Literature Report

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Fluorescent Probes

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A Fluorescent Probe for Rapid, High-Contrast Visualization of Folate-Receptor-Expressing Tumors In Vivo

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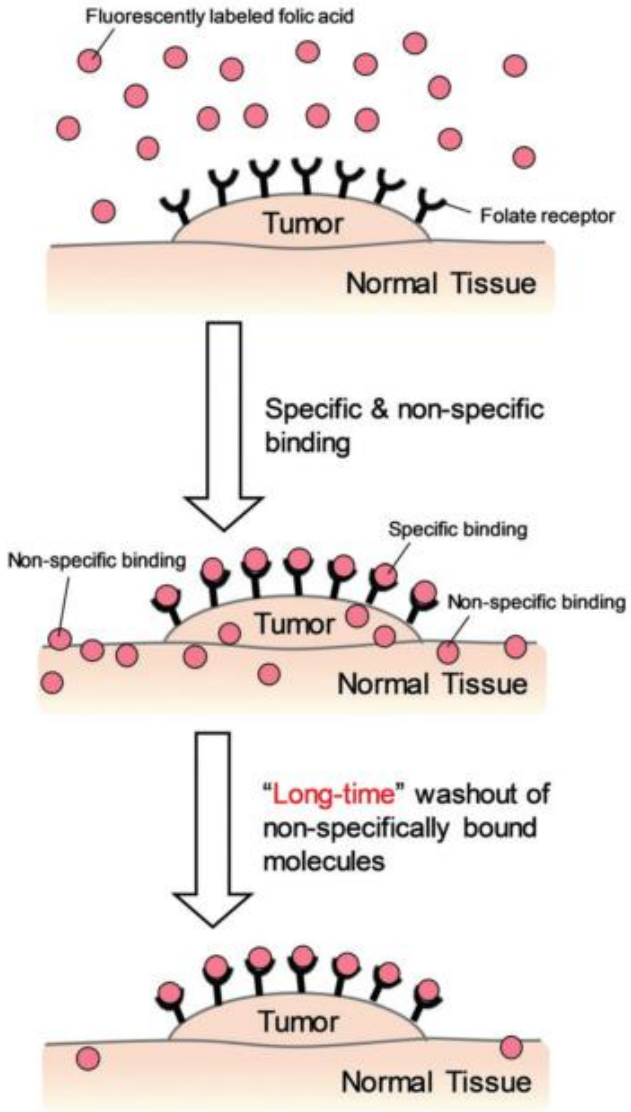
研究领域：化学生物学

主要研究兴趣是光功能探针的开发及其在实时成像中的应用。

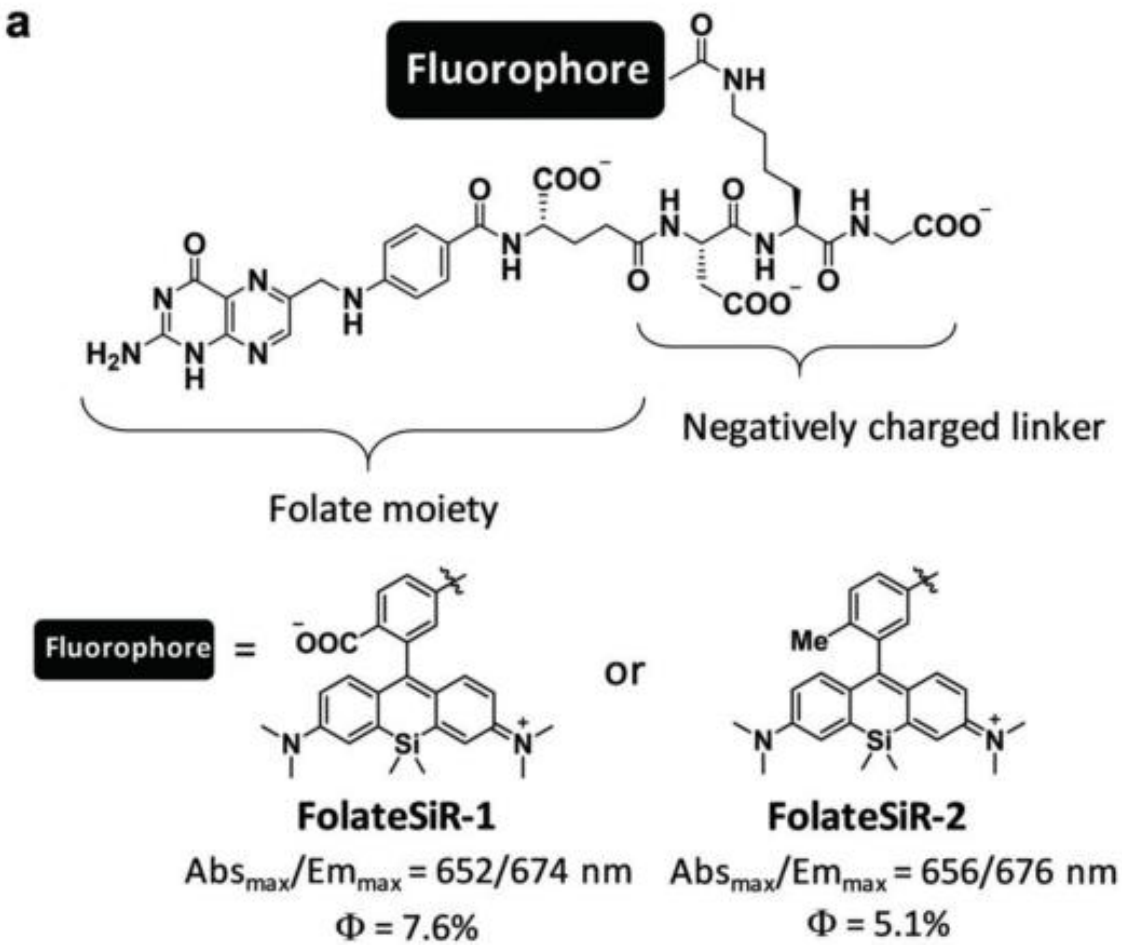
Introduction



Scheme 1. Imaging strategy of existing near-infrared fluorescent probes for in vivo fluorescence imaging of whole animals.

叶酸受体(folate receptor)是一种糖基磷脂酰肌醇偶联蛋白。除个别组织外,叶酸受体在正常组织上表达水平很低,而在许多肿瘤细胞（例如，卵巢癌细胞和子宫内膜癌细胞）表面过表达。叶酸受体与叶酸及其衍生物有高度的亲和性,基于这种特性,可将荧光染料、治疗药物等与叶酸偶联,靶向给予肿瘤细胞,从而应用于肿瘤的影像诊断和和肿瘤治疗。

Introduction



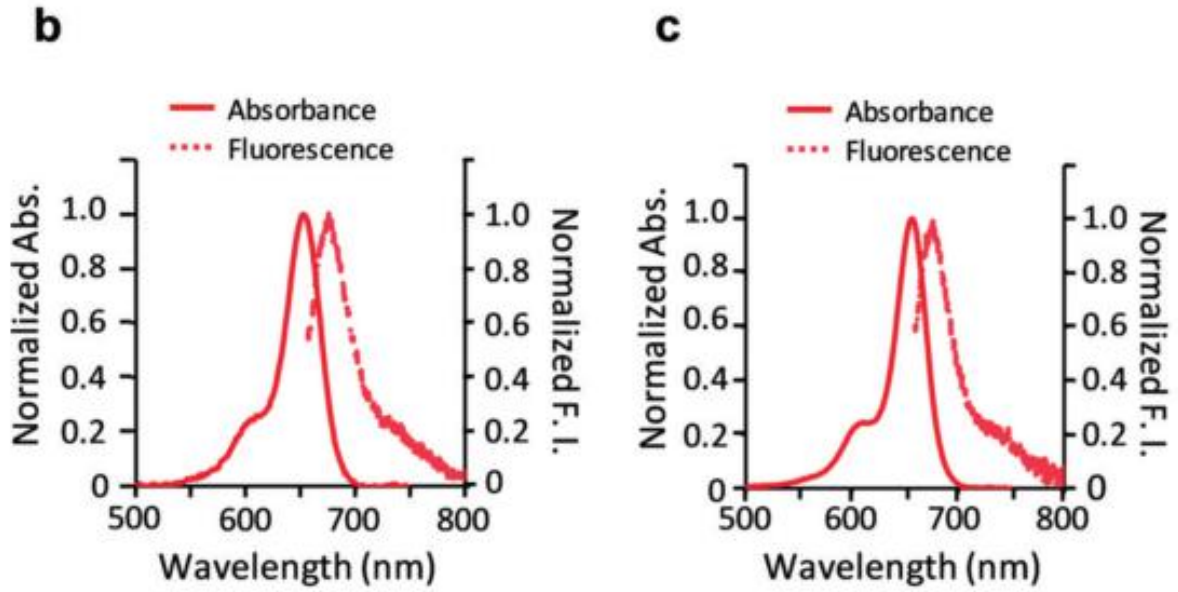


Figure 1. a) Molecular design of fluorescent probes for detection of folate receptors. The structures of **FolateSiR-1** and **FolateSiR-2** are also shown. b) Absorption and emission spectra of 1 μM **FolateSiR-1** in 100 mM sodium phosphate buffer at pH 7.4, $\lambda_{ex} = 652$ nm. c) Absorption and emission spectra of 1 μM **FolateSiR-2** in 100 mM sodium phosphate buffer at pH 7.4, $\lambda_{ex} = 656$ nm.

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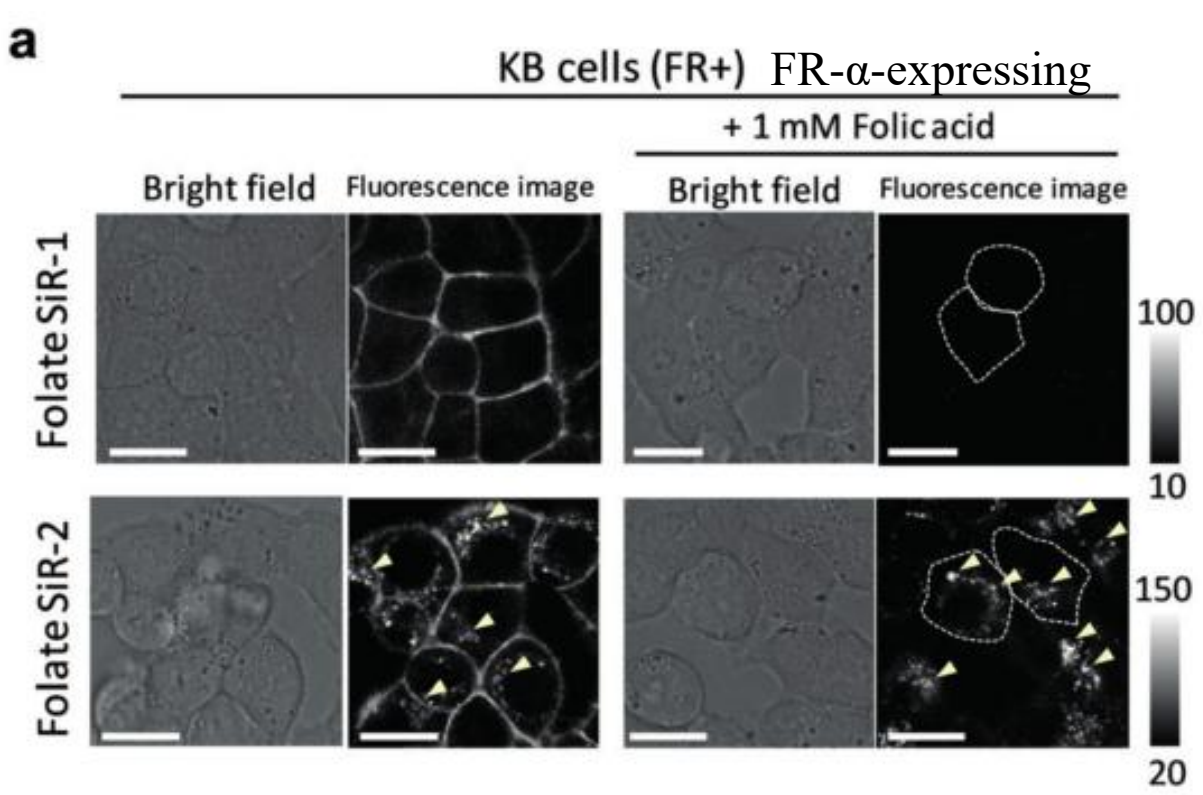

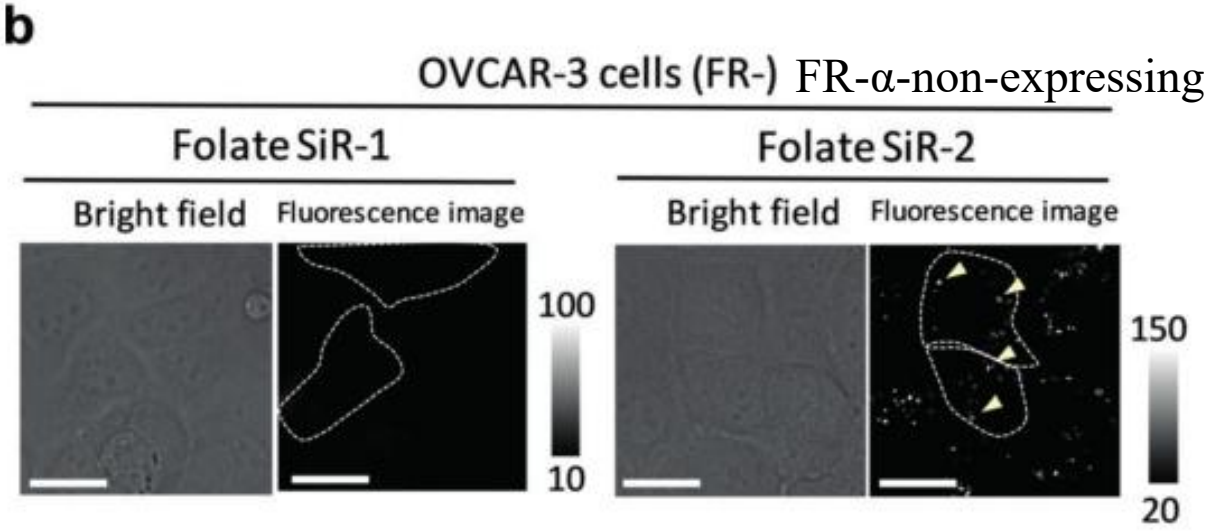

Figure 2. a) Bright-field (left) and fluorescence (right) images of KB cells incubated with 5 μM **FolateSiR-1** or **FolateSiR-2** in the presence or absence of 1 mM folic acid and 0.5% DMSO as a cosolvent. White arrows indicate bright dots inside cells; $\lambda_{ex} = 650$ nm, $\lambda_{em} = 670$–750 nm. Scale bars = 20 μm. b) Bright-field (left) and fluorescence (right) images of OVCAR-3 cells incubated with 5 μM **FolateSiR-1** or **FolateSiR-2** and 0.5% DMSO as a cosolvent. White arrows indicate bright dots inside cells, $\lambda_{ex} = 650$ nm, $\lambda_{em} = 670$–750 nm. Scale bars = 20 μm.

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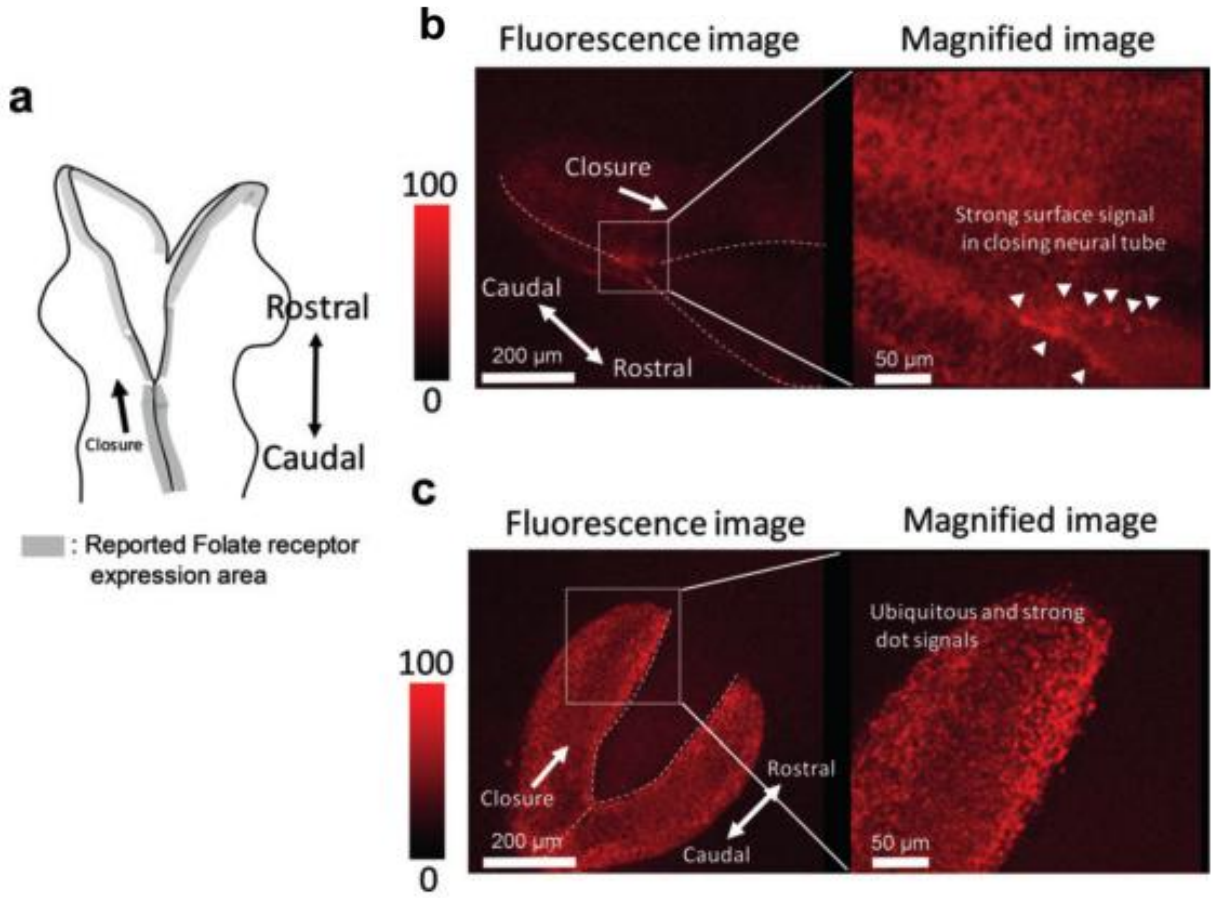
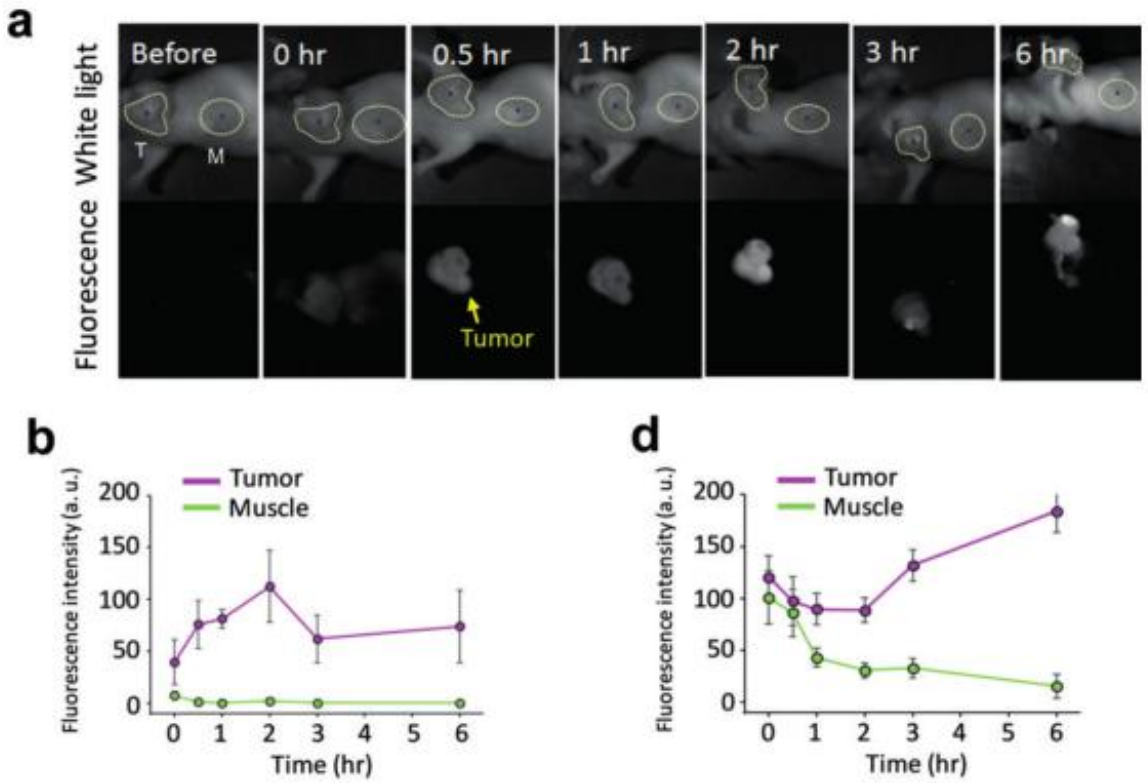


Figure 3. a) Schematic of folate receptor (= Folbp 1) expression in mouse embryo; regions reported to show folate receptor expression are shown in gray. b) Fluorescence image of mouse embryo incubated with 20 μM **FolateSiR-1**. Locations stained with **FolateSiR-1** are indicated by white arrowheads. c) Fluorescence image of mouse embryo incubated with 20 μM **FolateSiR-2**.

用FolateSiR-1染色时，神经管闭合区域与其他区域相比显示出较强的荧光，而整个胚胎都只观察到微弱的荧光

用FolateSiR-2染色时，我们观察到整个胚胎都有强烈的斑点荧光，这表明FolateSiR-2与细胞非特异性结合

Introduction



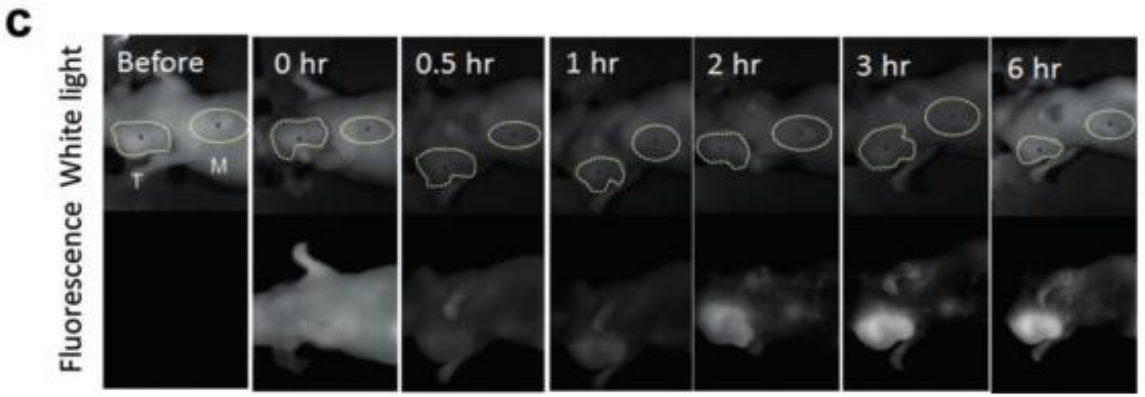


Figure 4. a) Fluorescence images at different time points of KB tumor-bearing mouse injected with 100 μM **FolateSiR-1** in 100 μL saline containing 1% DMSO as a cosolvent. Fluorescence and white light images were obtained before and 0, 0.5, 1, 2, 3 and 6 h after the probe injection; λ_{ex} = 661 (641–681) nm, λ_{em} = 700–800 nm. T = tumor, M = muscle. Fluorescence intensity scale: gray scale 0 to 255. b) Time-dependent change of fluorescence intensity in tumor and non-tumor (muscle) areas of three mice, including the mouse in (a). Error bar shows S.E. c) Fluorescence images at different time points of KB tumor-bearing mouse injected with 100 μM **FolateSiR-2** in 100 μL saline containing 1% DMSO as a cosolvent. Fluorescence and white-light images were obtained before and 0, 0.5, 1, 2, 3 and 6 h after the probe injection; λ_{ex} = 661 (641–681) nm, λ_{em} = 700–800 nm. T = tumor, M = muscle. Fluorescence intensity scale: gray scale 0 to 255. d) Time-dependent change of fluorescence intensity in tumor and non-tumor (muscle) areas of three mice, including the mouse in (c). Error bar shows S.E.

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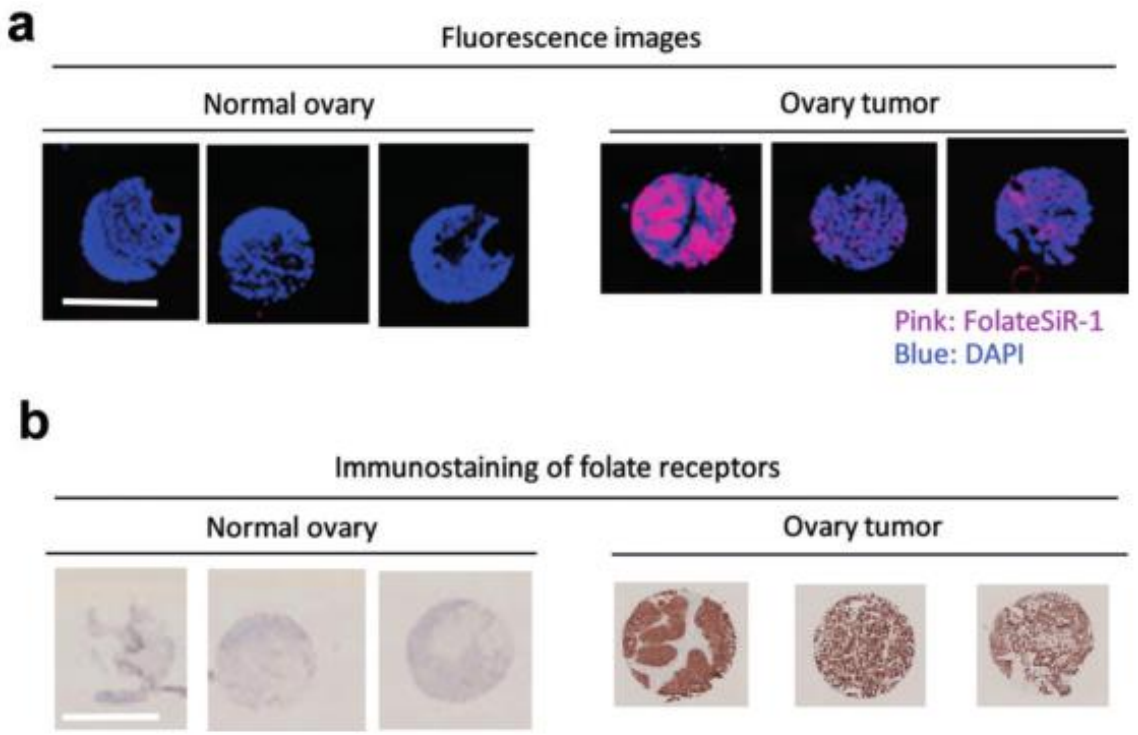

Figure 5. a) The ovarian cancer tissue microarray was incubated with 5 μM **FolateSiR-1** and 2.9 μM DAPI (nuclear stain) in phosphate-buffered saline containing 0.05% Tween 20 (PBST) for 2 h. Then, the tissue microarray was washed with PBST three times and the fluorescence image was obtained. The microarray contains 37 tumor tissues and 3 normal tissues. Fluorescence images of the 3 normal tissues and 3 representative tumor tissues are shown, scale bar = 2 mm. b) Immunostaining of folate receptors in the tissue microarray. The immunostained 3 normal tissues and 3 tumor tissues correspond to those in (a), scale bar = 2 mm.