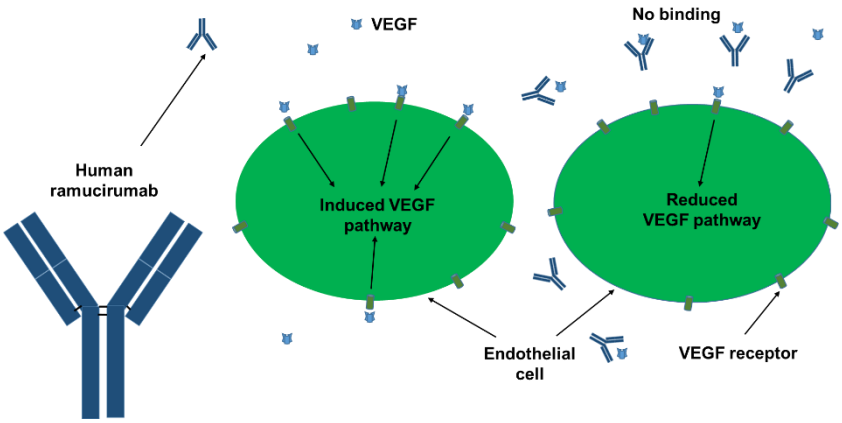
Ramucirumab – Fact Sheet

Molecule

Ramucirumab (Cyramza®), isolated from a native phage display library, is a fully human monoclonal IgG1 / kappa antibody composed of two heavy chain (γ1-chain) molecules consisting of 446 amino acid residues each and two light chain (κ-chain) molecules consisting of 214 amino acid residues each (combined molecular weight of 143.6 kDa).

Mode of Action

Similar to bevacizumab, ramucirumab inhibits angiogenesis (formation of new blood vessels) by binding to a specific epitope on the extracellular domain of vascular endothelial growth factor receptor -2 (VEGFR-2) and blocking the interaction of VEGF-A, VEGF-C, or VEGF-D with its receptors. Ramucirumab can therefore slow the growth of new blood vessels in tumors.



Indication

Cyramza® is indicated for gastric cancer, gastro - oesophageal junction adeno- carcinoma, metastatic colorectal cancer, non-small cell lung cancer that has spread to other parts of the body or in patients whose cancer involves mutations in EGFRs, and hepatocellular carcinoma in patients with a high blood level of alpha fetoprotein.

Patent Situation

Cyramza® patents will expire in the US in November 2025 and in the EU in May 2023.

Market and Competitive Field

The originator product Cyramza® was developed by ImClone Systems and is now owned by Eli Lilly. It was approved for its first indication by FDA and EMA in 2014. In 2019, Cyramza® had sales of 849 million €, an increase of 13 percent as compared with full year 2018. Biosimilar developments are currently at an early stage.

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VelaLabs Portfolio

		Ramucirumab
		Cyramza®
	Clone selection/ comparability	
HPLC	Separation based on **size** (SE-HPLC)	
HPLC	Separation based on **hydrophobicity** (RP-HPLC)	
HPLC	Detection of **charge variants** (CEX-HPLC)	
Binding	Binding to **cell surface** expressed target (Flow cytometry)	n.a
Binding	Binding to **soluble target** (ELISA)	
Binding	Binding to specific **antibody or antigen** (SPR-BIACORE, ELISA)	
Binding	**Affinity/ kinetic** to recombinant target (SPR-BIACORE)	
Effector function	Binding to C1q, [1]**CDC surrogate** (ELISA)	
Effector function	**Affinity** to recombinant Fc-receptors (SPR-BIACORE)	
Effector function	Reporter gene assays, [2]**ADCC surrogate** (Luminescence)	n.a.
Effector function	[1]**CDC** (Flow cytometry)	n.a.
Effector function	[2]**ADCC** (DELFIA, Fluorescence)	n.a.
Effector function	Additional **bioassays** (Luminescence, fluorescence)	Anti-proliferation
Gly	Glyco-pattern with **Lectin Microarray** (45 different lectins)	
	(Pre)clinical application	
Clinics	Pharmacokinetics – **PK** (ECL, ELISA)	
Clinics	Pharmacodynamics – **PD** (ECL, ELISA, flow cytometry, bioassay)	
Clinics	Immunogenicity - [3]**ADAs** (ECL, Biacore, ELISA, neutr. assay)	

[1]CDC = Complement Dependent Cytotoxicity
[2]ADCC = Antibody Dependent Cellular Cytotoxicity
[3]ADA = Anti-Drug Antibody

	Vela portfolio
	n.a. = not applicable

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