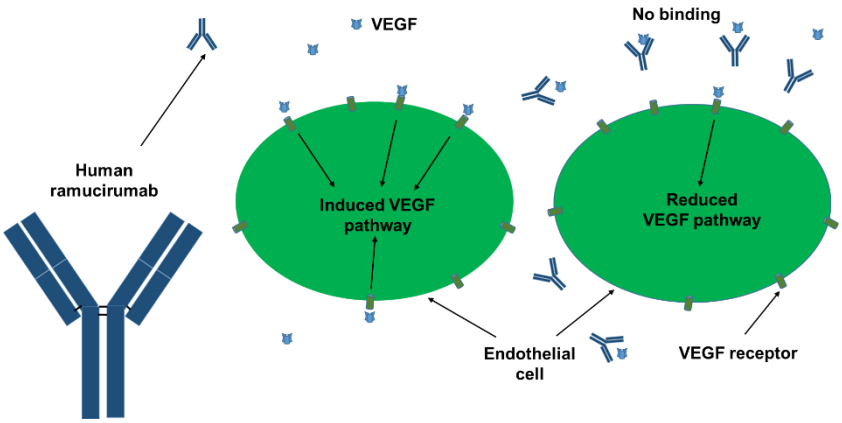
# Ramucirumab – Fact Sheet

## Molecule

Ramucirumab (Cyramza®), originally 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 2021, Cyramza® had sales of 0.96 billion € similar to 2020. 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 |

If you are interested in the full version including patent and originator data please contact us: velabd@vela-labs.at

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