



# Synthesis of a Novel Ligand T used to Detect Riboflavin (and Related Flavin) and to Purify Flavin Binding Proteins

TECHNOLOGY NUMBER: 2023-131



## OVERVIEW

A dual-functional ligand has been synthesized—combining biotin and riboflavin via a custom linker—to enable both the detection of riboflavin (vitamin B2 and other flavins) and purification of flavin-binding proteins.

**Key Features:** The ligand integrates a biotin moiety for avidin binding and a riboflavin component for specific recognition by riboflavin-binding protein (RBP), greatly facilitating quantification and isolation steps.

**Market Opportunity:** Offers a novel, cost-effective tool for rapid vitamin B2 detection and protein purification, directly applicable in diagnostics, research labs, and kit development—especially for underserved global markets lacking advanced analytical infrastructure.

## BACKGROUND

Riboflavin (vitamin B2) is crucial for metabolism and cellular health across virtually all living organisms. Most measuring methods for B2 and its related flavins (FMN, FAD) require high-end equipment—like liquid chromatography and mass spectrometry—making testing expensive and inaccessible, especially in resource-limited settings.

## Technology ID

2023-131

## Category

Diagnostics  
Life Sciences

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Millions may suffer from undiagnosed or subclinical riboflavin deficiency, which can impact blood health, child development, and the body's metabolic functions. Current diagnostics are slow, expensive, centralized in specialized labs, and unsuitable for widespread or point-of-care applications. Recent market analyses show growing interest in affordable diagnostic solutions for B vitamins, with significant trends toward decentralized testing, especially in developing regions and with populations at risk (children, elderly, athletes, pregnant individuals).

This technology addresses the market need for a fast, reliable, and adaptable platform to detect, monitor, and research riboflavin and flavin-binding proteins in various biological samples, without the infrastructure hurdle present with competitors.

## INNOVATION

This ligand is a hybrid molecule connecting riboflavin (for target recognition) and biotin (for easy separation via the well-known avidin system). These two units are spaced by a linker that preserves their binding abilities:

### How it works:

- The ligand binds riboflavin-binding proteins, allowing selective quantification of riboflavin and related flavins in a sample via indirect competition assays.
- The biotin unit offers a straightforward method for isolation by capturing complexes on standard avidin columns.
- This enables both detection **and** purification in a single workflow, in contrast to all existing solutions, which only quantify riboflavin, and do so by expensive instruments.

### Novelty:

- This is the first synthesized tag that maintains binding specificity for both RBP and avidin, allowing flexible use in assays and affinity purification.
- The competition binding assay format allows quantification without liquid chromatography or mass spectrometry, reducing complexity, cost, and time-to-result.
- The ligand and its applications can be rapidly adapted to kits for clinics or research, opening doors to widespread adoption and novel research angles (e.g., studying flavin metabolism, or screening for deficiency in populations).
- Existing ELISA kits for riboflavin are limited to detection; this tag allows for both detection of flavin levels and isolation of binding proteins, with better scalability and versatility.