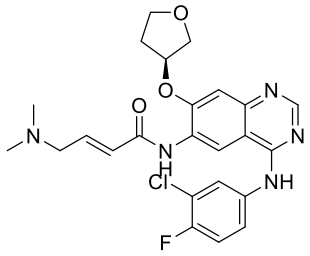
Product data sheet

MedKoo Cat#: 200500 Name: Afatinib free base CAS#: 850140-72-6 (free base) Chemical Formula: $C_{24}H_{25}ClFN_5O_3$ Exact Mass: 485.163 Molecular Weight: 485.94	
Product supplied as:	Powder
Purity (by HPLC):	≥ 98%
Shipping conditions	Ambient temperature
Storage conditions:	Powder: -20°C 3 years; 4°C 2 years.
	In solvent: -80°C 3 months; -20°C 2 weeks.

1. Product description:

Afatinib, also know as BIBW 2992, is an orally bioavailable dual receptor tyrosine kinase (RTK) inhibitor with potential antineoplastic activity. EGFR/HER2 tyrosine kinase inhibitor BIBW 2992 irreversibly binds to and inhibits human epidermal growth factor receptors 1 and 2 (EGFR-1; HER2), which may result in the inhibition of tumor growth and angiogenesis. EGFR/HER2 are RTKs that belong to the EGFR superfamily; both play major roles in tumor cell proliferation and tumor vascularization and are overexpressed in many cancer cell types. Afatinib is approved in much of the world (including the United States, Canada, the United Kingdom and Australia) for the treatment of metastatic non-small cell lung carcinoma (NSCLC), developed by Boehringer Ingelheim. It acts as an angiokinase inhibitor.

2. CoA, QC data, SDS, and handling instruction

SDS and handling instruction, CoA with copies of QC data (NMR, HPLC and MS analytical spectra) can be downloaded from the product web page under "QC And Documents" section. Note: copies of analytical spectra may not be available if the product is being supplied by MedKoo partners. Whether the product was made by MedKoo or provided by its partners, the quality is 100% guaranteed.

3. Solubility data

Solvent	Max Conc. mg/mL	Max Conc. mM
DMSO	98.5	202.70
Ethanol	97.0	199.61

4. Stock solution preparation table:

Concentration / Solvent Volume / Mass	1 mg	5 mg	10 mg
1 mM	2.06 mL	10.29 mL	20.58 mL
5 mM	0.41 mL	2.06 mL	4.12 mL
10 mM	0.21 mL	1.03 mL	2.06 mL
50 mM	0.04 mL	0.21 mL	0.41 mL

5. Molarity Calculator, Reconstitution Calculator, Dilution Calculator

Please refer the product web page under section of "Calculator"

6. Recommended literature which reported protocols for in vitro and in vivo study

In vitro study

1. Chen Y, Chen X, Ding X, Wang Y. Afatinib, an EGFR inhibitor, decreases EMT and tumorigenesis of Huh-7 cells by regulating the ERK-VEGF/MMP9 signaling pathway. Mol Med Rep. 2019 Oct;20(4):3317-3325. doi: 10.3892/mmr.2019.10562. Epub 2019 Aug 6. PMID: 31432165; PMCID: PMC6755195.
2. Chen YJ, Hsu CC, Shiao YJ, Wang HT, Lo YL, Lin AMY. Anti-inflammatory effect of afatinib (an EGFR-TKI) on OGD-induced neuroinflammation. Sci Rep. 2019 Feb 21;9(1):2516. doi: 10.1038/s41598-019-38676-7. Erratum in: Sci Rep. 2021 Jan 25;11(1):2693. PMID: 30792526; PMCID: PMC6385176.

In vivo study

1. Liu Z, Chen Z, Wang J, Zhang M, Li Z, Wang S, Dong B, Zhang C, Gao J, Shen L. Mouse avatar models of esophageal squamous cell carcinoma proved the potential for EGFR-TKI afatinib and uncovered Src family kinases involved in acquired resistance. J Hematol Oncol. 2018 Aug 29;11(1):109. doi: 10.1186/s13045-018-0651-z. PMID: 30157900; PMCID: PMC6114252.

2. Moll HP, Pranz K, Musteanu M, Grabner B, Hruschka N, Mohrherr J, Aigner P, Stiedl P, Brcic L, Laszlo V, Schramek D, Moriggl R, Eferl R, Moldvay J, Dezso K, Lopez-Casas PP, Stoiber D, Hidalgo M, Penninger J, Sibilia M, Győrffy B, Barbacid M, Dome B, Popper H, Casanova E. Afatinib restrains K-RAS-driven lung tumorigenesis. Sci Transl Med. 2018 Jun 20;10(446):eaao2301. doi: 10.1126/scitranslmed.aao2301. PMID: 29925635; PMCID: PMC7610658.

7. Bioactivity

Biological target:

Afatinib (BIBW 2992) is an irreversible EGFR family inhibitor with IC_{50}s of 0.5 nM, 0.4 nM, 10 nM and 14 nM for $EGFR^{wt}$, $EGFR^{L858R}$, $EGFR^{L858R/T790M}$ and HER2, respectively.

In vitro activity

To investigate the molecular mechanisms underlying afatinib function, the activity of ERK and the expression levels of VEGF and MMP9 were investigated following treatment with afatinib. RT-qPCR and western blot analysis results suggested that the expression levels of VEGF and MMP9 were decreased by afatinib through EGFR inhibition (Fig. 4A and B). Moreover, the phosphorylation level of ERK was significantly decreased after treatment with afatinib through EGFR inhibition, and the ratio of p-ERK/ERK was significantly decreased after treatment with afatinib through EGFR inhibition (Fig. 4C and D). The present results suggested that afatinib decreased the activity of the ERK-VEGF/MMP9 signaling pathway in vitro.

Reference: Mol Med Rep. 2019 Oct; 20(4): 3317–3325. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6755195/

In vivo activity

When this study analyzed the lungs of these mice, this study noticed significantly reduced tumor burden and number in lungs of afatinib treated mice as compared to vehicle treated mice (Fig. S7A and S7B). In accordance to reduced tumor area this study also detected reduced oncogenic K-ras G12D levels in total lung lysates of the afatinib treated group, which reflects the decreased amount of tumor cells in the lungs (Fig. S7C).

Reference: Sci Transl Med. 2018 Jun 20; 10(446): eaao2301. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7610658/

Note: The information listed here was extracted from literature. MedKoo has not independently retested and confirmed the accuracy of these methods. Customer should use it just for a reference only.