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Novartis presents new data demonstrating long-term efficacy, safety and tolerability of Aimovig® (erenumab) in patients with chronic and episodic migraine

- *Results from a one-year study of efficacy and safety of Aimovig in chronic migraine and data from a three-year analysis assessing safety and tolerability of Aimovig in episodic migraine will be presented at AHS*
- *Aimovig showed robust efficacy in patients with chronic migraine, with substantial reductions in monthly migraine days sustained throughout the study*
- *Safety data in both studies were consistent with the placebo-like safety profile seen for Aimovig across the clinical trial program of 3,000 patients*
- *Aimovig is the first and only FDA-approved treatment designed specifically to prevent migraine; EMA approval is expected in the coming months*

Basel, June 28, 2018 – Novartis today announced the results of two open-label extension studies (OLE) of Aimovig® (erenumab) in patients with chronic and episodic migraine, which will be presented at the 60th Annual Scientific Meeting of the American Headache Society in San Francisco[1,2]. The data reinforce the established safety and efficacy profile of Aimovig in long-term use for patients with chronic migraine. In addition, data will be presented from the longest running study of a CGRP therapy, demonstrating the long-term safety and tolerability of Aimovig in episodic migraine. Aimovig is the first and only FDA-approved treatment specifically developed to prevent migraine by blocking the calcitonin gene-related peptide receptor (CGRP-R), which is believed to play a critical role in migraine.

In the study in chronic migraine patients (15 or more migraine days per month), the primary and secondary endpoints were long-term safety and efficacy, respectively[1]. The safety results after one year were consistent with the established safety profile of Aimovig in previous studies. The most frequent adverse events (AEs) were viral upper respiratory tract infection, upper respiratory tract infection, sinusitis, arthralgia, and migraine.

The efficacy data showed sustained benefits up to one year. Compared to a baseline of 18.1 average monthly migraine days, patients taking Aimovig 140mg and 70mg (based on last dose received) respectively achieved a:

- Substantial reduction of average monthly migraine days – 10.5 and 8.5 days
- 50% or more reduction in monthly migraine days - 67% and 53%
- 75% or more reduction in monthly migraine days - 42% and 27%
- Migraine-free status (100% reduction) - 13% and 6%

“These data showing sustained efficacy and consistent safety and tolerability of Aimovig over an extended period of time are important for migraine patients and their clinicians to know,” said Stewart J. Tepper, M.D., professor of neurology at the Geisel School of Medicine at Dartmouth Medical School. “Collectively these data reinforce the safety and tolerability of

Aimovig, and having a treatment specifically designed for migraine has the potential to truly improve the lives of those living with this neurological disease."

The results from a three-year interim data analysis of the five-year OLE study assessing safety in episodic migraine (four or more migraine days per month) showed Aimovig had a safety profile consistent with the spectrum and rate of AEs seen in shorter-term placebo-controlled studies. The most frequent AEs were viral upper respiratory tract infection, upper respiratory tract infection, sinusitis, influenza, and back pain and there were no new safety signals.

"Following FDA approval, with European approval anticipated in the coming months, we are very pleased to report positive long-term safety and efficacy results for Aimovig," said Danny Bar-Zohar, Global Head of Neuroscience Development at Novartis Pharmaceuticals. "For patients who have suffered from migraine for years, these new data further confirm that Aimovig may offer long-term sustained and safe relief from migraine and the heavy burden it imposes."

Aimovig was approved by the FDA on May 17, 2018. The Committee for Medicinal Products for Human Use (CHMP) of the European Medicines Agency (EMA) delivered a positive opinion for Aimovig for the prevention of migraine in adults on May 31, 2018. The European Commission will review the CHMP opinion before delivering its final decision.

Novartis and Amgen are co-commercializing Aimovig in the U.S, Amgen has exclusive commercialization rights to the drug in Japan and Novartis has exclusive rights to commercialize in the rest of the world.

About the Open-Label Extension Study in Chronic Migraine
After the 12-week, Phase II, double-blind placebo-controlled parent study, eligible patients could enroll in the OLE. 451 people completed the study receiving either Aimovig 70 mg, 140 mg or changing from 70 mg to 140 mg during the course of the study. Of the 609 patients who enrolled in the study, 199 increased their dose from 70 mg to 140 mg by week 28[1].

The primary outcome measure of the study was long-term safety. The secondary outcome measure was efficacy, as determined by four measures: change from baseline to week 52 in monthly migraine days (MMD), monthly acute migraine-specific medication days, monthly cumulative hours of headache, and proportion of patients achieving at least a 50% reduction in MMD.

The most frequent adverse events (greater than 2.0 per 100-subject-years) were viral upper respiratory tract infection, upper respiratory tract infection, sinusitis, arthralgia, and migraine. In the double-blind treatment phase, no differences were observed in the safety events between Aimovig and placebo.

About the Open-Label Extension Study in Episodic Migraine
Following a Phase II 12-week double-blind, placebo-controlled study of Aimovig in adults with episodic migraine, patients could enroll in the OLE, initially receiving 70 mg Aimovig monthly. A protocol amendment increased the dosage to 140 mg monthly to assess long-term safety of the higher dose. Safety and tolerability were assessed by monitoring AEs, electrocardiograms, laboratory assessments, and vital signs. Of the 383 patients who enrolled in the open-label extension, 235 patients (61.3 percent) remained in the OLE study at the data cutoff point for this interim analysis, all having received Aimovig for at least three years. The study is continuing for up to five years of treatment.

Data at approximately four and five years of treatment will be reported in the future.

About Aimovig® (erenumab)
Aimovig is the only FDA-approved treatment specifically developed to prevent migraine by blocking the calcitonin gene related peptide receptor (CGRP-R), which plays an important role in migraine. Aimovig has been studied in several large, global, randomized, double-blind, placebo-controlled studies to assess its safety and efficacy in migraine prevention. More than 3,000 patients have participated in our overall/ clinical trial program across the four placebo-controlled Phase II and Phase III clinical studies, their open-label extensions and further studies such as LIBERTY, a dedicated study in a difficult-to-treat treatment failure population.

About Migraine
Migraine is a distinct neurological disease[3]. It involves recurrent attacks of moderate to severe head pain that is typically pulsating, often unilateral and associated with nausea, vomiting and sensitivity to light, sound and odors[4]. Migraine is associated with personal pain, disability and reduced quality of life, and financial cost to society[5]. It has a profound and limiting impact on an individual's abilities to carry out everyday tasks and was reported by the World Health Organization to be one of the top 10 causes of years lived with disability for men and women[6]. It remains under-recognized and under-treated[5,7]. Existing preventive therapies have been repurposed from other indications and are often associated with poor tolerability and lack of efficacy, with high discontinuation rates among patients[8].

About Novartis and Amgen Neuroscience Collaboration
In August 2015, Novartis entered into a global collaboration with Amgen to develop and commercialize pioneering treatments in the field of migraine and Alzheimer's disease. The collaboration focuses on investigational Amgen drugs in the migraine field, including Aimovig (approved by the FDA in May 2018 for the preventive treatment of migraine in adults) and AMG 301 (currently in Phase II development). In April 2017, the collaboration was expanded to include co-commercialization of Aimovig in the U.S. For the migraine program, Amgen retains exclusive commercialization rights in Japan, and Novartis has exclusive commercialization rights in Europe, Canada and rest of world. Also, the companies are collaborating in the development and commercialization of a beta-secretase 1 (BACE) inhibitor program in Alzheimer’s disease. The oral therapy CNP520 (currently in Phase III for Alzheimer’s disease) is the lead molecule and further compounds from both companies' pre-clinical BACE inhibitor programs may be considered as follow-on molecules.

Novartis in Neuroscience
Novartis has a strong ongoing commitment to neuroscience and to bringing innovative treatments to patients suffering from neurological conditions where there is a high unmet need. We are committed to supporting patients and physicians in multiple disease areas, including Multiple Sclerosis (MS), Alzheimer's disease, Parkinson's disease, Epilepsy and Attention Deficit Hyperactivity Disorder, and have a promising pipeline in MS, Alzheimer's disease, migraine and specialty neurology (e.g., neuropathic pain).

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This press release contains forward-looking statements within the meaning of the United States Private Securities Litigation Reform Act of 1995. Forward-looking statements can generally be identified by words such as “potential,” “can,” “will,” “plan,” “expect,” “anticipate,” “look forward,” “believe,” “committed,” “investigational,” “pipeline,” “launch,” or similar terms, or by express or implied discussions regarding potential marketing approvals, new indications or labeling for Aimovig or the other investigational or approved products described in this press release, or regarding potential future revenues from such products or the collaboration with Amgen. You should not place undue reliance on these statements. Such forward-looking statements are based on our current beliefs and expectations regarding future events, and are subject to significant known and unknown risks and uncertainties. Should one or more of

these risks or uncertainties materialize, or should underlying assumptions prove incorrect, actual results may vary materially from those set forth in the forward-looking statements. There can be no guarantee that Aimovig or the other investigational or approved products described in this press release will be submitted or approved for sale or for any additional indications or labeling in any market, or at any particular time. Neither can there be any guarantee that the collaboration with Amgen will achieve any or all of its intended goals and objectives, or be commercially successful. Nor can there be any guarantee that Aimovig or the other investigational or approved products described in this press release will be commercially successful in the future. In particular, our expectations regarding such products, and the collaboration with Amgen, could be affected by, among other things, the uncertainties inherent in research and development, including clinical trial results and additional analysis of existing clinical data; regulatory actions or delays or government regulation generally; global trends toward health care cost containment, including government, payor and general public pricing and reimbursement pressures; our ability to obtain or maintain proprietary intellectual property protection; the particular prescribing preferences of physicians and patients; general political and economic conditions; safety, quality or manufacturing issues; potential or actual data security and data privacy breaches, or disruptions of our information technology systems, and other risks and factors referred to in Novartis AG's current Form 20-F on file with the US Securities and Exchange Commission. Novartis is providing the information in this press release as of this date and does not undertake any obligation to update any forward-looking statements contained in this press release as a result of new information, future events or otherwise.

About Novartis

Novartis provides innovative healthcare solutions that address the evolving needs of patients and societies. Headquartered in Basel, Switzerland, Novartis offers a diversified portfolio to best meet these needs: innovative medicines, cost-saving generic and biosimilar pharmaceuticals and eye care. Novartis has leading positions globally in each of these areas. In 2017, the Group achieved net sales of USD 49.1 billion, while R&D throughout the Group amounted to approximately USD 9.0 billion. Novartis Group companies employ approximately 124,000 full-time-equivalent associates. Novartis products are sold in approximately 155 countries around the world. For more information, please visit http://www.novartis.com.

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References

1. Tepper S, et al. Assessment of the Long-Term Safety and Efficacy of Erenumab During Open-Label Treatment of Subjects With Chronic Migraine. Data presented at 60th Annual Scientific Meeting of the American Headache Society, San Francisco, June 2018
2. Ashina M, et al. Long-term Safety and Tolerability of Erenumab: Three-plus Year Results from an Ongoing Open-Label Extension Study in Episodic Migraine. Data presented at 60th Annual Scientific Meeting of the American Headache Society, San Francisco, 30 June 2018
3. Migraine Research Foundation. Migraine Fact Sheet. 2015. http://www.migraineresearchfoundation.org/fact-sheet.html. Accessed May 2018
4. National Institute for Neurological Disorders and Stroke. https://www.ninds.nih.gov/Disorders/All-Disorders/Migraine-Information-Page (link is external). Accessed March 2018
5. World Health Organization. Headache disorders. http://www.who.int/mediacentre/factsheets/fs277/en/ (link is external). Accessed May 2018
6. Global Health Estimates 2015: Disease burden by Cause, Age, Sex, by Country and by Region, 2000-2015. Geneva, World Health Organization; 2016.
7. Diamond S et al. Patterns of Diagnosis and Acute and Preventive Treatment for Migraine in the United States: Results from the American Migraine Prevalence and Prevention Study. Headache. 2007;47(3):355-63.

8. Blumenfeld AM et al. Patterns of use and reasons for discontinuation of prophylactic medications for episodic migraine and chronic migraine: results from the second international burden of migraine study (IBMS-II). Headache. 2013 Apr;53(4):644-55.

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