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# General payments from Biogen to U.S. physicians between 2015 and 2020

## INTRODUCTION

The approval of aducanumab (Aduhelm) for Alzheimer's disease is one of the most consequential and criticized decisions the U.S. Food and Drug Administration (FDA) has made in recent years.<sup>1</sup> Indeed, the accelerated approval ignited a federal investigation due to a confluence of factors, most notably an opaque relationship between the company and the U.S. FDA that facilitated the approval of a drug with poor clinical evidence.<sup>2</sup>

One unknown element of the aducanumab controversy is the financial conflict of interests between the manufacturer and U.S. physicians. It is well-established that pharmaceutical companies provide financial incentives to medical professionals.<sup>3–6</sup> The Open Payments (OP) database was established to track industry payments as part of the Physician Payment Sunshine Act. Since its inception, numerous studies have explored payments across medical specialties, including linking these data with Medicare to demonstrate how even small sums can influence prescribing.<sup>3</sup> Therefore, we characterized payments from Biogen to U.S. physicians to understand where financial conflict of interests might exist and provide a baseline for future evaluations.

## METHODS

We conducted a systematic search of OP dataset<sup>7</sup> between 2015 and 2020 to identify all generic payments made to physicians from Biogen (excluding research contributions). General payments include consulting fees, education costs, meal and travel expenses, and grants. OP database includes an “other” category for non-consulting services such as speaking fees.<sup>7</sup> Due to the nature of search through the company profile, the “other” category could not be further aggregated into discrete categories. We quantified payments from Biogen to physicians by speciality, drug, nature, and “significant” payments over \$10,000 dollars per year. Since aducanumab is indicated for Alzheimer's disease, we performed an analysis of specialties likely to be involved in prescribing, such as geriatric psychiatry and geriatric medicine subspecialists. OP dataset categories physicians by primary residency therefore subspecialists coded “geriatrics” were from family medicine, internal medicine, and neurology. Finally, we investigated payments associated with drugs listed on Biogen's product portfolio. One limitation of OP dataset is that there are numerous payments not assigned an identifier. These funds yield a “blank” and were not included in this analysis. Descriptive data analyses were performed using Excel Software v16.50.

**TABLE 1** Summary characteristics of Biogen payments to physicians between 2015 and 2020

Variable	Total number (%)
<b>Physicians</b>	
# Physicians	33,505 (100)
# physicians receiving over \$10,000	1864 (6)
<b>Payments</b>	
# of payments	273,727 (100)
Total value (\$ USD)	82,178,093 (100)
Median payment value (IQR)	97 (79–105)
<b>Top payments by specialty (% total)</b>	
Neurology	67,202,433 (82)
Internal medicine	6,688,899 (8)
Pediatrics	2,384,452 (3)
Surgery (all)	1,100,698 (1)
Family medicine	757,469 (1)
Radiology	831,679 (1)
Other	3,212,463 (4)
<b>Subspecialists</b>	
Geriatric psychiatry	\$23,000 (0)
Geriatric family practice	\$8400 (0)
Geriatric internal medicine	\$236,600 (0)
<b>Therapeutics<sup>a</sup></b>	
# of payments	247,096 (100)
Total value (\$USD)	54,513,855 (100)
<b>Drug (trade name)</b>	
Aducanumab (Aduhelm)	NR
Nusinersen (Spinraza)	6,525,110 (13)
Peginterferon beta-1a (Plegridy)	6,228,084 (12)
Diroximel fumarate (Vumerity)	1,816,426 (4)
Dimethyl fumarate (Tecfidera)	18,560,112 (36)
Dalfampridine (Fampyra)	8103 (0)
Natalizumab (Tysabri)	13,589,989 (26)
Interferon beta-1a (Avonex)	721,524 (1)
Other	4,132,411 (8)

Abbreviation: NR, not reported.

<sup>a</sup>List based on U.S. marketed therapeutics per Biogen product profile.

## RESULTS

From 2015 to 2020, Biogen made 273,727 non-research payments to 33,505 physicians totaling \$82,179,093 (Table 1). The median annual payment was \$97 (IQR: \$79–\$105). Annual payments decreased across all specialties except for neurologists who experienced an increase within the study period (except 2020) (Figure 1).

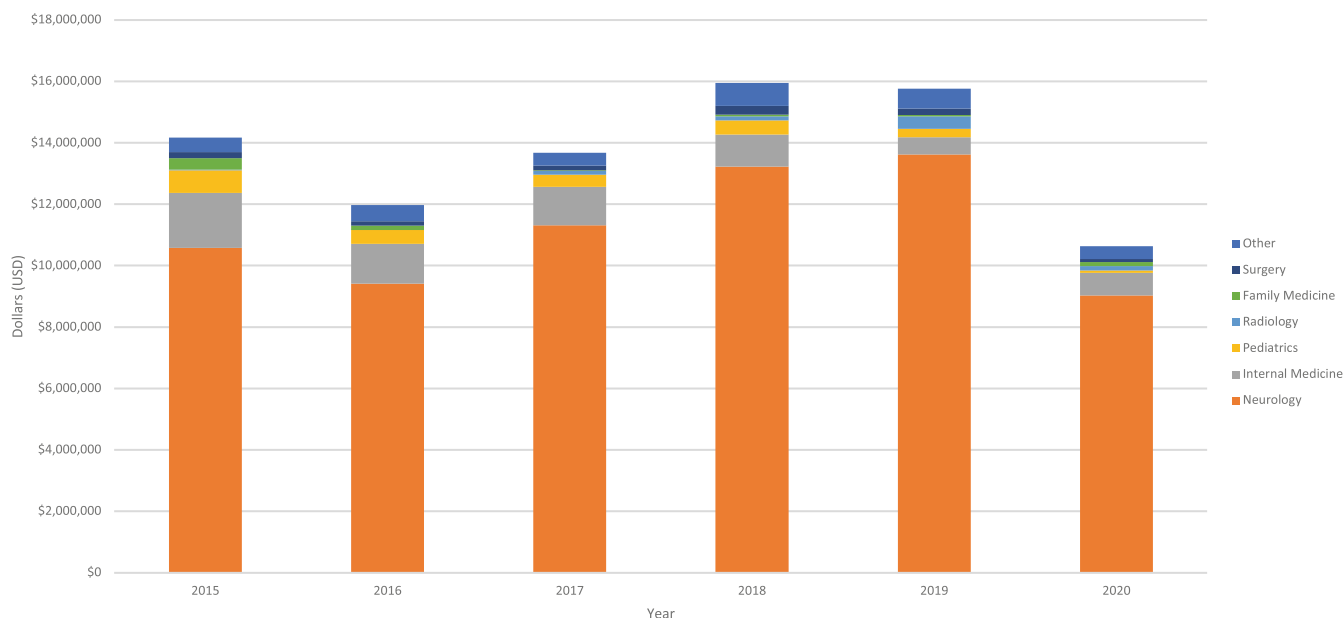
The decrease of total payments in 2020 might be COVID-related as the total proportion of payments shifted from travel (which decreased 6%) to non-research grants (increased by 13%). Approximately 44% of payments were related to activities coded under the “other” category (such as speaking fees), followed by consulting (36%), travel (7%), meals (6%), and grants (6%).

Neurologists were the highest paid physician specialists receiving \$67,202,433 (82%) of total payments, followed by internal medicine (8%), pediatrics (3%), family medicine, surgery, and radiology (all 1%) (Figure 1). Biogen gave \$268,000 to geriatric subspecialists consisting of consulting fees (92%), travel (6%), and meals (2%). Of these, geriatric psychiatry (neurology) received \$23,000. Geriatric medicine subspecialists from family medicine received \$8400 and internal medicine \$236,600. There were 1864 (6%) physicians who received over \$10,000 per year. Of these, 1588 (85%) were neurologists. Over half of payments in OP dataset (66%) were associated with a drug. Of those reported, dimethyl fumarate (36%) was the top drug in total amount, followed by natalizumab (26%), nusinersen (13%), and peginterferon beta-1a (12%) (Table 1).

## DISCUSSION

Our analysis demonstrates that financial payments from Biogen are widespread across medical specialties. However, 82% of funds were given to neurologists. In fact, approximately 40% of practicing neurologists in the United States have received general payments from Biogen. One possible explanation for this overrepresentation might be the nature of Biogen's Product Portfolio which is dominated by drugs for neurological ailments. Neurologists also received 85% of payments over \$10,000, which might suggest an industry strategy to concentrate payments to one group.

Financial payments are a widespread marketing strategy used by pharmaceutical companies<sup>3</sup> and is not limited to physicians but stakeholders across medicine such as national academies,<sup>8</sup> journal editors,<sup>9</sup> nurse practitioners, and physician assistants.<sup>10</sup> Further, more than two thirds of U.S. Congress received payments from top pharmaceutical companies in 2020, such as Pfizer, Amgen, Biogen, among others.<sup>11</sup> This is concerning as numerous studies have found financial payments influence behavior toward increased prescribing, more costly prescriptions, and a higher use of brand name medicines.<sup>3,10</sup> In the case of aducanumab, incentives for increased prescribing would exacerbate the negative forecasted impacts on health system and patients across the nation.



**FIGURE 1** The distribution of payments from Biogen to U.S. physicians per speciality between 2015 and 2020. Geriatricians and geriatric psychiatrists represent a small subgroup within family medicine, psychiatry, and internal medicine.

## AUTHOR CONTRIBUTIONS

All authors were involved in the preparation of the manuscript and data interpretation. Drs. Lythgoe and Prasad were involved with conceptualization, drafting, and editing of the manuscript, along with supervision. Ms. Jenei had primary access to the data and takes responsibility for the analysis.

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## CONFLICT OF INTEREST

Dr Prasad reports (Research funding) Arnold Ventures (Royalties) Johns Hopkins Press, MedPage, YouTube, Substack (Consulting) Optum Health. (Other) Plenary Session podcast has Patreon (<https://www.patreon.com/plenarysession>) backers. Dr. Lythgoe has received advisory fees from Clovis Oncology outside the submitted work. Ms. Jenei reports no conflicts.

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The sponsor did not have a role in the manuscript.

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