

# ImmunoTools *FlowISiAM* Award 2024



**Steven Gray, PhD**



**Bashier Mohammed, PhD**

TCDSJ CI  
Trinity St James Cancer Institute  
St James's Hospital  
Dublin D08 RX0X  
IRELAND

## Co-Applicants:



**Kathy Gately, PhD**



**Sharon O'Toole, PhD**



**Feras Abu Saadeh, MD**



**Laura Gleeson, MD, PhD**



**Gerard J. Fitzmaurice, MD**  
BSc MB BCh BAO MSc PCHMgt FRCSI (CTh)

## *FlowISiAM* for detection of Lung Cancer, Ovarian Cancer and Pleural/Peritoneal Mesothelioma

### Introduction

*FlowISiAM* technology for general tumor detection is based off detecting two key biomarkers, Apo10 and TKTL1. Apo10 is responsible for cell proliferation and resistance to apoptosis, while TKTL1 plays a major role in anaerobic glycolysis of tumor cells, leading to destruction of the basal membrane and metastasis as well as in controlling cell cycle [1]. Both markers are present on activated monocytes/macrophages.

Cancers frequently shed tumor cells and release soluble proteins into the blood stream where they are detected and mopped up by these activated macrophages. We hypothesize that in addition to patient blood, these monocytes can also be detected in other patient fluids such as urine, pleural and peritoneal effusions [2,3], and maybe a more sensitive means to detect

cancer as opposed to serum ELISA based approaches which have limitations with respect to sensitivity and specificity.

### **Research Team**

Embedded in a well-established biobank our research unit(s) are aimed at improving outcomes for people with cancer through innovative and ground-breaking fundamental, translational, and clinical research [4]. Given the potential utility of the *FlowISiAM* technology for the detection of cancer in fluids, we would like to develop/assess this platform for its utility in detecting the following:

(a) NSCLC in pleural effusions; (b) Pleural Mesothelioma in pleural effusions; and (c) Ovarian Cancer from ascites fluid; (d) a cohort of normal pleural effusions/ascites (non-cancerous) and (e) if available, compare the results against matched patient blood samples taken at the same time.

The technology to be developed will involve adding the following panel of additional biomarkers added to the existing Apo10 and TKTL1.

- (a) CA125 (Mucin 16) in NSCLC, Mesothelioma and Ovarian Cancer
- (b) Mesothelin (MSLN) in Mesothelioma and Ovarian Cancer
- (c) Carcinoembryonic antigen (CEA), squamous cell carcinoma antigen (SCCA), Thyroid transcription factor 1 (TTF-1) and p40 ( $\Delta$ Np63) for NSCLC
- (d) Human Epididymis protein 4 (HE-4) for ovarian and NSCLC cancer
- (e) Folate Receptor alpha (FOLR1) for ovarian cancer

Evidence for several of these has been examined in NSCLC [5] mesothelioma [6] and ovarian cancer [7], but most studies limit themselves to assessing total levels in patient serum samples. Using the *FlowISiAM* technology, on a cohort of different patients, we will study if macrophages detected using these panels of candidate biomarkers are superior to current technologies such as cytopsin (cytology) or assessment methodologies.

We envisage that in the first instance we will assess a cohort of n=10 from each of the above categories for (a-e) equating to n=40 effusions and n=40 bloods. It is estimated that this will be conducted over a time frame of 12 months depending upon accrual, with built in go/no go assessments with **ImmunoTools** on a quarterly basis. If results appear promising the time frame for completion and numbers of patients may be increased if necessary following discussions with **ImmunoTools**.

### **Outputs**

This project will develop robust protocols for the utility of *FlowISiAM* for different patient fluid types. Finally, the results will be assessed to those obtained in the same patients' blood samples, allowing for direct comparisons

## Cooperation Partners

It is envisaged that **ImmunoTools** will provide access to the *FlowISiAM* platform, and actively assist with protocols and technology know-how. INVIGATE will provide support regarding selection of specific antibodies against specific biomarkers, production of soluble proteins for optimization of controls and SOPs, and assist with evaluating any results, and integration into the **ImmunoTools** *FlowISiAM* network.

## References

- [1]. Saman S, Stagno MJ, Warmann SW, Malek NP, Plentz RR, Schmid E. Biomarkers Apo10 and TKTL1: Epitope-detection in monocytes (EDIM) as a new diagnostic approach for cholangiocellular, pancreatic and colorectal carcinoma. *Cancer Biomark.* 2020;27(1):129-137.
- [2]. Pomerantz T, Brooks R. Circulating Tumor DNA (ctDNA) and Its Role in Gynecologic Malignancies. *Curr Treat Options Oncol.* 2024 Apr;25(4):510-522.
- [3]. Kanayama M, Oyama R, Mori M, Taira A, Shinohara S, Kuwata T, Takenaka M, Yoneda K, Kuroda K, Ohnaga T, Kato Y, Tanaka F. Novel circulating tumor cell-detection chip combining conventional podoplanin and EGFR antibodies for all histological malignant pleural mesothelioma. *Oncol Lett.* 2021 Jul;22(1):522.
- [4] <https://www.stjames.ie/cancer/research/biobanknetwork/>
- [5] Ai L, Wang W, Li J, Ye T, Li Y. Use of tumor markers in distinguishing lung adenocarcinoma-associated malignant pleural effusion from tuberculous pleural effusion. *Am J Med Sci.* 2024 Apr 5:S0002-9629(24)01156-X.
- [6] Paajanen J, Sadek A, Richards WG, Xie Y, Mazzola E, Sidopoulos K, Kuckelman J, Gill RR, Bueno R. Circulating SMRP and CA-125 before and after pleurectomy decortication for pleural mesothelioma. *Thorac Cancer.* 2024 Apr 16. doi: 10.1111/1759-7714.15264.
- [7] McKendry K, Duff S, Huang Y, Redha M, Scanlon Á, Abu Saadeh F, Gleeson N, O'Leary J, Norris L, O'Toole S. The value of human epididymis 4, D-dimer, and fibrinogen compared with CA 125 alone in triaging women presenting with pelvic masses: a retrospective cohort study. *Acta Obstet Gynecol Scand.* 2021 Jul;100(7):1239-1247. doi: 10.1111/aogs.14126.

**ImmunoTools** *FlowISiAM* AWARD for

**Steven Gray, Bashier Mohammed, Kathy Gately, Sharon O'Toole,**

**Feras Abu Saadeh, Laura Gleeson, and Gerard J. Fitzmaurice** includes

antibodies for *FlowISiAM*, know how transfer and protocol, support regarding selection of specific antibodies against specific biomarkers from INVIGATE, expert assistance in evaluating the results obtained, and integration into the **ImmunoTools** *FlowISiAM* network.

more [AWARDS](#)

[DETAILS](#) about **ImmunoTools**