Kansas State University Research Foundation
TECHNOLOGY LICENSING PROFILE

Highly Sensitive & Accurate Detection of Immune Suppression and Related Ailments

REF. NO. (15-007)

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Description: Researchers at Kansas State University have developed novel, highly sensitive and accurate nanoplatforms for directly detecting the enzymatic activity of Arginase (AGN), Indoleamine 2,3-dioxygenase 1 (IDO1) and Tryptophan 2,3-dioxygenase (TDO). AGN, IDO1, and TDO are biomarkers for local and systemic immune suppression, which is indicative of the existence of surgical trauma, numerous cancers, as well as Pelvic Inflammatory Disease (PID). In veterinary medicine, immune suppression is a typical occurrence in subclinical and clinical metritis and mastitis; two of the largest economic issues in the dairy industry. The nanoplatforms developed by KSU researchers utilize the novel principle of posttranslational modification for detecting the activity of these enzymes directly and accurately.

Most existing methods detect these enzymes indirectly via substrate degradation and subsequent measurement of substrate concentration. The disadvantage of these existing methods is that other enzymes that are using the same substrates, but have different physiological functions, can cause unwanted signal increase, thus leading to an inaccurate detection of target enzymes. On the other hand, KSU's nanoplatforms offer considerably higher sensitivity and accuracy than existing methods (including ELISA) in the direct detection of active target enzymes.

Advantages:

- To the best of our knowledge, these nanoplatforms are 1,000 times more sensitive than ELISA, 10,000 times more sensitive than fluorescence assays and 50,000 times more sensitive than colorimetric assays.
- These nanoplatforms are advantageous over existing detection methods (including ELISA) because of their ability to differentiate between active target enzymes, zymogens (inactive precursors) and non-target enzymes.
- Due to their high sensitivity, these nanoplatforms can be adapted to detect enzymatic activity even in blood serum samples, which typically have low concentrations of target enzymes (~10-12 M).

Applications:

This technology can be used for the development of highly sensitive nanoplatforms for the detection of AGN, IDO1, and TDO activity in both humans and animals, and is envisioned to have applications in (but not limited to) the following areas:

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- Detecting immune suppression to indicate the presence of surgical trauma, cancer and PID
- Early detection of solid tumors (stage 1), cancer recurrence and monitoring of treatment Success/Failure
- Detection of immune complications after surgical trauma, or birth
- Detection of the efficacy of immune therapy, or allergy treatments
- Detection of subclinical metritis or mastitis in cows

Patent Status: Pending

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