Novartis SEG101 (crizanlizumab, formerly SelG1) significantly reduces frequency of sickle cell pain crises in Phase II study

- **SEG101 reduced annual rate of sickle cell-related pain crises (SCPC) by 45.3% compared to placebo in patients with or without hydroxyurea therapy**

- **SEG101 is a potential new disease-modifying, preventive treatment option for patients with SCPC; first in nearly 20 years**

- **Data being highlighted in ASH 2016 media briefing, presented at Plenary Scientific Session and published simultaneously in The New England Journal of Medicine**

**Basel, December 3, 2016** – Results from the Phase II SUSTAIN study show that SEG101 (crizanlizumab, formerly SelG1), an anti-P-selectin antibody, reduced the median annual rate of sickle cell-related pain crises (SCPC) by 45.3% compared to placebo (1.63 vs 2.98, p=0.010) in patients with or without hydroxyurea therapy. Novartis today announced that the data are being featured in the official press briefing at the 58th American Society of Hematology (ASH) Annual Meeting and presented during the Plenary Scientific Session tomorrow (Abstract #1, 2:00 - 4:00 p.m. PST). The results also are being published simultaneously in The New England Journal of Medicine.

“Acute painful episodes, commonly referred to as vaso-occlusive crises, are a substantial cause of morbidity in sickle cell disease with limited treatment options,” said Kenneth I. Ataga, M.D., Division of Hematology/Oncology, University of North Carolina, Chapel Hill. “These findings show that crizanlizumab significantly reduces the frequency of painful crises and represents a potentially novel disease-modifying therapeutic option.”

In the SUSTAIN study, patients were assigned to high-dose (5.0 mg/kg), low-dose (2.5 mg/kg) and placebo arms. The study met its primary endpoint, reduction of the annual rate of SCPC in the high-dose arm by 45.3% vs. placebo (medians of 1.63 vs. 2.98, p=0.010). In the low-dose arm, the annual rate of SCPC was reduced by 32.6% vs. placebo (medians of 2.01 vs. 3.0, p = 0.180). For patients in the high dose arm, time to first SCPC vs. placebo was 2.9 times longer (medians of 4.07 vs. 1.38 months, p = 0.001) and time to second SCPC was 2.0 times longer than placebo (medians of 10.32 vs. 5.09 months, p = 0.022).

“Patients have long been in need of a new therapy for treatment of SCPC, the most common and debilitating complication of sickle cell disease,” said Bruno Strigini, CEO of Novartis Oncology. “We are pleased that data from the SUSTAIN study show SEG101 may have the potential to become the first new option for patients dealing with SCPC since hydroxyurea was approved for use in sickle cell anemia about 20 years ago.”

Despite its availability, hydroxyurea often is not utilized primarily due to concerns about patient compliance and potential adverse events.
About the SUSTAIN trial
The SUSTAIN trial was a multicenter, multinational, randomized, placebo-controlled, double-blind, 12-month study to assess safety and efficacy of the anti-P-selectin antibody SEG101 with or without hydroxyurea therapy in sickle cell disease patients with sickle cell-related pain crises. Patients included in the study had a history of 2 to 10 pain crises in the previous 12 months. Patients receiving hydroxyurea or erythropoietin were included if prescribed for the preceding 6 months and dose was stable for at least 3 months. The trial randomized 198 patients age 16 to 65 to receive high dose SEG101, low dose SEG101 or placebo.

Adverse events that occurred in 5% or more of patients in an active dose group and were elevated over placebo by at least 2-fold were arthralgia, pruritus, vomiting, chest pain, diarrhea, road traffic accident, fatigue, myalgia, musculoskeletal chest pain, abdominal pain, influenza and oropharyngeal pain. There were no apparent increases in infections with SeG101 treatment. Five deaths occurred during the study, 2 at 5.0 mg/kg, 1 at 2.5 mg/kg and 2 in placebo; no deaths were deemed related to the study drug.

About SEG101 (crizanlizumab)
SEG101 (crizanlizumab, formerly SelG1) is a humanized anti-P-selectin monoclonal antibody that binds a molecule called P-selectin on the surface of endothelial cells and platelets in the blood vessels, causing a blockade of P-selectin. P-selectin drives the vaso-occlusive process. Vaso-occlusive crises, also known as SCPC, occur episodically when sickle-shaped red blood cells block blood flow through blood vessels. The therapeutic blockade of P-selectin can prevent painful vaso-occlusion in small blood vessels and maintain blood flow.

Disclaimer
The foregoing release contains forward-looking statements that can be identified by words such as "potential," "potentially," "may," or similar terms, or by express or implied discussions regarding potential marketing approvals for SEG101, or regarding potential future revenues from SEG101. You should not place undue reliance on these statements. Such forward-looking statements are based on the current beliefs and expectations of management 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 SEG101 will be submitted or approved for sale in any market, or at any particular time. Nor can there be any guarantee that SEG101 will be commercially successful in the future. In particular, management’s expectations regarding SEG101 could be affected by, among other things, the uncertainties inherent in research and development, including unexpected clinical trial results and additional analysis of existing clinical data; unexpected regulatory actions or delays or government regulation generally; the company's ability to obtain or maintain proprietary intellectual property protection; general economic and industry conditions; competition in general; global trends toward health care cost containment, including ongoing pricing pressures; unexpected manufacturing, safety or quality issues, 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, eye care and cost-saving generic pharmaceuticals. Novartis is the only global company with leading positions in these areas. In 2015, the Group achieved net sales of USD 49.4 billion, while R&D throughout the Group...
amounted to approximately USD 8.9 billion (USD 8.7 billion excluding impairment and amortization charges). Novartis Group companies employ approximately 118,000 full-time-equivalent associates. Novartis products are available in more than 180 countries around the world. For more information, please visit http://www.novartis.com.

Novartis is on Twitter. Sign up to follow @Novartis at http://twitter.com/novartis and @NovartisCancer at http://twitter.com/novartiscancer
For Novartis multimedia content, please visit www.novartis.com/news/media-library
For questions about the site or required registration, please contact media.relations@novartis.com

References

Novartis Media Relations
Central media line: +41 61 324 2200
E-mail: media.relations@novartis.com

Eric Althoff
Novartis Global Media Relations
+41 61 324 7999 (direct)
+41 79 593 4202 (mobile)
eric.althoff@novartis.com

Jeannie Neufeld
Novartis Oncology Communications
+1 862 778 2104 (direct)
+1 201 650 2728 (mobile)
jeannie.neufeld@novartis.com

Novartis Investor Relations
Central investor relations line: +41 61 324 7944
E-mail: investor.relations@novartis.com

Central
Samir Shah +41 61 324 7944
Pierre-Michel Bringer +41 61 324 1065
Thomas Hungerbuehler +41 61 324 8425
Isabella Zinck +41 61 324 7188

North America
Richard Pulik +1 212 830 2448
Sloan Pavsner +1 212 830 2417