NIH NATIONAL CANCER INSTITUTE

CONFORMATIONAL RESTRICTION OF CYANINE FLUOROPHORES IN FAR-RED AND NEAR-IR RANGE

SUMMARY (1024-CHARACTER LIMIT)

Researchers at the National Cancer Institute (NCI) seek licensing and/or co-development research collaborations for a new class of conformationally restricted cyanine dyes

NIH REFERENCE NUMBER

E-143-2017

PRODUCT TYPE

- Diagnostics

KEYWORDS

- Fluorescent probes, cyanine fluorophores, imaging, FACS, super resolution microscopy, Fluorescence guided surgery, cancer, gastrointestinal (GI), kidney, cardiovascular, Schnermann

COLLABORATION OPPORTUNITY

This invention is available for licensing and co-development.

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STATUS

Active

DESCRIPTION OF TECHNOLOGY

Small molecule fluorescent probes are important tools in diagnostic medicine. Existing far-red and near-IR cyanine fluorophores (e.g. Cy5, Alexa 647, Cy7, ICG) are active in the far-red and near-range, but these agents suffer from modest quantum yields (brightness) which limit wide utility. It has been reported that the limited brightness of these fluorophores is due to an excited-state C-C rotation pathway.

The invention is directed to a new class of conformationally restricted cyanines that exhibit significantly improved quantum yield (3-4-fold increase in fluorescence quantum yield). These compounds are active in the long wavelength range (absorbance maxima = 661nm, emission maxima = 681nm). Additionally, these compounds are detectable at lower concentrations with concurrent improvements in signal to

noise. While these compounds can be readily appended to antibodies and small-molecule based targeting motifs, these compounds are particularly useful for imaging procedures where photon count is limiting, e.g., FACS procedures, super resolution microscopy, and fluorescence guided surgery applications.

The invention is also directed to a generalized approach for synthesizing variants of the invention cyanine fluorophores prepared thus far.

POTENTIAL COMMERCIAL APPLICATIONS

- Fluorescence guided surgery
- Tumor visualization
- In vivo imaging
- Fluorescent marker of the bile duct and ureter during abdominal surgery
- Diagnostic medicine
- Super resolution microscopy
- FACS and other microscopy procedures where photon count is limiting

COMPETITIVE ADVANTAGES

- Improved quantum yield (3-4-fold increase in fluorescent emission over normal Cy5-type dyes (Absorbance maxima = 661 nm, Emission maxima= 681 nm, fluorescence quantum yield = 0.70)
- Excellent recovery from NaBH4 reduction
- Improved photon output in single molecule localization microscopy

INVENTOR(S)

Martin J Schnermann (NCI), Megan Michie (NCI)

DEVELOPMENT STAGE

- Pre-clinical (in vivo)

PUBLICATIONS

Michie M, et al. Cyanine Conformational Restraint in the Far-Red Range. [PMID: 28862842]

PATENT STATUS

- **U.S. Patent Filed:** U.S. Patent Application Number 62/549,566 , Filed 24 Aug 2017

RELATED TECHNOLOGIES

- E-271-2014 - A New Class of Stable Heptamethine Cyanine Fluorophores and Biomedical Applications Thereof
- E-036-2018
- E-139-2018

THERAPEUTIC AREA

- Cancer/Neoplasm
- Cardiovascular Systems
- Gastrointestinal
- Kidney and the Genitourinary