

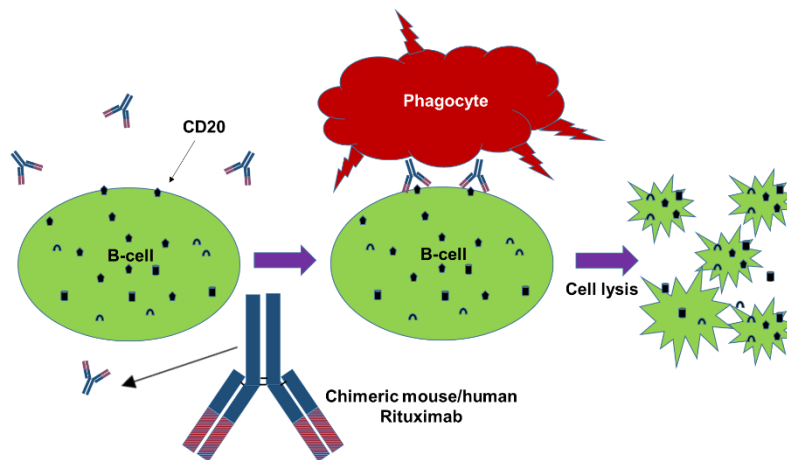
Rituximab – Fact Sheet

Molecule

Rituximab (Rituxan®, MabThera®) is a chimeric IgG1/kappa monoclonal antibody targeting CD20, which is primarily detected on the surface of B-cells.

Mode of Action

Rituximab binds to amino acids 170-173 and 182-185 on CD20 protein. CD20 is widely expressed on B-cells, from early pre B-cells to later in differentiation, but it is absent on terminally differentiated plasma cells. CD20 may play a role in Ca^{2+} influx across plasma membranes, maintaining intracellular Ca^{2+} concentration and activation of B-cells. Rituximab destroys both normal and malignant B-cells that have CD20 on their surfaces, and is therefore used to treat diseases, which are characterized by having too many overactive or dysfunctional B-cells.



Indication

Rituxan® is applied for treatment of many lymphomas and leukemias, transplant rejection and some autoimmune disorders. Rituximab is also used off-label to treat difficult cases of Multiple Sclerosis, Systemic Lupus Erythematosus and autoimmune anemias.

Patent Situation

Rituxan® patents expired in 2013 in EU and in 2016 in US. Several biosimilars are already marketed without triggering any patent litigation.

Market and Competitive Field

Roche's Rituxan®, the originator product, was approved by FDA in November 1997 and MabThera® by EMA in June 1998. Rituxan® had sales of 6.07 billion € in 2018. In respect of the blockbuster sales, many companies are developing or marketing biosimilars of the drug, e.g. Celltrion, Hospira, Amgen, Pfizer, Sandoz. Rixathon® and Truxima® are already approved.

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

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

	VelaLabs portfolio
	n.a. = not applicable