

# INCIDENCE OF CUSHING'S DISEASE IN THE UNITED STATES

Broder M<sup>1</sup>, Neary MP<sup>2</sup>, Chang E<sup>1</sup>, Ludlam WH<sup>2</sup>, Cherepanov D<sup>1</sup>

<sup>1</sup> Partnership for Health Analytic Research, LLC, <sup>2</sup> Novartis Pharmaceuticals Corporation

## BACKGROUND

- Cushing's disease (CD) results from excessive glucocorticoid exposure from a pituitary tumor that secretes adrenocorticotropic hormone (ACTH).<sup>1</sup>
- Although recent US epidemiologic data are lacking for this rare disorder, reports of CD incidence were estimated to range from 1.2 to 2.4 per million population per year based on studies outside of the US.<sup>2,3</sup>

## OBJECTIVE

- To estimate the annual incidence of CD in a commercially-insured population in the US.

## METHODS

### Study Design and Data Source

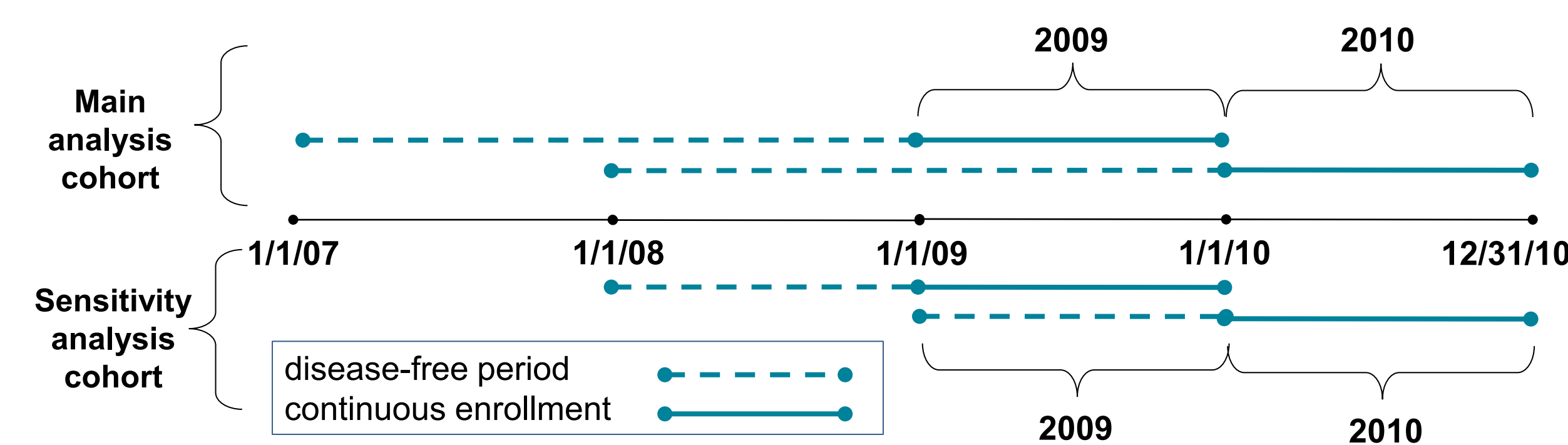
- This is a retrospective cohort study of CD patients (<65 years old) using data from 2007 to 2010 from a commercial HIPAA-compliant administrative claims database: Thomson Reuter MarketScan Commercial.

### Study Population and Study Timeframe

- Patients had a claim with diagnosis of Cushing's syndrome (ICD-9-CM: 255.0) and either benign pituitary adenomas (ICD-9-CM: 227.3) or hypophysectomy (ICD-9-CM: 07.6x; CPT: 61546, 61548, 62165) in the same calendar year, 2009 or 2010.

### Study Cohorts

- Main analysis cohort:** Patients were continuously enrolled in the measurement year (2009 or 2010), the 2 prior years, and had no evidence of CD in the **2 prior** years
- Sensitivity analysis cohort:** Patients were continuously enrolled in the measurement year (2009 or 2010), the prior year, and had no evidence of CD in the **1 prior** year.



### Study Measures

Incidence rates were calculated as follows:

- Main analysis:** (Number of patients in main analysis cohort) ÷ (Number continuously enrolled in that year and 2 years prior)
- Sensitivity analysis:** (Number of patients in sensitivity analysis cohort) ÷ (Number continuously enrolled in that year and year before)

### Analysis

- Analysis were performed using SAS® version 9.3 (SAS Institute, Cary, NC).

## RESULTS

### Main Analysis: Annual CD Incidence Rates

- Annual CD incidence rates were 7.6 per million person year (PMPY) in 2009 and 6.2 PMPY in 2010.
- The rates varied by age with lowest rates of 2.4 to 2.8 PMPY in ≤17 year olds and highest rates ranging from 9.4 to 17.7 PMPY in 18-24 year olds.
- The rates varied by sex from 2.3 to 2.7 PMPY in males and from 9.8 to 12.1 PMPY in females:
- In females, the lowest incidence rates ranged from 2.5 to 4.0 PMPY in ≤17 year olds and the highest from 16.7 to 27.2 PMPY in 18-24 year olds.

Main Analysis: Annual CD Incidence Rates PMPY <sup>a</sup>					
Gender	Age, years	2009		2010	
		Rate PMPY	No. of patients in cohort / No. of continuously enrolled	Rate PMPY	No. of patients in cohort / No. of continuously enrolled
Female	≤7	4.0	5 /1,250,367	2.5	4 /1,596,557
	18-24	27.2	10 /368,059	16.7	8 /480,273
	25-34	24.4	14 /572,713	11.8	9 /761,546
	35-44	12.4	12 /971,077	13.0	16 /1,228,675
	45-54	12.2	16 /1,316,216	14.2	23 /1,616,544
	55-64	9.8	11 /1,127,218	6.5	9 /1,392,433
<b>All</b>	<b>12.1</b>	<b>68 /5,605,650</b>	<b>9.8</b>	<b>69 /7,076,028</b>	
Male	≤17	0.8	1 /1,302,233	3.0	5 /1,670,918
	18-24	8.2	3 /365,929	2.1	1 /477,567
	25-34	2.1	1 /482,112	1.5	1 /645,526
	35-44	2.3	2 /851,493	2.8	3 /1,087,041
	45-54	2.6	3 /1,143,803	1.4	2 /1,409,559
	55-64	4.1	4 /983,451	2.4	3 /1,227,135
<b>All</b>	<b>2.7</b>	<b>14 /5,129,021</b>	<b>2.3</b>	<b>15 /6,517,746</b>	
<b>All</b>	≤17	2.4	6 /2,552,600	2.8	9 /3,267,475
	18-24	17.7	13 /733,988	9.4	9 /957,840
	25-34	14.2	15 /1,054,825	7.1	10 /1,407,072
	35-44	7.7	14 /1,822,570	8.2	19 /2,315,716
	45-54	7.7	19 /2,460,019	8.3	25 /3,026,103
	55-64	7.1	15 /2,110,669	4.6	12 /2,619,568
<b>All</b>	<b>7.6</b>	<b>82 /10,734,671</b>	<b>6.2</b>	<b>84 /13,593,774</b>	

<sup>a</sup> PMPY: Per Million Person Year

### Sensitivity Analysis: Annual CD Incidence Rates

- We performed sensitivity analysis using the sensitivity analysis cohort, and found annual incidence rates were 7.9 PMPY in 2009 and 6.3 PMPY in 2010.
- As in the main analysis, incidence rates were lowest in ≤17 year olds (ranging from 2.0 to 2.1 PMPY) and highest in 18-24 year olds (10.0 to 13.7 PMPY).
- Incidence rates were also lower in males (ranging from 2.0 to 3.4 PMPY) than in females (12.0 to 10.2 PMPY).
- In females, the lowest incidence rates ranged from 1.6 to 3.4 PMPY in ≤17 year olds and the highest rates ranged from 18.5 to 20.0 PMPY in 18-24 year olds.

Sensitivity Analysis: Annual CD Incidence Rates PMPY <sup>b</sup>					
Gender	Age, Years	2009		2010	
		Rate PMPY	No. of patients in cohort / No. of continuously enrolled	Rate PMPY	No. of patients in cohort / No. of continuously enrolled
Female	≤7	3.4	8 /2,347,239	1.6	4 /2,461,208
	18-24	20.0	14 /701,317	18.5	14 /755,674
	25-34	19.1	23 /1,202,121	12.5	16 /1,275,458
	35-44	15.5	27 /1,741,154	13.8	25 /1,816,083
	45-54	12.4	27 /2,169,445	14.5	33 /2,272,141
	55-64	11.6	20 /1,728,767	8.0	15 /1,866,492
<b>All</b>	<b>12.0</b>	<b>119 /9,890,043</b>	<b>10.2</b>	<b>107 /10,447,056</b>	
Male	≤17	0.8	2 /2,454,103	2.3	6 /2,575,186
	18-24	7.3	5 /683,763	1.4	1 /740,342
	25-34	1.0	1 /1,035,771	1.8	2 /1,091,478
	35-44	5.8	9 /1,559,445	1.9	3 /1,621,064
	45-54	3.7	7 /1,911,914	1.5	3 /1,989,130
	55-64	4.5	7 /1,549,127	2.4	4 /1,653,016
<b>All</b>	<b>3.4</b>	<b>31 /9,194,123</b>	<b>2.0</b>	<b>19 /9,670,216</b>	
<b>All</b>	≤17	2.1	10 /4,801,342	2.0	10 /5,036,394
	18-24	13.7	19 /1,385,080	10.0	15 /1,496,016
	25-34	10.7	24 /2,237,892	7.6	18 /2,366,936
	35-44	10.9	36 /3,300,599	8.1	28 /3,437,147
	45-54	8.3	34 /4,081,359	8.4	36 /4,261,271
	55-64	8.2	27 /3,277,894	5.4	19 /3,519,508
<b>All</b>	<b>7.9</b>	<b>150 /19,084,166</b>	<b>6.3</b>	<b>126 /20,117,272</b>	

<sup>b</sup> PMPY: Per Million Person Year

## LIMITATIONS

- CD does not have its own ICD-9-CM code, and therefore some cases may have been missed.
- This study is based on claims alone, without verification in medical charts, so cases may have been missed due to miscoding of ICD-9-CM codes.
- Results may not be representative of the general CD population since our analysis included only patients with commercial insurance.
- Since we only examined patients under age 65, our results are not representative of older patients.

## CONCLUSIONS

- The annual incidence of CD in US individuals <65 years old may be up to 8 cases per million, or approximately 2,000 new cases per year in the US, and may be higher in certain subgroups.
- Annual incidence of CD is highest among females and those >18 years old among commercially-insured patients <65 years old.
- Incidence may be as high as 27 PMPY in 18-24 year old females.
- All estimates of annual incidence of CD, including age and gender specific rates, were confirmed by sensitivity analysis.
- Our estimates are higher than previously reported rates of 1.2 to 2.4 per million population per year,<sup>2,3</sup> however, the prior rates were estimated using non-US data that is >10 years older than the US population data used in this study.

### References

- Newell-Price J, Bertagna X, Grossman AB, Nieman LK. Cushing's syndrome. *Lancet*. 2006 May 13;367(9522):1605-17. Review.
- Lindholm J et al. Incidence and late prognosis of Cushing's syndrome: a population-based study. *J Clin Endocrinol Metab*. 2001 Jan;86(1):117-23.
- Extabe J, Vazquez JA. Morbidity and mortality in Cushing's disease: an epidemiological approach. *Clin Endocrinol (Oxf)* 1994; 40: 479- 84.

URL: <http://novartis.medicalcongressposters.com/Default.aspx?doc=7a982>  
 Text Code: **Q7a982**To: 8NOVA (86682) US Only: +18324604729 North, Central and South Americas; Caribbean; China; +447860024038 UK, Europe & Russia; +46737494608 Sweden, Europe. Standard data or message rates may apply.

