



COMMON FUND PATENT REPORT

Produced by the Office of Strategic Coordination

Data are current as of November 29th, 2017

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Report Summary

The Common Fund is a unique funding entity at NIH, functioning as a “venture capital” space where high-risk and innovative endeavors with the potential for extraordinary impact can be supported. Common Fund programs are short-term, goal-driven investments, with deliverables intended to catalyze research across multiple biomedical disciplines.

Due to its focus on high-impact and catalytic research, the Common Fund research portfolio has a higher proportion of technology and resource development activities and high-risk research than that of the NIH as a whole. We expect these kinds of research activities to result in more deliverables suitable for patenting. To test this hypothesis, we conducted an analysis to see if there is a difference in the proportion of patents, resulting from Common Fund supported programs and other NIH-supported initiatives. By comparing the proportion of patent applications and awarded patents between Common Fund and all NIH supported programs, we hope to understand if the Common Fund selectively supports the kind of research that translates into innovative, and patentable, results.

The data collected below show the following three results:

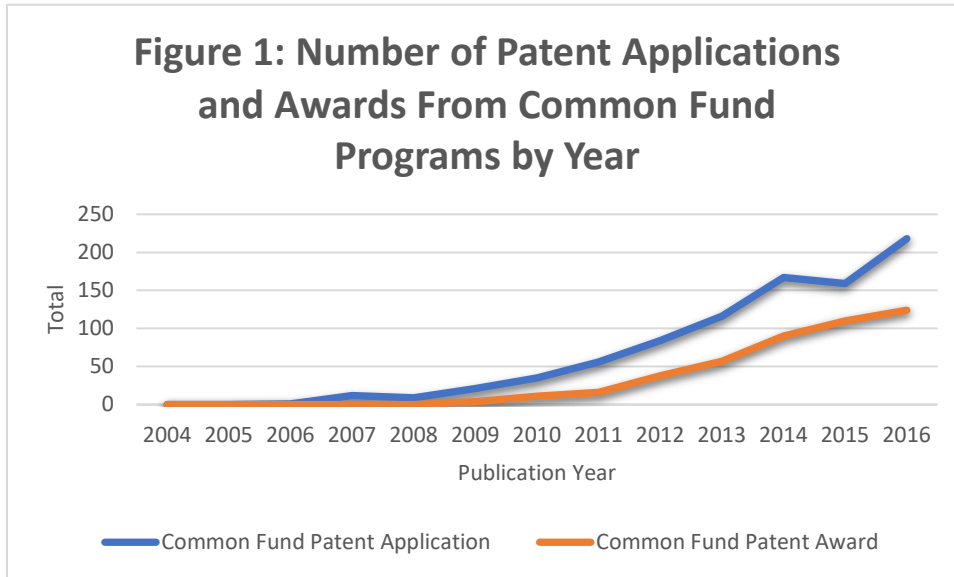
1. Common Fund programs have seen an increase in the number of patent applications and patent awards since the inception of the Common Fund in 2004.
2. When normalized to the total number of grants issued, the Common Fund more frequently produces patent applications (~11%) and patent awards (~5%) compared to the NIH, which has an ~1.4% frequency of producing a patent application per grant and a ~1% frequency of producing a patent award per grant between 2004 and 2016
3. By comparing the normalized values for Common Fund programs and the entire NIH research portfolio (which includes the Common Fund data), Common Fund programs have an ~8 times higher frequency of producing a patent application and a ~5 times higher frequency of producing a patent award compared to the NIH.

Data Analysis

Information for Common Fund and NIH patent applications and awards was obtained using the online tools provided by the [Office of Portfolio Analysis](#) (OPA), which is part of the [Division of Program Coordination, Planning, and Strategic Initiatives](#) (DPCPSI) at the NIH. These online tools, called [iSearch](#), allow users to identify patents linked to grants awarded by all of the NIH or just the Common Fund. To gain information on the entire NIH research portfolio (which includes all Common Fund supported research), an untargeted search was done in the *iPatent* search function in the iSearch toolset. Only NIH supported research was then analyzed. Data were obtained for all Common Fund supported programs by searching all funding opportunity announcement titles for the inclusion of the Road Map (RM) two letter identifier that associates a funding opportunity announcement with the Common Fund. Values were pulled using the patent publication year, not the patent filing year. Figure 1 shows how the number of patent applications or patent awards has changed each year since the beginning of the Common Fund in

2004. As the early Common Fund programs matured, and new Common Fund programs were developed, the number of patent applications and patent awards increased each year since 2004. These results indicate that the Common Fund is supporting programs whose ideas lead to patentable results. It is important to note that the number of patent applications in a given year does not correlate with the

number of awarded patents in that year. In general, there is a delay, often several years, between when a patent is applied for and when a patent is awarded.



We wanted to see how patent applications and awards from Common Fund supported programs, compared to the NIH as a whole.

Two factors prevent us from simply comparing the number of patent applications and

Figure 1: Since it began in 2004, the Common Fund has seen an increase in the number of patent applications and patent awards each year. Please note, these data are not linked on a yearly basis. The number of patent applications per year does not correlate with the number of patent awards issued in each year.

awards each year between the Common Fund and the NIH. First, there is a large discrepancy in the number of grants awarded each year by the whole NIH and just the Common Fund. The larger volume of NIH supported grants leads to a larger number of patent applications and awards. Second, due to the complexities of timing between when a grant is awarded, when a patent is applied for, and when a patent is awarded, it is not easy to look at these values on a year by year basis. Instead, it is more telling to look at the total number of patent applications or awards from the Common Fund and the NIH after they have been normalized to the total number of grants awarded by each entity from 2004-2016. To account for the larger number of grants issued by the NIH as a whole, the number of patent applications and patent awards during this time frame has been normalized by the total number of grants awarded. This was done using the following formula:

$$\frac{\text{total patent value}^1}{\text{total number of grants}} \times 100 = \text{normalized number of patents per grant}$$

¹ Total patent value is equivalent to either the total number of patent applications or the total number of patent awards from 2004-2016

Figure 2: Common Fund and NIH Patent Applications and Awards Normalized by The Total Number of Awarded Grants from 2004-2016

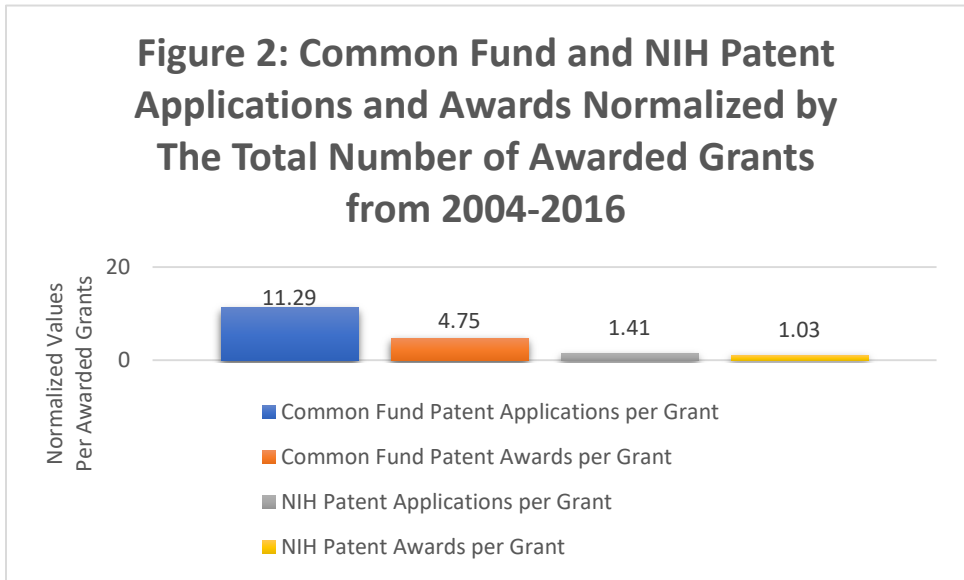


Figure 2: Between 2005-2016 the Common Fund has produced more patent applications and patent awards compared to the NIH when normalized to the total number of grants awarded. Data for the NIH includes the Common Fund supported research. These values were calculated by dividing the total sum of patent applications (or awards) by the total number of grants issued from 2004-2016.

Figure 2 shows the normalized values for both Common Fund and NIH patent applications and patent awards per total number of issued grants. These data indicate that for Common Fund supported programs, there are ~11 patent applications per 100 grants and ~5 patent awards per 100 grants. For the NIH as a whole, which includes all Common Fund supported research, there are approximately 1.4

patent applications per 100 grants and ~1 patent award per 100 grants. It is important to note there is often a delay from when a grant is issued and when a patent application is submitted. This means that for grants issued in 2016, while possible, it is unlikely these grants have produced any patent applications or patent awards.

To gain a deeper understanding of how likely it is for programs supported by the Common Fund to generate patents, we compared the normalized values above between the Common Fund and the entire NIH research portfolio. This analysis was calculated by dividing the normalized patent data per grant from the Common Fund by the normalized patent data per grant for the NIH. Figure 3 shows the patent applications and patent awards, after normalization between Common Fund supported research and the

Figure 3: Common Fund Patent Applications and Awards Compared to the NIH Normalized by the Total Number of Awarded Grants from 2004-2016

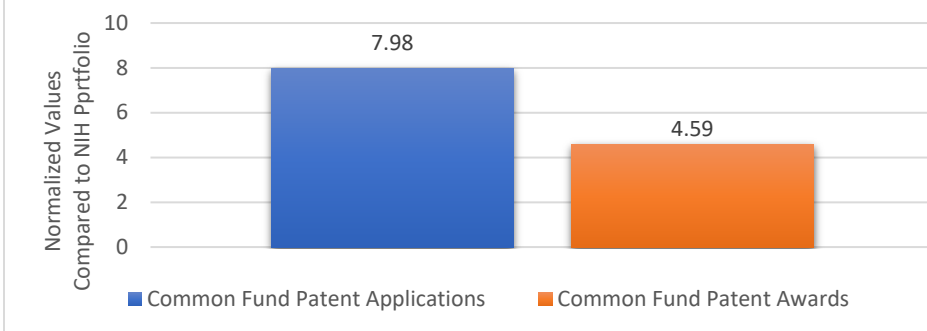


Figure 3: Compared to the NIH, Common Fund programs are more likely to generate patent applications and patent awards. This data was obtained by dividing the normalized patents per grant for the Common Fund by the normalized patent data for the NIH portfolio (which includes the Common Fund data).

entire NIH portfolio of research (which includes Common Fund supported programs.) This analysis supports the concept of the Common Fund being a venture capital space to specifically support research that moves science in new directions as Common Fund programs have an ~8 times higher frequency of patent applications per grant and an ~5 times higher frequency of

awarded patents per grant when compared to the entire NIH portfolio. These results support our hypothesis that Common Fund supported programs may lead to more patents. Again, this is not surprising since the Common Fund is intended to support research that moves science in new directions and provides resources to the research community. The research portfolio of the whole NIH is more balanced, supporting some risky and resource-directed research, and also less risky, but essential, research projects that enhance our understanding of biology, health, and disease.

Examples of patents resulting from NIH Common Fund-supported research

The Molecular Libraries and Imaging program, which ended in 2015, offered public sector biomedical researchers access to the large-scale screening capacity necessary to identify small molecules that could be optimized as chemical probes to study the functions of genes, cells, and biochemical pathways. This led to new ways to explore the functions of genes and signaling pathways in health and disease.



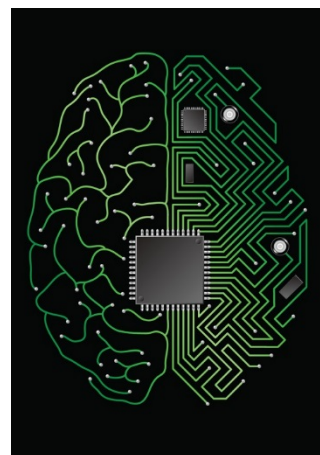
NIH anticipated these projects would also facilitate the development of new drugs, by providing early stage chemical compounds to researchers in the public and private sectors for validation of new drug targets, which could then be moved into the drug-development pipeline. One such drug is called Ozanimod (Patent ID US-2013231326) and has just entered the New Drug Approval process with the U.S. Food and Drug Administration (FDA). Ozanimod is a novel chemical compound that can be taken orally, and helps reduce inflammation in patients with

relapsing multiple sclerosis (RMS). It was developed at the Scripps Research Institute using Common Fund

support. More information on Ozanimod and its upcoming trials can be found in a [press release](#) from the Scripps Research Institute.

In addition to developing new drugs, Common Fund researchers have developed patents in other biomedical fields. A prime example can be found in the research of Charles Lieber from Harvard University. Dr. Lieber is a recipient of the Common Fund's [High-Risk, High-Reward Pioneer Award](#), which supports exceptionally creative scientists pursuing new research directions to develop pioneering approaches to major challenges in biomedical and behavioral research.

A major component of Dr. Lieber's research focuses on the implantation of electronic devices into biological tissues using syringes. Dr. Lieber has several patents and patent applications (Patent or application ID's US-15301792, US-14018082, and US-14018082) that allow the delivery of flexible, mesh-like electronics into different organs of test animals, including the brain. This work has great therapeutic potential as Dr. Lieber showed the electronics were not rejected by an animal's immune system. [A paper](#) from Dr. Lieber that focuses on the syringe injectable electronics, published in 2015, has already been cited over 70 times by outside sources. Further research from other laboratories has used Dr. Lieber's patent to capture action potentials of neurons in the brains of rodents, reduce the level of fibrosis following glaucoma surgery, and even monitor the stress and strain put on non-biological materials found within buildings.



The innovative, high-risk research supported by Common Fund programs allows scientists and doctors to explore uncharted areas of biomedical research, and produce an ever-increasing number of patents, showing that research supported by Common Fund programs generates novel results.

Report Limitations

As noted above, there is often a delay between when a grant is issued and when a patent application is filed. There is also a delay from when a patent application is filed and when a patent award is made. In 2017, the average time between patent application and award was less than 3 years.² Due to these facts, the number of patent applications and patent awards is a dynamic number. These values are current as of November 29th, 2017. In addition, patent information for Common Fund supported programs was obtained by searching all Funding Opportunity Announcement (RFA/PA) numbers that include the Road Map (RM) identifier. If the patent submitter did not include this information or a linked grant number, the results would not be captured in this report. This analysis looked at patents resulting from the entire NIH portfolio and compared this to patents resulting from NIH Common Fund programs, which frequently include a technology development aim. It is unknown what the findings would be, if this analysis only compared grants with a technology development aim.

² Source: USPTO Annual Reports Performance and Accountability Report (PAR) <https://www.uspto.gov/about-us/performance-and-planning/uspto-annual-reports>.