# Galectin-3: One Molecule for an Alphabet of Diseases, from A to Z

Salvatore Sciacchitano, Luca Lavra, Alessandra Morgante, Alessandra Ulivieri, Fiorenza Magi, Gian Paolo De Francesco, Carlo Bellotti, Leila B. Salehi and Alberto Ricci
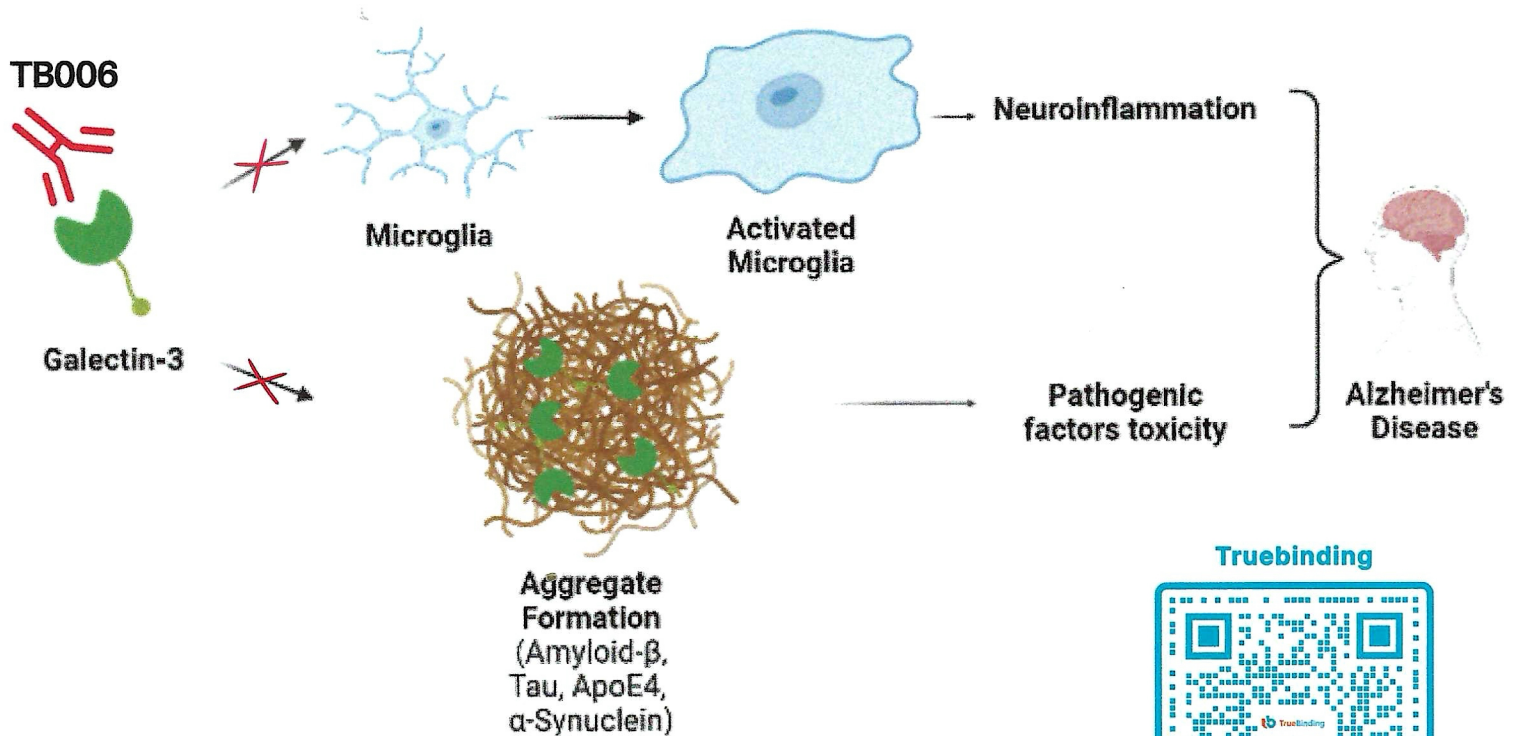
**Abstract:** Galectin-3 (Gal-3) regulates basic cellular functions such as cell–cell and cell–matrix interactions, growth, proliferation, differentiation, and inflammation. It is not surprising, therefore, that this protein is involved in the pathogenesis of many relevant human diseases, including cancer, fibrosis, chronic inflammation and scarring affecting many different tissues. The papers published in the literature have progressively increased in number during the last decades, testifying the great interest given to this protein by numerous researchers involved in many different clinical contexts. Considering the crucial role exerted by Gal-3 in many different clinical conditions, Gal-3 is emerging as a new diagnostic, prognostic biomarker and as a new promising therapeutic target. The current review aims to extensively examine the studies published so far on the role of Gal-3 in all the clinical conditions and diseases, listed in alphabetical order, where it was analyzed.
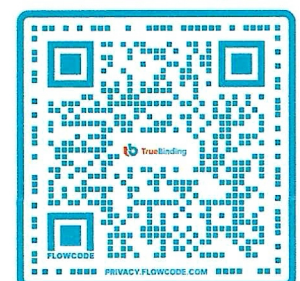
# TrueBinding®

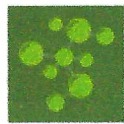## TB006: A Breakthrough Treatment for Alzheimer's and Other Dementias

- **Galectin-3 (Gal-3)** is a multifunctional protein regulating various stages along the continuum from acute inflammation to chronic inflammation
- **Gal-3** is 10x higher in Alzheimer's brain microglia
- **TB006**, the only therapeutic that targets Gal-3 to reduce toxic neuroinflammation and prevent protein aggregation



TB006
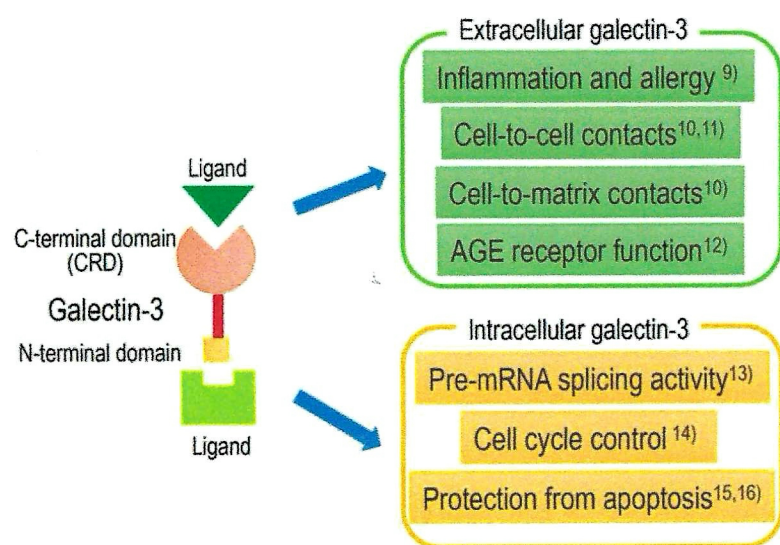
Galectin-3

Microglia → Activated Microglia → Neuroinflammation

Aggregate Formation (Amyloid-β, Tau, ApoE4, α-Synuclein) → Pathogenic factors toxicity

Alzheimer's Disease

**Truebinding**

Mechanism of action video

*biomolecules*

# Galectin-3 as a Next-Generation Biomarker for Detecting Early Stage of Various Diseases

Akira Hara, Masayuki Niwa, Kei Noguchi, Tomohiro Kanayama, Ayumi Niwa, Mikiko Matsuo, Yuichiro Hatano, Hiroyuki Tomita

**Abstract:** Galectin-3 is a β-galactoside-binding lectin which is important in numerous biological activities in various organs, including cell proliferation, apoptotic regulation, inflammation, fibrosis, and host defense. Galectin-3 is predominantly located in the cytoplasm and expressed on the cell surface, and then often secreted into biological fluids, like serum and urine. It is also released from injured cells and inflammatory cells under various pathological conditions. Many studies have revealed that galectin-3 plays an important role as a diagnostic or prognostic biomarker for certain types of heart disease, kidney disease, viral infection, autoimmune disease, neurodegenerative disorders, and tumor formation. In particular, it has been recognized that galectin-3 is extremely useful for detecting many of these diseases in their early stages. The purpose of this article is to review and summarize the recent literature focusing on the biomarker characteristics and long-term outcome predictions of galectin-3, in not only patients with various types of diseases, but associated animal models.
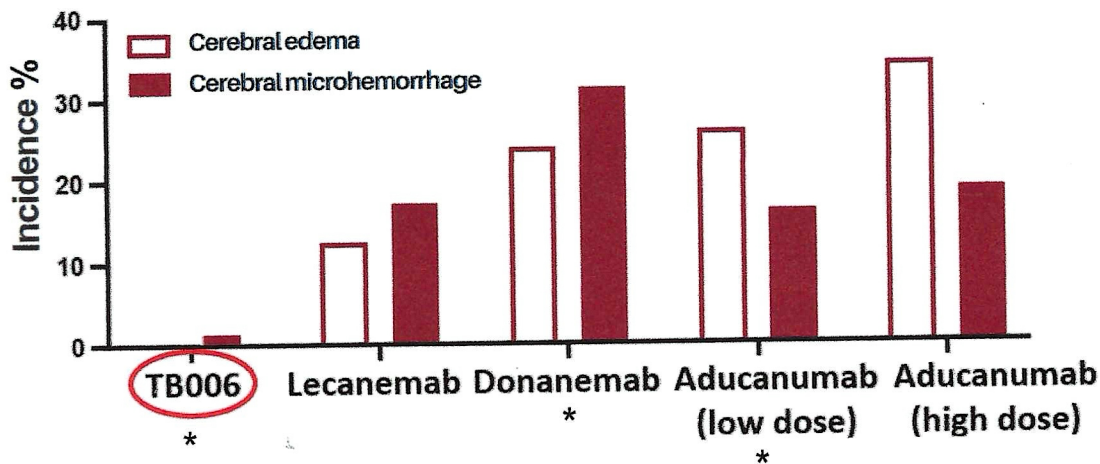
# TrueBinding®

# TB006 Safety and Efficacy Data

## To date, excellent safety profile

### Incidence of Amyloid Related Imaging Abnormalities (ARIA)



Bar chart — Incidence %, legend: □ Cerebral edema, ■ Cerebral microhemorrhage. Categories: TB006 *, Lecanemab, Donanemab *, Aducanumab (low dose) *, Aducanumab (high dose).
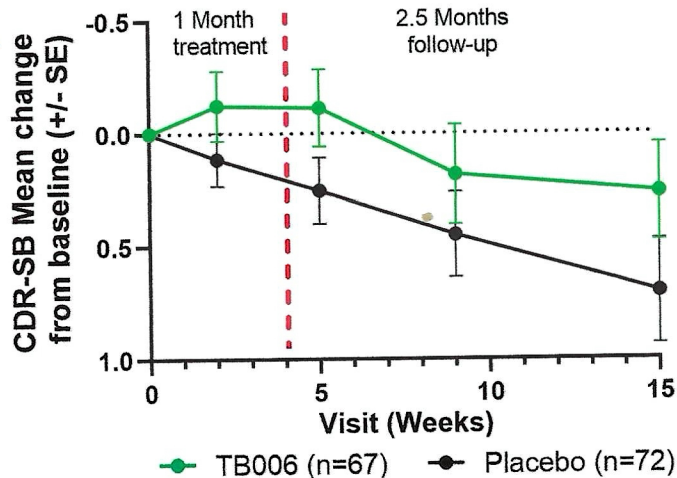
\* Currently not approved by FDA

During 9 months of TB006 treatment (n=88), there was only 1 asymptomatic cerebral hemorrhage (1.1% occurrence) compared to 17 - 35% incidence seen in three competitors' drugs.

## TB006 treated group demonstrated evidence of disease reversal in phase IIa

### Improving CDR-SB score



Disease Improving

TB006 (n=67) — Placebo (n=72)

### Improving MMSE score



*p=0.0401

TB006 (n=67) — Placebo (n=72)
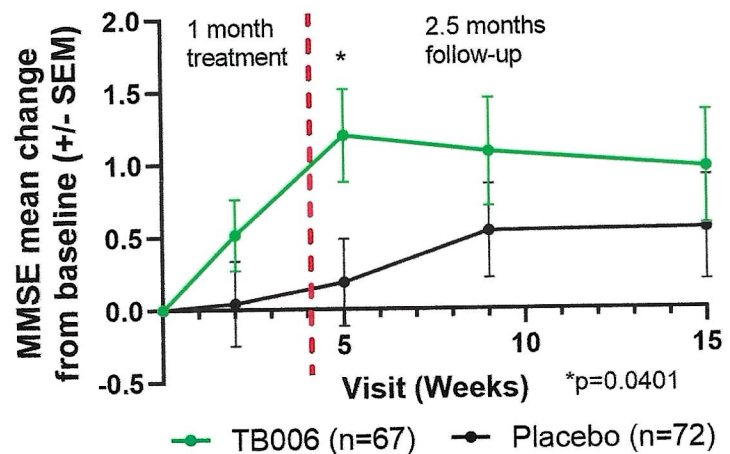
The approved AD drugs only work in early or mild stages of AD, while TB006 showed improvement in mild, moderate, and severe AD patients.