

New Novartis Phase III data for Brolucizumab Demonstrate Reliability of 12-week Treatment Interval

Basel, April 30, 2018 – Novartis announced new positive brolucizumab (RTH258) data in neovascular age-related macular degeneration (nAMD) from a pre-specified secondary analysis of the Phase III HAWK and HARRIER trials. The findings showed that patients assessed as appropriate for a 12-week treatment frequency during the first 12-week cycle after loading could reliably stay on that quarterly interval through week 48. This is the first time a high level of reliability has been prospectively demonstrated for a pre-specified secondary endpoint of a 12-week dosing interval with an anti-vascular endothelial growth factor (VEGF) therapy in Phase III trials. These additional data were presented at the Association for Research in Vision and Ophthalmology (ARVO) 2018 Annual Meeting, in a follow-up to data presented in November 2017 at the American Academy of Ophthalmology.

The new findings showed that brolucizumab 6 mg patients who were suitable for 12-week treatment intervals during the first 12-week cycle after the loading phase had an 87% (HAWK) and 83% (HARRIER) probability of remaining on this quarterly treatment interval through week 48. The ability to reliably assess the likelihood of patients remaining on quarterly dosing could help physicians and patients better manage, personalize and optimize treatment plans.

“The ability to quickly identify patients who can maintain a 12-week interval has the potential to simplify treatment plans for nAMD patients,” said Glenn J. Jaffe, M.D., Chief of Retinal Ophthalmology, Duke University, and an author of the

presentation. “These robust data may offer physicians confidence that when 12-week dosing with brolocizumab is initially successful, there is high probability that the patient will maintain this interval through the first year of treatment.”

“HAWK and HARRIER previously demonstrated non-inferiority in the primary endpoint of visual acuity and superiority in several secondary endpoints assessing key anatomical outcomes versus aflibercept, with a majority of brolocizumab patients maintained on an every-12-week dosing interval following the loading phase through week 48[1],” said Dirk Sauer, Development Unit Head, Novartis Ophthalmology. “Here we show that success early on with brolocizumab appears strongly predictive of the ability of these patients to successfully maintain this 12-week treatment interval[2] through week 48. We look forward to continuing to advance brolocizumab through regulatory approvals as a welcome new option for treatment of nAMD, which is a leading cause of blindness.”

Brolocizumab safety was comparable to aflibercept with the overall incidence of adverse events balanced across all treatment groups in both studies[3]. The most frequent ocular adverse events (greater than 5% of patients in any treatment arm) were reduced visual acuity, conjunctival hemorrhage, vitreous floaters and eye pain[4]. The most frequent non-ocular adverse events were typical of those reported in an nAMD population; there were no notable differences between arms[4].

About Brolocizumab (RTH258)

Brolocizumab (RTH258) is a humanized single-chain antibody fragment (scFv) and the most clinically advanced, humanized single-chain antibody fragment to reach this stage of development. Single-chain antibody fragments are highly sought after in drug development due to their small size, enhanced

tissue penetration, rapid clearance from systemic circulation and drug delivery characteristics[1],[5],[6].

The proprietary innovative structure results in a small molecule (26 kDa) with potent inhibition of, and high affinity to, all VEGF-A isoforms[1],[7]. In preclinical studies, brolocizumab inhibited activation of VEGF receptors through prevention of the ligand-receptor interaction[1],[5],[6],[7]. Increased signaling through the VEGF pathway is associated with pathologic ocular angiogenesis and retinal edema[8]. Inhibition of the VEGF pathway has been shown to inhibit the growth of neovascular lesions, resolve retinal edema and improve vision in patients with chorioretinal vascular diseases[9].

About HAWK and HARRIER study design

With more than 1,800 patients across 400 centers worldwide, HAWK (NCT02307682) and HARRIER (NCT02434328) are the first and only global head-to-head trials in patients with nAMD that prospectively demonstrated efficacy at week 48 using an innovative q12w/q8w regimen, with a majority of patients on q12w immediately following the loading phase[10]. Both studies are 96-week prospective, randomized, double-masked multi-center studies and part of the Phase III clinical development of brolocizumab[10],[11].

The studies were designed to compare the efficacy and safety of intravitreal injections of brolocizumab 6 mg and 3 mg (HAWK only) versus aflibercept 2 mg in patients with nAMD[10],[11]. In both trials, patients were randomized to either brolocizumab or aflibercept. Immediately following the 3-month loading phase, patients in the brolocizumab arms received a q12w dosing interval with an option to adjust to a q8w dosing interval based on masked disease activity assessments at defined visits. Aflibercept was dosed bi-monthly according to its label[10],[11].

Brolucizumab met the primary efficacy objective of non-inferiority versus aflibercept in mean change in best-corrected visual acuity (BCVA) from baseline to week 48 with high statistical significance[2]. Additionally, brolucizumab demonstrated superiority in three secondary endpoints considered key markers of nAMD: central subfield retinal thickness, retinal fluid (intraretinal fluid and/or subretinal fluid) and disease activity[3]. These results were achieved while a majority of brolucizumab patients-57% in HAWK and 52% in HARRIER-were maintained on a q12w dosing interval immediately following the loading phase through week 48[3].

About neovascular age-related macular degeneration (nAMD or wet AMD)

nAMD is the leading cause of severe vision loss and legal blindness in people over the age of 65 in North America, Europe, Australia and Asia, impacting an estimated 20 to 25 million people worldwide[12],[13]. nAMD occurs when abnormal blood vessels form underneath the macula, the area of the retina responsible for sharp, central vision. These blood vessels are fragile and leak fluid, disrupting the normal retinal architecture and ultimately causing damage[14],[15],[16].

Early symptoms of nAMD include distorted vision or metamorphopsia and difficulties seeing objects clearly[17]. Prompt diagnosis and intervention are essential. As the disease progresses, cell damage increases, further reducing vision quality. This progression can lead to a complete loss of central vision, leaving the patient unable to read, drive or recognize familiar faces[14]. Without treatment, vision can rapidly deteriorate[18].

About Novartis in Ophthalmology

Novartis is a leading ophthalmology company, with therapies that treat both front and back of the eye disorders, including retina diseases, glaucoma, dry eye and other external eye diseases. In 2016, approximately 200 million patients worldwide were treated with Novartis ophthalmic products.

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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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