other staff, attracting talent from throughout the world. In addition, OMRF provided training for an estimated 95 graduate students through summer research opportunities. OMRF specializes in research of immunology and cancer, cardiovascular biology and neurodegenerative diseases, and is one of the country's leading independent medical research organizations.

OMRF collaborates with organizations across the country to conduct sponsored research. These collaborations, combined with federal grants from the National Institutes of Health, National Science Foundation, Department of Defense and Veterans Affairs, provided over $48 million in outside funding in FY22 to support scientific research.

From an economic perspective, research organizations function just like other businesses or organizations. They hire people and pay wages, purchase goods and services from local and non-local vendors, and receive income from their "customers." In addition to translating research into treatments and diagnostics that yield better outcomes for patients, a research organization makes economic contributions to the community or region in which it is located.

2.0 Impact Summary

OMRF provides significant economic benefits to the Oklahoma City metro area in terms of output, jobs, income and tax revenues from employees.

Economic Contributions

- **Overall Operations.** All total, OMRF created an economic contribution of over $165.2 million in the Oklahoma City metro area in fiscal year 2022. This total includes direct contributions of OMRF's operations plus indirect and induced contributions from local vendor purchases, employee spending and construction activity.

- **Direct Jobs and Income.** OMRF has 482 regular employees as well as 95 postdoctoral and graduate residents with a combined annual payroll of $42.5 million, resulting in average wages of about $88,000 per year. Approximately 95% of the employees live in the Oklahoma City metro area.

- **Local Vendor Spending.** OMRF makes purchases from local vendors for goods and services to support their laboratories and clinic, creating an estimated indirect economic contribution of $31.1 million in the Oklahoma City metro area in FY22, supporting 214 jobs and $10 million in annual labor income at other local businesses.

- **Construction Expenditures.** In addition to regular operations, OMRF made $1 million in construction expenditures for lab space renovation in FY22. This $1 million in construction activity created an indirect economic contribution of $1.9 million in the metro area, supporting an estimated 11 jobs and $600,000 in labor income.

- **Employee Spending.** The 482 current scientists, technicians and other staff working at OMRF make a significant volume of local consumer purchases. Employee spending generated an estimated induced economic contribution of $43.1 million in FY22 supporting an estimated 298 jobs and $13.5 million in labor income at other local businesses.

- **Sponsored Research.** Another key function of research organizations like OMRF is attracting grant money to the region to support research. OMRF received about $48 million in sponsored research funding and grants in FY22 from private institutions like the American Heart Association as well as from federal government sources like the National Institutes of Health, the National Science Foundation and the Department of Veterans Affairs.

- **Start-Up Activity.** As a result of research partnerships initiated through OMRF, a start-up company called Progentec Diagnostics was formed in Oklahoma City in 2015. Based on FY22 employment levels, Progentec generated an annual economic contribution of $8 million in FY22, directly and indirectly supporting an estimated 30 jobs and $2.2 million in annual labor income.

2.0 Impact Summary

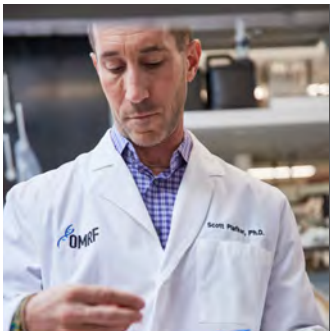
Tax Revenues

- **State and Local Tax Impacts**. Since OMRF is a nonprofit institution, it does not pay any property, sales or income taxes in Oklahoma. However, the organization supports substantial property, sales and personal income tax revenues through employees' spending. Annual state and local tax revenue impacts include an estimated $1.2 million in sales and property taxes to cities and counties in the Oklahoma City metro area and $1.1 million to the state in sales and personal income taxes for a total of $2.3 million in estimated state and local revenues in FY22 from direct and indirect jobs associated with OMRF.

OMRF not only conducts groundbreaking laboratory and clinical research and provides educational programs for graduate and doctoral students, it also supports a significant amount of additional economic activity, jobs and payroll at related local supplier and consumer businesses. OMRF plays an important role in regional economic development by attracting world-class talent and serving as a key building block for the biotech sector in the Oklahoma City metro area.

The information and observations contained in this report are based on our present knowledge of the operations of OMRF and of the current fiscal and socioeconomic conditions of the affected areas. Some estimates made in this report are based on hypothetical assumptions. However, even if the assumptions outlined in this report were to occur, there will usually be differences between the estimates and the actual results because events and circumstances frequently do not occur as expected. This analysis is based on the best available information and is intended to aid OMRF in quantifying its economic contributions to the local economy. In no way will Applied Economics be held responsible or have any liability or be subject to damages resulting from this analysis. This report may be used only for the purposes that it was intended.

2.0 Impact Summary

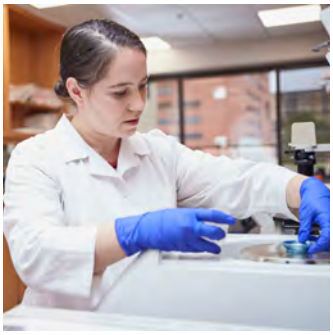


SUMMARY OF ECONOMIC CONTRIBUTIONS
OKLAHOMA MEDICAL RESEARCH FOUNDATION – FY22
(Millions of Dollars)

Institutional Profile	
Permanent Employees	482
Graduate Students and Visiting Scientists	95
Annual Payroll	$42.5
Annual Operating Budget	$89.1
OMRF Operations - Total Economic Contribution*	
Output	$165.2
Jobs	1,100
Labor Income	$66.6
Start Up Activity Economic Contribution	
Output	$8.0
Jobs	30
Labor Income	$2.2
Tax Revenue Impacts	
Local Sales and Property Taxes	$1.2
State Sales and Income Tax	$1.1

*Includes OMRF operations, local vendor purchases, construction and employee spending.

3.0 Economic Contributions



Economic impacts measure the response of the local economy to an increase in economic activity such as new jobs and payroll. Since OMRF is not new to the region, this analysis quantifies the "economic contribution" rather than the "economic impact." An economic contribution measures the gross changes in a region's economy that can be attributed to an existing activity. While the economic contribution of an industry does include the indirect effects of local vendor purchases and the induced effects of employee spending, there are no iterative indirect or induced effects as there would be in an economic impact where new demand for indirect and induced businesses creates additional demand for suppliers to suppliers, and so on.

Economic contributions shown here are quantified in terms of direct, indirect and induced jobs, labor income and output that are supported by OMRF through its operations. Indirect and induced contributions, which make up the difference between total and direct contributions, are the result of the multiplier effect and capture supported supplier and consumer businesses and employees in the Oklahoma City metro area that benefit from the existence of OMRF. Multiplier effects are a way of representing the larger economic effects on the local economy. In essence, the multiplier effect represents the recycling of local spending that, in turn, creates new business opportunities. This analysis uses multipliers from IMPLAN, a national vendor of economic impact software, that are specific to the Oklahoma City metro area.

Direct contributions represent employees and payroll at OMRF, as well as the output or value of research and clinical services. Indirect and induced contributions include local vendors from whom OMRF makes purchases and local establishments where employees shop. The economic contributions also include out-of-state patients and their families who visit the clinic and start- up businesses stemming from technology ventures by OMRF. The total economic contribution includes both the direct contributions of OMRF operations and the indirect and induced contributions of other local businesses and their employees. Additional purchases by both OMRF and its employees will also occur outside the region and are not represented here.

3.1 Annual Operations

OMRF had an estimated 482 permanent employees in FY22 including scientists, technicians and other staff. In addition, there were 95 graduate students and visiting scientists that worked for a portion of the year at the facility in Oklahoma City. The annual payroll for FY22 was $42.5 million, with a total annual operating budget of $89.1 million (Figure 1). The annual operating budget is used in this analysis as a proxy for direct output.

OMRF attracts talent globally, bringing highly-skilled researchers to the Oklahoma City metro area and supporting human capital in the biotech sector. Average wages are estimated at approximately $88,000, which is well above the median wage for the metro area. Approximately 95% of OMRF employees live in the Oklahoma City metro area.

FIGURE 1
FY22 EMPLOYMENT AND PAYROLL AT OMRF

Full and Part Time Staff	482
Graduate Students and Visiting Researchers	95
Total Annual Payroll (millions)	$42.5
Average Wage	$88,000
Percent% Living in Oklahoma City	95%

OMRF also purchases goods and services to support their operations. The estimated contribution of vendor spending captured in the Oklahoma City metro area based on industry- specific multipliers results in indirect output of $31.1 million per year. As purchases are made from local vendors, those businesses support an estimated 214 jobs and $10 million in payroll in the local area.

OMRF also supports economic activity through household spending by employees. These employees represent a substantial amount of purchasing power that supports additional jobs and payroll at local retail and service establishments in the region. With 577 permanent and temporary employees, including graduate students and visiting researchers, OMRF has an annual payroll of $42.5 million, a portion of which is re-spent in the regional economy on consumer goods and services. Direct and indirect workers generate induced output of $43.1 million per year in the Oklahoma City metro area, supporting an estimated 298 jobs and $13.5 million in labor income, primarily in the retail and service sectors.

3.2 Construction Spending

The economic benefits resulting from OMRF include both the ongoing industry contributions from operations and non-recurring construction impacts. OMRF made an estimated $1 million in construction expenditures in FY22 for lab space renovations. The multiplier effects of this spending resulted in a total increase in economic activity of about $1.9 million in the metro area (Figure 2). The approximately 11 direct and indirect jobs created by this construction activity supported an estimated $600,000 in total labor income in FY22.

FIGURE 2
ECONOMIC IMPACTS OF CONSTRUCTION IN FY22
(millions of dollars)

	Direct Impacts			Total Impacts		
	Construction Expenditures	Jobs	Labor Income	Output	Jobs	Labor Income
Lab Space Renovation	$1.0	5	$0.3	$1.9	11	$0.6

3.3 Combined Economic Contributions

The economic results are grouped into direct, indirect and induced contributions supported by OMRF. Direct contributions include the jobs, payroll and value of services provided by OMRF. Indirect contributions include local vendor spending and construction. Induced contributions include employee spending. Indirect and induced jobs represent employees at local supplier businesses where OMRF makes purchases as well as local consumer establishments where employees make purchases. The total economic contribution includes the direct contribution of OMRF and the indirect and induced contributions created by other local businesses and their employees. All total, the operations of OMRF create an annual economic contribution of $165.2 million in the Oklahoma City metro area economy each year, directly and indirectly supporting an estimated 1,100 jobs and $66.6 million in annual labor income in FY22 (Figure 3).

FIGURE 3
COMBINED ECONOMIC CONTRIBUTIONS OF OMRF OPERATIONS IN FY22

	Output	Jobs*	Labor Income
Direct Contributions-OMRF Operations	$89.1	577	$42.5
Indirect Contributions			
Local Vendor Purchases	$31.1	214	$10.0
Construction Spending	$1.9	11	$0.6
Induced Contributions			
Employee Spending	$43.1	298	$13.5
Total	**$165.2**	**1,100**	**$66.6**

*Direct jobs include FTE summer graduate students and visiting researchers.

The indirect and induced contributions presented here are called multiplier effects. Multiplier effects are a way of representing the larger economic benefit to the regional economy. Multiplier effects translate an increase in output (loosely defined as gross revenues, less non-local inputs) into a corresponding increase in jobs and labor income. In essence, the multiplier effect represents the recycling of local spending. This recycling process creates opportunities for existing local businesses.

The multipliers used in this analysis are from IMPLAN, a national vendor of economic impact software, and are specific to the 7-county region that makes up the Oklahoma City metro area. Industry-specific multipliers for scientific research and development services, nonresidential construction and diagnostic substance manufacturing were incorporated into the analysis. On average, the output multiplier for OMRF operations is 1.85. This means that for every $1 million of output or value of services provided by the institution, an additional $850,000 in economic activity is supported in the Oklahoma City metro area along with 12 jobs and $748,000 of payroll.

3.4 Sponsored Research and Start-Up Activity

OMRF regularly engages in collaborations with industry and academic partners for inter- institutional research, sponsored research and licensing agreements. These collaborative efforts resulted in approximately $8 million in funding for research at OMRF from 30 different institutions across the country in FY22. In addition, OMRF receives a significant amount of funding through federal research grants. In FY22, OMRF received $40 million from federal agencies that supported economic activity in Oklahoma City and is captured in the direct economic contribution results. The largest amount of grant funding comes from the National Institutes of Health. Figure 4 below lists the projects that received NIH grants in FY22 totaling $31.4 million. OMRF also received an estimated $8.6 million in grants from the National Science Foundation, Departments of Defense and Veterans Affairs in FY22.

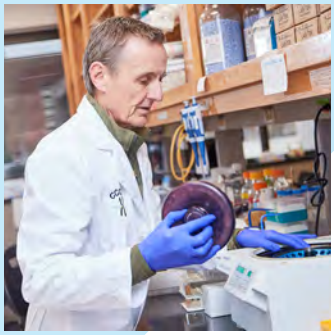
3.4 Sponsored Research and Start-Up Activity

FIGURE 4 NIH GRANT AWARDS TO OMRF IN FY22

Project Title	FY22 Total Cost
Accelerating Medicines Partnership-Autoimmune and Immunologic Disease Tissue Research Core	$2,500,000
Center for Cellular Metabolism Research in Oklahoma	$2,622,000
Expanding Excellence in Developmental Biology in Oklahoma	$2,563,648
Molecular and Immunologic Analysis of the Pathobiology of Human Anthrax	$2,223,977
Oklahoma Rheumatic Disease Research Cores Center (Overall Application)	$874,000
Disease and Race Specific Single-cell Epigenetic Mechanisms in Human SLE	$856,476
Protease-Mediated Vascular Instability in Development and Disease	$844,478
Characterization of European American and African American Sarcoidosis via Immunogenetics	$775,204
Discovery and Characterization of Genetic Risk Loci in Sjogren's Syndrome	$748,258
Translational Control of Megakaryocyte and Platelet Gene Expression in Disease	$730,936
Dissecting the integrated mechanisms of protein turnover to prevent proteostatic decline with aging	$660,106
Determining the context specificity of metformin treatment on muscle mitochondria and healthspan	$651,808
Epigenome-Guided Causal Variant Discovery and Mechanisms	$641,797
Complement C5 inhibition as sepsis therapy	$633,416
Does insulin sensitivity impact the potential of metformin to slow aging?	$625,157
A novel role for oxidized lipid mediators as effectors of muscle atrophy and weakness in aging	$591,603
Interrogating the intersection between diet and ocular autoimmunity	$580,796
Defining the Mechanisms of Lymphatic Vascular Growth and Function	$556,972
Characterization of a distinct NKT subset and its role in influenza responses	$537,917
Sex divergence and cell specificity of age-related hippocampal DNA modifications	$535,747
Discovery and Characterization of Novel Sepsis Proteome Biomarkers	$535,585
The Role of TGF-beta Activation and Signaling in Aortic Stenosis Progression	$523,299
Specificity and Molecular Definition of Pathogenic Lymphocytes in Sjogren's Syndrome	$520,558
Role of estrogen receptor-a in aging and sex-specific responses to 17a-estradiol	$514,994
Site-1 protease-mediated lipid metabolism in lymphatic vascular development	$437,000
Protease Activated Receptor and Thrombomodulin Signaling by Coagulation Proteases	$437,000
Platelet CLEC-2 in Arterial Thrombosis	$437,000
Molecular and cellular mechanisms regulating mitochondrial subpopulation dynamics and function in vivo	$437,000
Metabolic mechanisms controlling lymphatic vessel formation	$437,000
Intraarticular microbial DNA as a novel mediator of osteoarthritis	$437,000
Increasing glycolysis in the diabetic heart is cardioprotective and improves glucose tolerance	$437,000
Cellular senescence and epigenomic remodeling in ovarian aging	$437,000
Sex chromosomal regulation of hippocampal microglial activation with Alzheimer's and aging	$436,999
Understanding Cell Division	$436,998
Role of ATAD3A in Lysosomal Homeostasis and Neurogenesis	$433,300
The role of mitochondrial regulation in cell lineage specification and function	$426,250
Regulation of chromosome cohesion during cell cycle progression	$410,955
Peripheral blood mononuclear cell epigenetic associations in and biomarkers for knee osteoarthritis development and progression	$380,714
PDGF-regulated stem cells and bone disease	$380,714
Centromere Interactions and Meiotic Chromosome Segregation in Yeast	$349,600
Roles of N-glycans on neutrophil beta2 integrins in progression of acute lung injury	$262,200
Investigating the role of SIRT3 in metabolic flexibility and proteostasis in the aging heart	$262,200
Connecting the gap between GWAS and functional targets for lupus susceptibility	$262,200
Development of a lacO/lacI based flourescence reporter-operator system to study chromosome dynamics in	$219,197
Salivary gland response to innate immune mediators dictates Sjogren's syndrome development	$218,500
Targeting sfRon-S6K1 signaling and mitotic kinesin Eg5 in ovarian cancer: a novel synergistic treatment strategy	$200,212
Contribution of Endothelial Changes and Increased Cardiovascular Risk to Alzheimer's Disease Pathogenesis	$174,800
Oklahoma ACE: Molecular Deconstruction of Autoimmune Disease to Aid Clinical Trial Success	$87,400
Summer Training Course in Experimental Aging Research	$74,900
Equipment Supplement for Centromere Interactions and Meiotic Chromosome Segregation in Yeast	$49,017
TOTAL AWARDS in FY 22	**$31,410,888**

Source: National Institutes of Health, RePORTER, March 2023.

3.4 Sponsored Research and Start-Up Activity



OMRF engages in a variety of technology ventures that include industry partnerships as well as technology transfer and the creation of start-up companies. Start-up companies currently operating in the Oklahoma City metro area include Progentec Diagnostics. Progentec develops biologic and digital biomarker tests to diagnose and monitor autoimmune diseases such as lupus and multiple sclerosis. These diagnostics allow patients to make proactive treatment decisions and improve health outcomes. Progentec, which was founded in 2015, currently has 11 employees and annual payroll of $1.2 million. Through their operations, they create an annual economic contribution of $8 million in the Oklahoma City metro area, directly and indirectly supporting 30 jobs and $2.2 million in annual labor income (Figure 5).

FIGURE 5
ANNUAL ECONOMIC CONTRIBUTION OF PROGENTEC DIAGNOSTICS (Millions of Dollars)

	Direct Impacts			Total Impacts		
	Output	Jobs	Labor Income	Output	Jobs	Labor Income
FY22 Operations	$4.8	11	$1.2	$8.0	30	$2.2

4.0 Revenue Impacts

In addition to supporting jobs, output and income through its operations in Oklahoma City, OMRF also supports state and local tax revenues. Although the institution is exempt from taxes as a nonprofit, direct and indirect employees generate state and local tax revenues. All total, OMRF supported an estimated $2.3 million in state and local tax revenues in FY22 (Figure 6).

FIGURE 6
EMPLOYEE REVENUE IMPACTS IN FY22
(Thousands of Dollars)

	Local Taxes			State Taxes		
	Sales	**Lodging**	**Property**	**Sales**	**Income**	**Total**
OMRF Employees	$536	$0	$190	$593	$130	$1,450
Indirect & Induced Workers	$287	$0	$185	$301	$124	$897
Annual Total ($000)	**$823**	**$0**	**$376**	**$894**	**$254**	**$2,347**

OMRF employees pay personal income taxes on their earnings, sales taxes on a portion of their local purchases and property taxes on their homes. The same is true for workers at other local businesses that are supported by vendor spending and employee spending.

Annual state and local sales taxes are estimated at $1.7 million for FY22.[1] Sales taxes include consumer spending by direct, indirect and induced employees, adjusted for the share of workers living in the Oklahoma City metro area.

Local property taxes to the city, county, school district and other local taxing districts are estimated at $376,000 per year. Employee property tax revenues are based on per capita residential assessed value in the region multiplied by average property tax rate and by the supported population (employees and their families) associated with direct, indirect and induced jobs. Property tax revenues are also adjusted for the share of employees living in the Oklahoma City metro area.

OMRF employees and supported indirect and induced workers at other local businesses pay state income tax on their earnings. Based on the current personal income tax schedule in Oklahoma and the total labor income shown in the economic contribution results, it is estimated that direct, indirect and induced employees generated $254,000 in state income tax revenues in FY22.

[1] Sales taxes from employee spending are based on typical consumer expenditure patterns. According to the Census Bureau Consumer Expenditure Survey, approximately 31% of gross personal income is spent on taxable goods. Applying this assumption to personal income of OMRF employees and other supported jobs at local businesses times the state and local sales tax rate yields local sales tax revenues from employee spending.

Summary

The Oklahoma Medical Research Foundation is an important contributor to the region's economy and to the biotech industry in the Oklahoma City metro area. It attracts a highly- skilled workforce of scientists, physicians and technicians that utilize their skills to research detection and cures for conditions such as cancer, Alzheimer's, heart disease, diabetes and autoimmune diseases. The diagnostics and therapeutics developed at OMRF improve healthcare outcomes for patients everywhere. Through its operations, OMRF also provides quality jobs to hundreds of workers and supports the local economy with millions of dollars each year in vendor purchases and employee spending, creating a significant economic contribution in the region. This results in jobs and economic activity in the region as well as state and local tax revenues that would not have occurred were it not for the presence of this research institution in the Oklahoma City metro area.

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