

# Therapeutic drug monitoring (TDM)

- ELISAs and rapid assays
- Quantification of drug concentrations and anti-drug antibodies
- Validated by KU Leuven, Belgium
- Ready to use reagents
- Validated on automated ELISA systems



## Therapeutic monoclonal antibodies

Therapeutic monoclonal antibodies, such as infliximab, adalimumab, golimumab and vedolizumab are biologic agents used for the treatment of inflammatory diseases such as

Crohn's disease and ulcerative colitis. **Infliximab** (IFX), **adalimumab** (ADM) and **golimumab** (GLM) belong to the group of TNF $\alpha$  blockers. **Vedolizumab** (VDZ) instead is an  $\alpha 4\beta 7$ -integrin antagonist.

## How do therapeutic monoclonal antibodies work?

### TNF $\alpha$ blockers

In healthy individuals, TNF $\alpha$  plays an essential role in the regulation of inflammation via binding to specific receptors.

In patients with Crohn's disease and ulcerative colitis, the immune cells are continuously triggered to produce TNF $\alpha$ , so that the inflammation does not cease and becomes chronic.

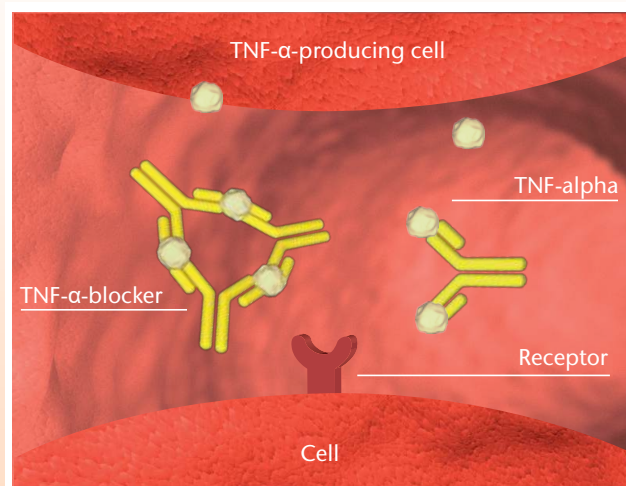
TNF $\alpha$  blockers bind to TNF $\alpha$  (see Figure 1), hereby blocking the pro-inflammatory signaling pathway that inflicts damage to the gut tissue.

As a result, gut inflammation and symptoms in patients with inflammatory bowel diseases resolve.

### $\alpha 4\beta 7$ -integrin antagonists

The  $\alpha 4\beta 7$ -integrin antagonist vedolizumab is a gut-specific, humanized monoclonal antibody targeting the  $\alpha 4\beta 7$ -integrin protein. This protein is involved in the migration of lymphocytes to the gut.

By binding to the  $\alpha 4\beta 7$ -integrin the lymphocytes are prevented from migrating into the gut lumen so that they cannot exert their pro-inflammatory effect.



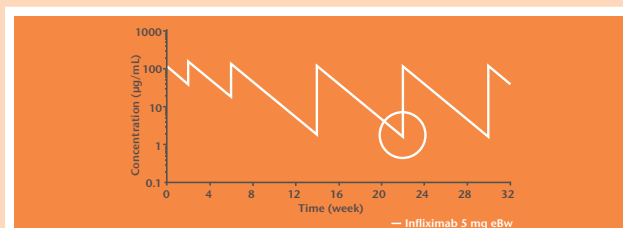
**Figure 1:** Example of the function of TNF $\alpha$  blockers. TNF $\alpha$  blockers scavenge TNF $\alpha$ , which as a result, can no longer bind to the receptor. The pathway leading to disease is interrupted, because the receptor is not activated anymore. Therefore, no pro-inflammatory signal is transmitted.

## Individual dose adjustment by measuring drug levels and immunogenicity

In order for biological drugs to work optimally, the drug concentration needs to be sufficiently high. Therefore, regular drug concentration monitoring is advised. The trough concentration (TC) is defined as the drug concentration in the blood measured right before the next infusion (see Figure 2).

**Immunogenicity** may have an impact on the efficacy of the drug. Anti-drug antibodies (ADA) may bind to the drug and lead to a decrease in drug availability and allergy-like reactions.

**Monitoring of drug- and anti-drug-antibody-concentrations of biologic agents helps to optimally adjust the therapy to the individual needs of the patient.**



**Figure 2:** Pharmacokinetic profile of IFX. The white circle marks an example of a trough concentration. (Adapted from Tracey D. et al., Pharm & Ther 2008)

## TDM using RIDASCREEN® and RIDA®QUICK assays

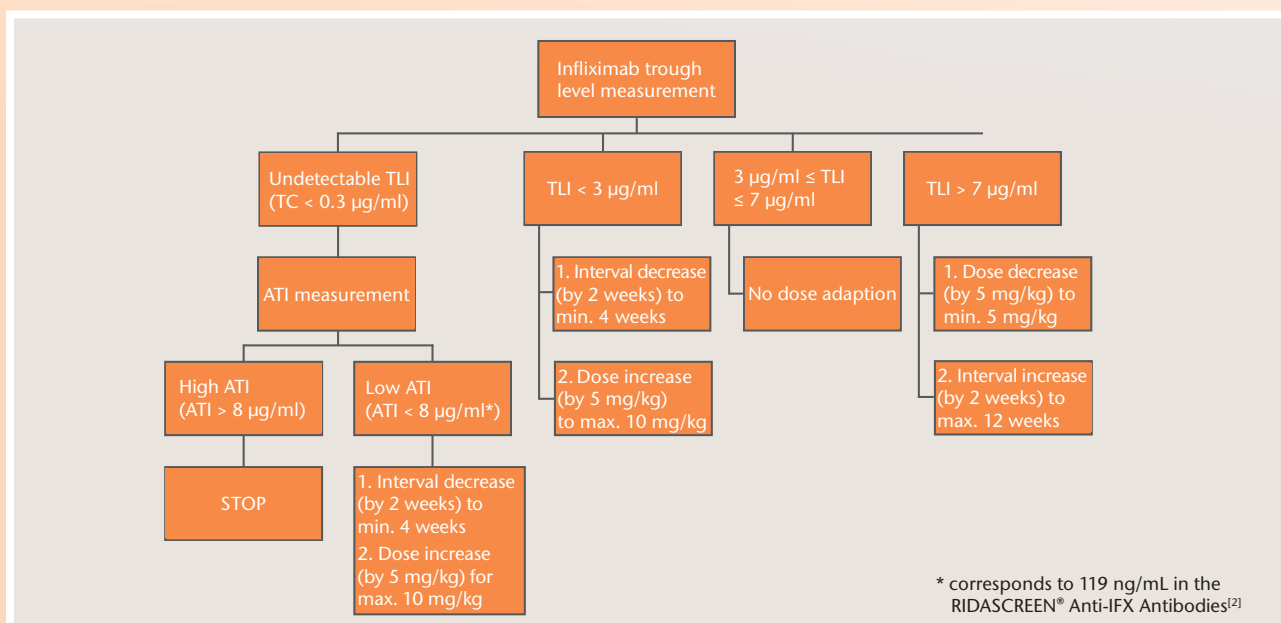
### Key features of R-Biopharm's TDM assays

- All TDM assays of R-Biopharm AG are validated by KU Leuven, Belgium
- ELISAs and the corresponding rapid assays correlate very well due to identical monoclonal antibodies
- RIDASCREEN® IFX Monitoring and RIDA®QUICK IFX Monitoring quantify infliximab and its biosimilars. RIDASCREEN® ADM Monitoring and RIDA®QUICK ADM Monitoring quantify adalimumab
- The rapid assays RIDA®QUICK IFX Monitoring and RIDA®QUICK ADM Monitoring allow the determination of trough level concentrations of infliximab and its biosimilars and adalimumab, respectively within 20 minutes
- All ELISAs are validated on automated ELISA readers such as DSX® and have breakable microwell plates

## Therapy adjustment based on therapeutic drug monitoring

The TAXIT-Algorithm (TAXIT = Trough Concentration Adapted Infliximab Treatment, Figure 3) is a recommendation for therapy adaptation based on the results of trough- and anti-drug-antibody-concentrations of infliximab. It is a result of the study<sup>[1]</sup> by *Niels Vande Castele et al.* (KU Leuven, Belgium) which investigated the effect of drug monitoring on the outcome of TNF $\alpha$ -treatment. The study

shows the positive effect of TDM for **therapy optimization** and **treatment cost reduction**. Moreover, it indicates that testing for anti-drug-antibodies is useful in patients with undetectable trough concentrations of infliximab (see Figure 3). RIDASCREEN® IFX Monitoring and RIDASCREEN® Anti-IFX Antibodies are based on the assays used in this study.



**Figure 3:** TAXIT-Algorithm based on TLI and ATI (*Niels Vande Castele et al.* 2015)  
TLI = Trough Level Infiximab, ATI = Antibodies Towards Infiximab

### Referenzen:

<sup>[1]</sup> *Vande Castele N et al.* Trough concentrations of infliximab guide dosing for patients with inflammatory bowel disease. *Gastroenterology* 2015;148:1320-1329.e3

<sup>[2]</sup> *Imbrechts M et al.* Anti-infliximab antibodies: How to compare old and new data? *J Pharm Biomed Anal* 2020;177:112842



## R-Biopharm therapeutic drug monitoring (TDM) at a glance

Product	Description	Tests	Matrix	Art. No.
<b>Enzyme immunoassays and lateral flow assay</b>				
RIDASCREEN® IFX Monitoring	Enzyme immunoassay for the quantitative determination of infliximab (IFX) and its biosimilars	96	Serum/ plasma	G09041
RIDASCREEN® Anti-IFX Antibodies	Enzyme immunoassay for the quantitative determination of antibodies to infliximab (IFX) and its biosimilars	96	Serum/ plasma	G09042
RIDASCREEN® ADM Monitoring	Enzyme immunoassay for the quantitative determination of adalimumab (ADM)	96	Serum/ plasma	G09043
RIDASCREEN® Anti-ADM Antibodies	Enzyme immunoassay for the quantitative determination of antibodies to adalimumab (ADM)	96	Serum/ plasma	G09044
RIDASCREEN® VDZ Monitoring	Enzyme immunoassay for the quantitative determination of vedolizumab (VDZ)	96	Serum/ plasma	G09045
<b>New</b> RIDASCREEN® GLM Monitoring	Enzyme immunoassay for the quantitative determination of golimumab (GLM)	96	Serum/ plasma	G09047
RIDA®QUICK IFX Monitoring	Immunochromatographic lateral flow assay for the quantitative determination of infliximab (IFX) and its biosimilars	25	Serum/ plasma	GN3041
RIDA®QUICK ADM Monitoring	Immunochromatographic lateral flow assay for the quantitative determination of adalimumab (ADM)	25	Serum/ plasma	GN3043

Also available:  
For IBD and IBS diagnostics

<b>Enzyme immunoassay</b>				
RIDASCREEN® Calprotectin	Enzyme immunoassay for the quantitative determination of calprotectin	96	Stool	G09036

### Accessories

RIDA®TUBE Calprotectin	For collection and preparation of stool samples • only use with RIDASCREEN® Calprotectin G09036	50		GZ3016
RIDA®TUBE	For collection and preparation of stool samples • unfilled; to use after internal validation	50		GZ3013
RIDA®QUICK SCAN II - IVD SET	Lateral flow reader (CE-IVD) and 2D barcode scanner • for read out of GN3041 and GN3043			ZRQS2-KD-SET
RIDA®QUICK IFX Monitoring Control Set	Positive controls • accessory for GN3041			GP3041
RIDA®QUICK ADM Monitoring Control Set	Positive controls • accessory for GN3043			GP3043

For further details and information visit our website [www.r-biopharm.com](http://www.r-biopharm.com), contact your local distributor or Clinical Sales International.