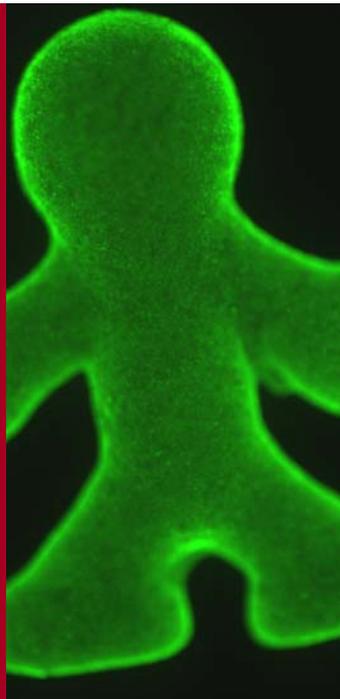




竹内昌治

の拓く健康社会

LIFE BEANS



BEANSの目指す未来(健康医療)

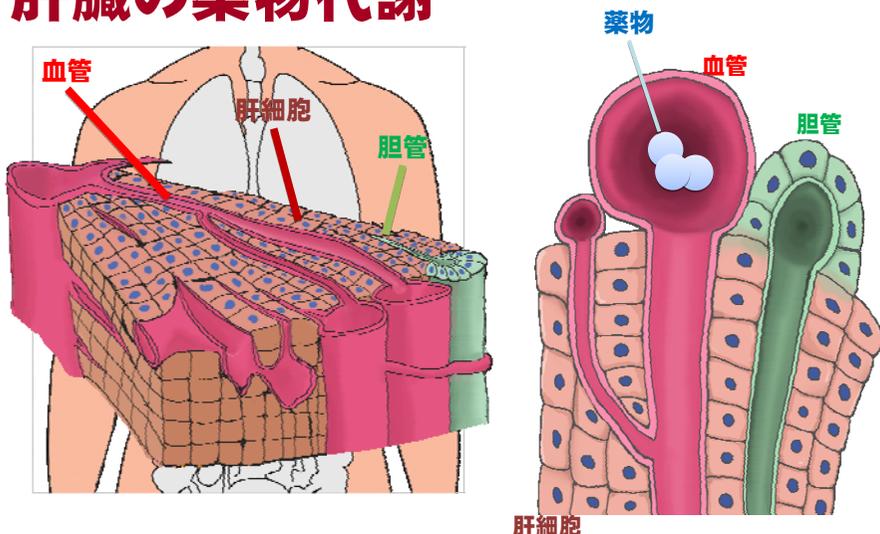
1. オーダーメイド
創薬・医療

患者さんの細胞を使って、
一人一人に合った薬の提供

2. 24時間健康モニタリング
(体内埋め込み計測)

血糖値などのバイタルサインの
常時計測

肝臓の薬物代謝



肝細胞で代謝された代謝物は主に胆管に排出される。

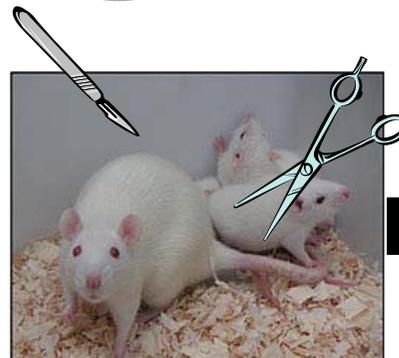
動物実験をなくした薬物動態解析実験



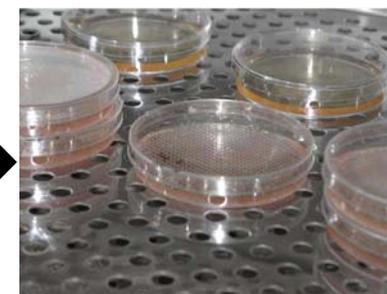
Much time
Much compounds
Not human



Low cost
Human cells



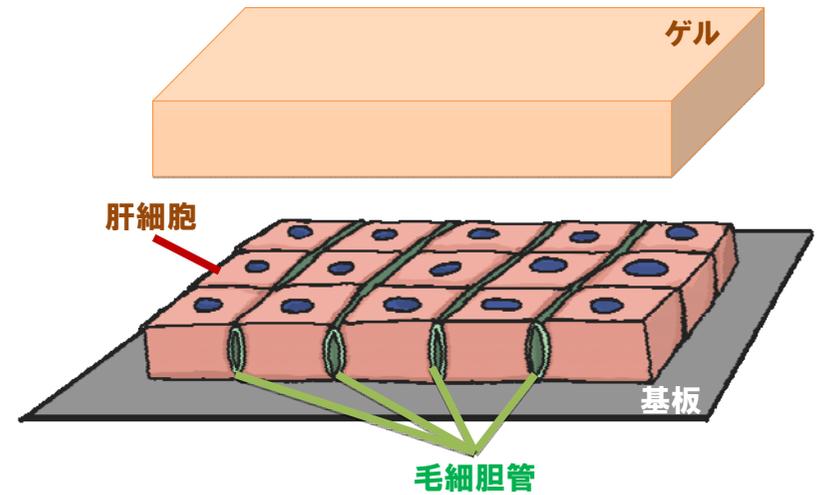
動物実験



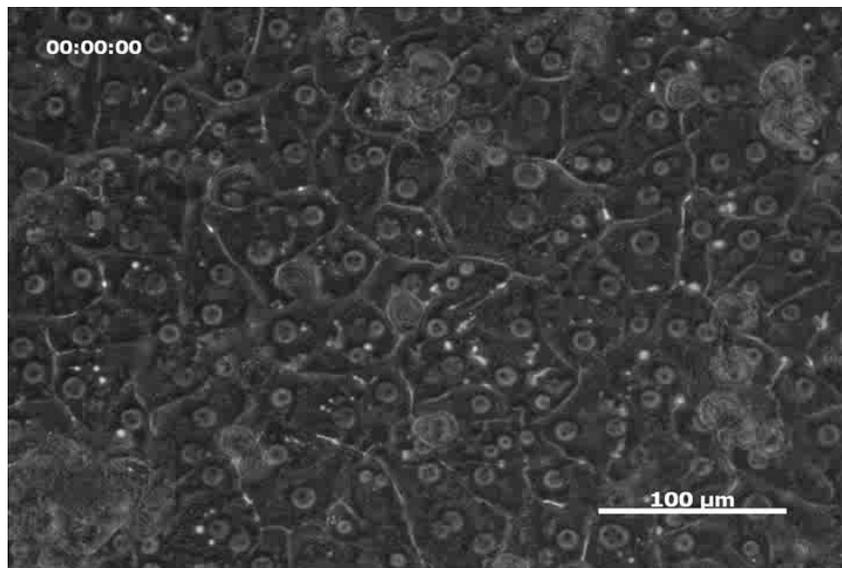
細胞実験

まずは、 「肝臓ー胆管」 モデルをつくる

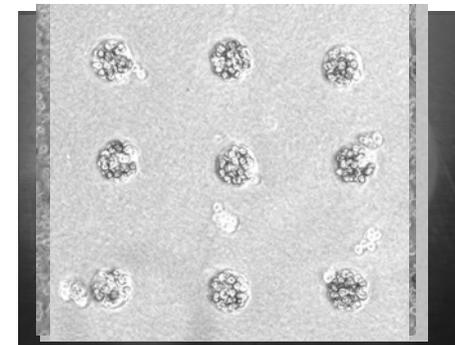
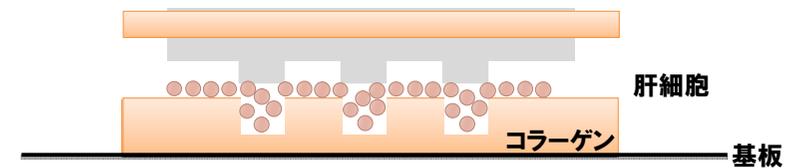
従来の毛細胆管誘導方法 (サンドイッチ法)



胆管ができる様子

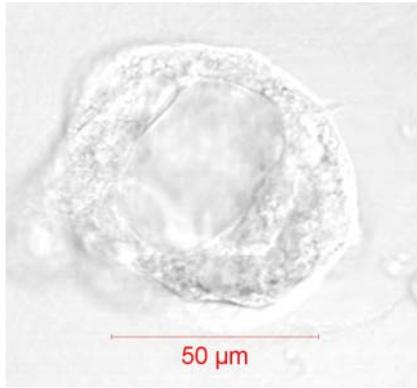


肝細胞の3次元培養系をつくる!

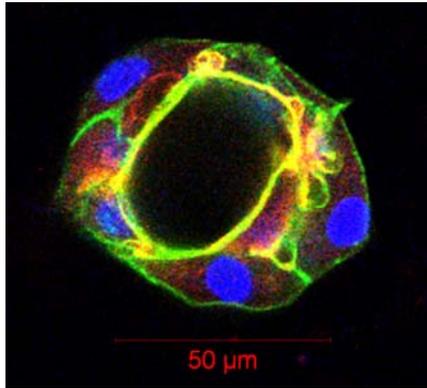


肝細胞塊内部に形成された胆管の構造

明視野像



核 細胞膜 胆管膜

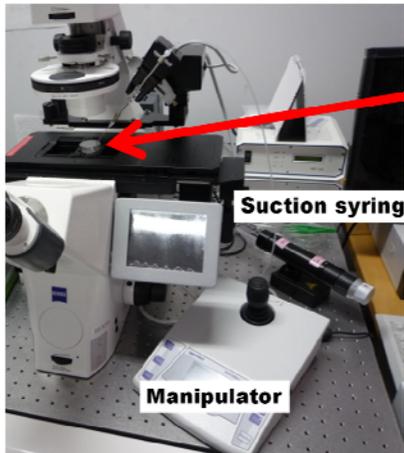


肝細胞塊の中央に胆管が形成された



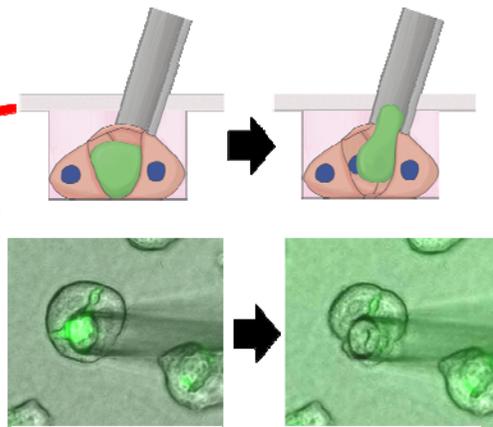
BEANS

胆汁を回収する!

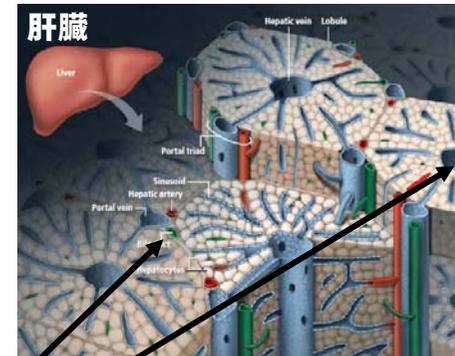


Suction syringe

Manipulator



より立体的な組織へ



ブロック組み立て?



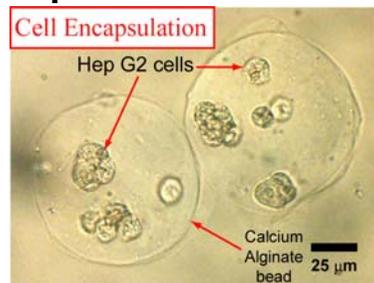
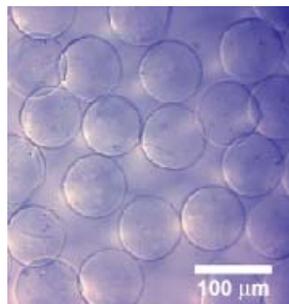
細胞ビーズ



gelation

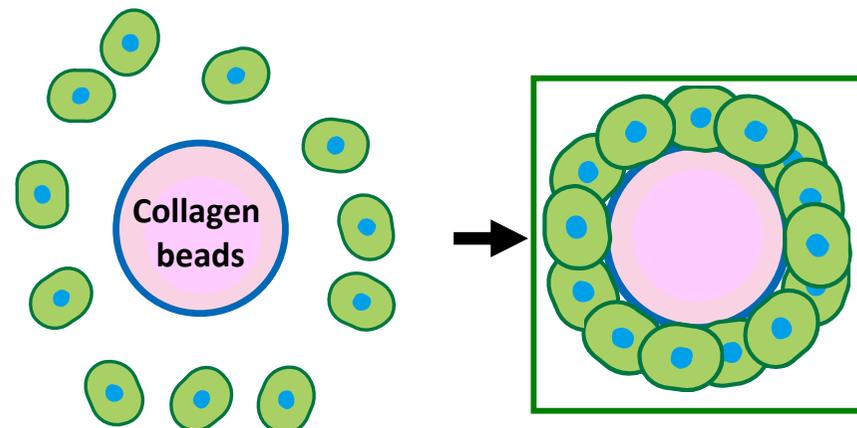


droplet formation



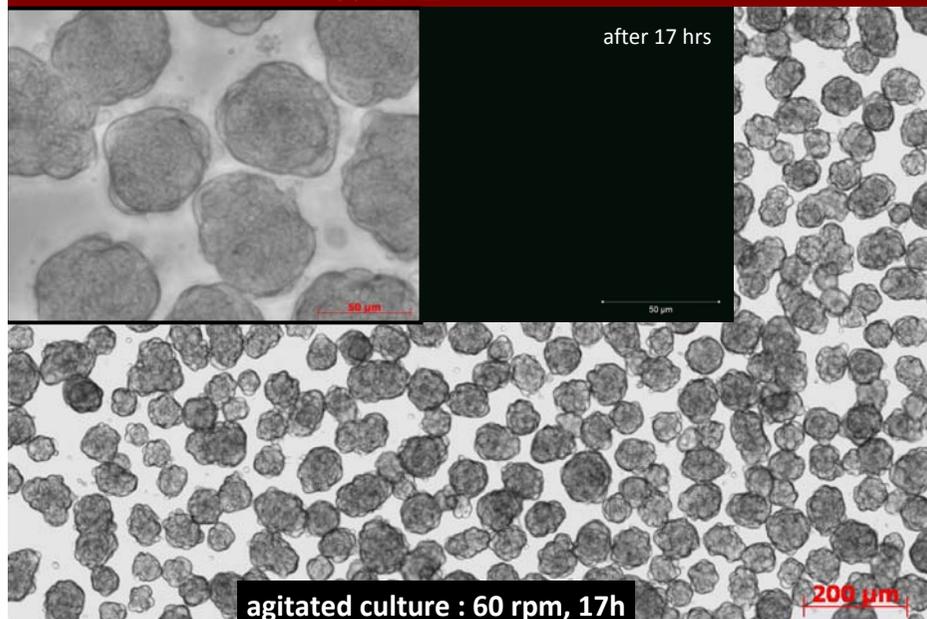
Adv. Mat. 2007, BMMD 2009

コラーゲンの周りに細胞をコート

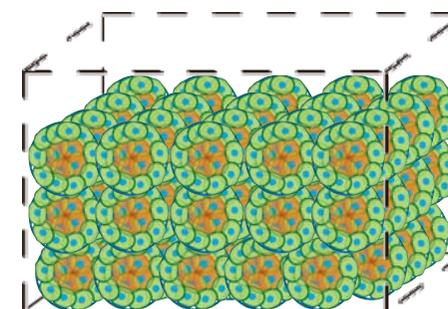


Cross-sectional view

細胞ビーズ



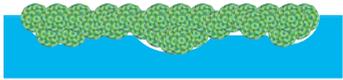
細胞ビーズをつかった立体形成



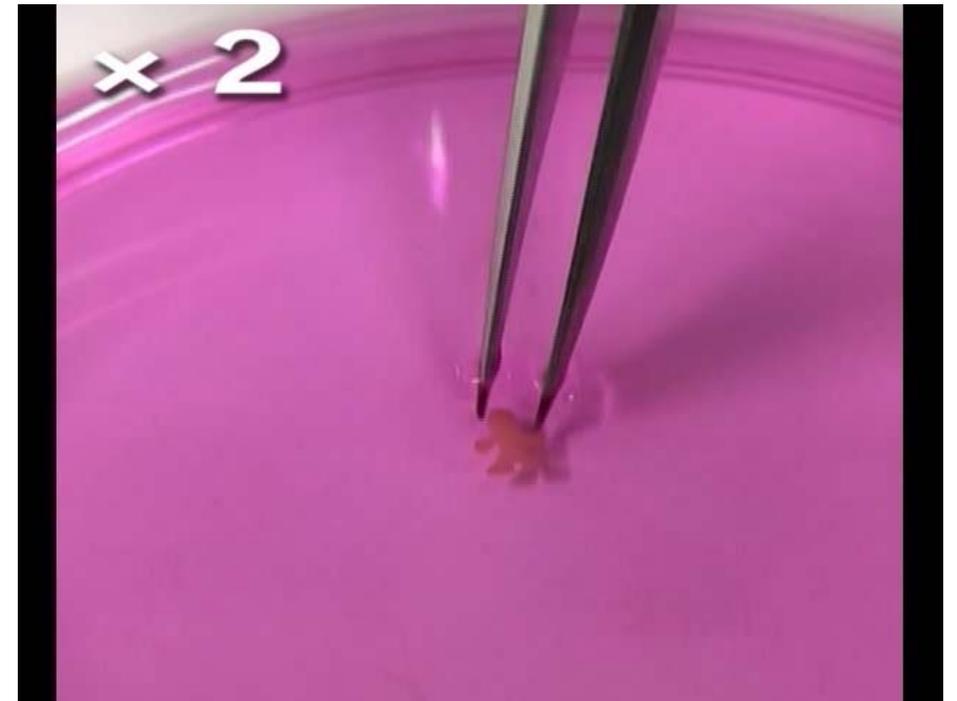
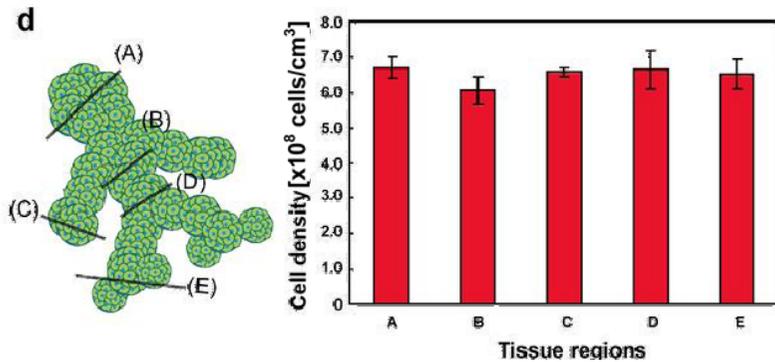
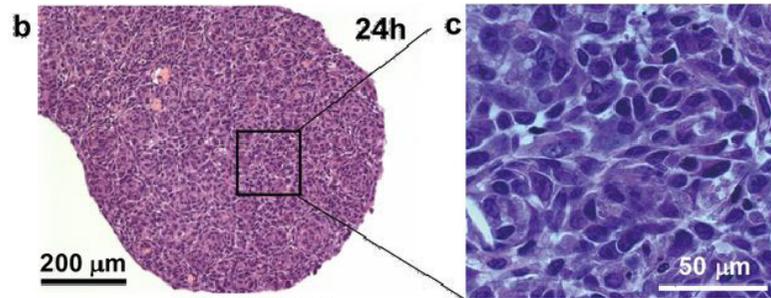
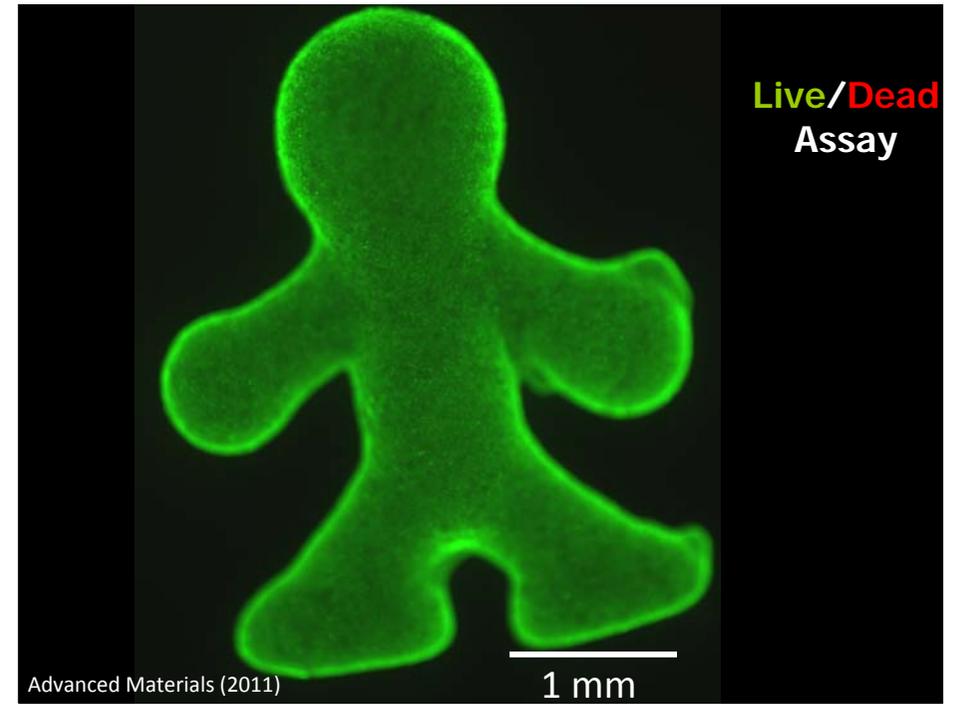
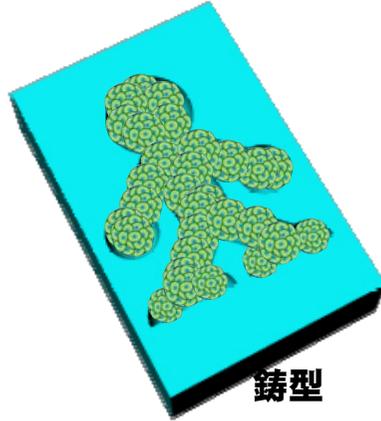
- 様々な形状
- 均質な密度
- 高速形成

立体組織形成

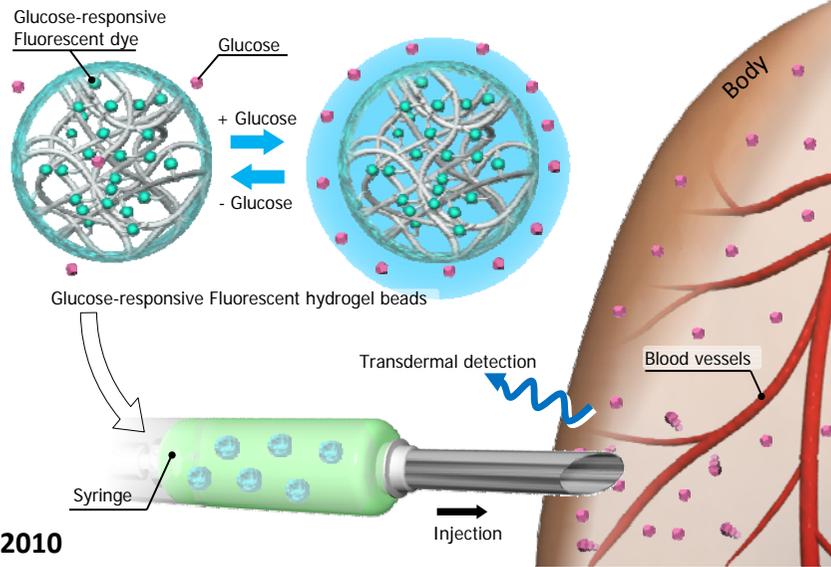
side



perspective

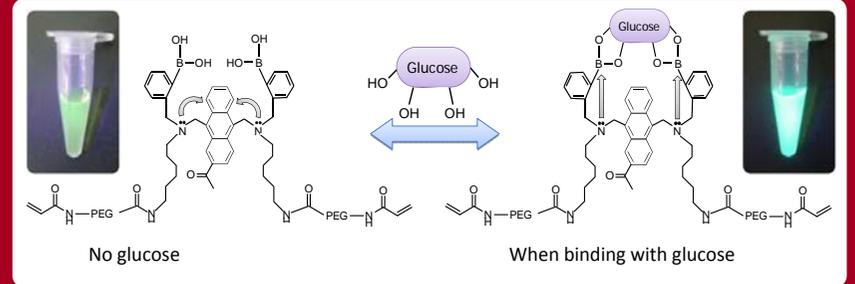


Fluorescent microbeads for Continuous glucose monitoring

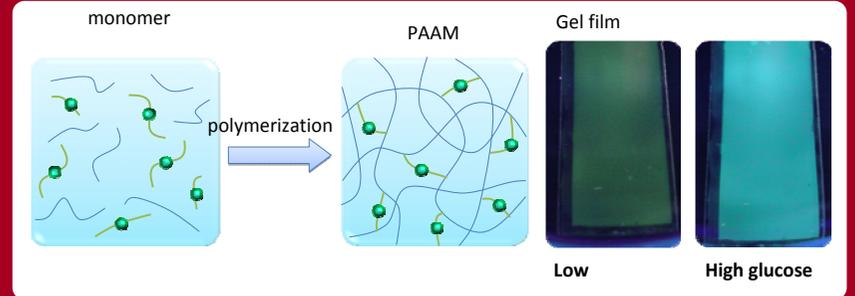


PNAS 2010

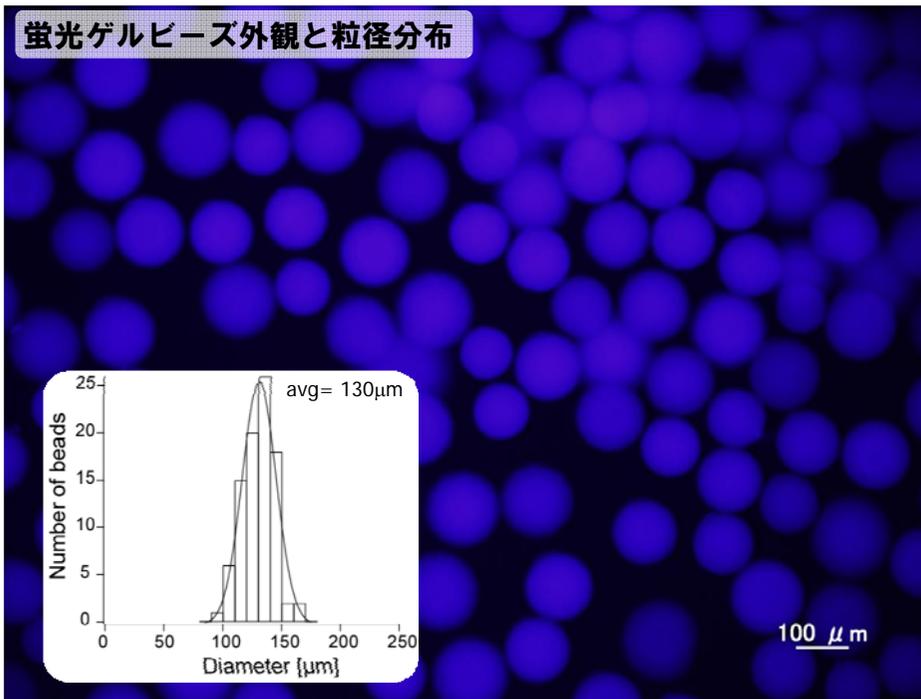
Materials



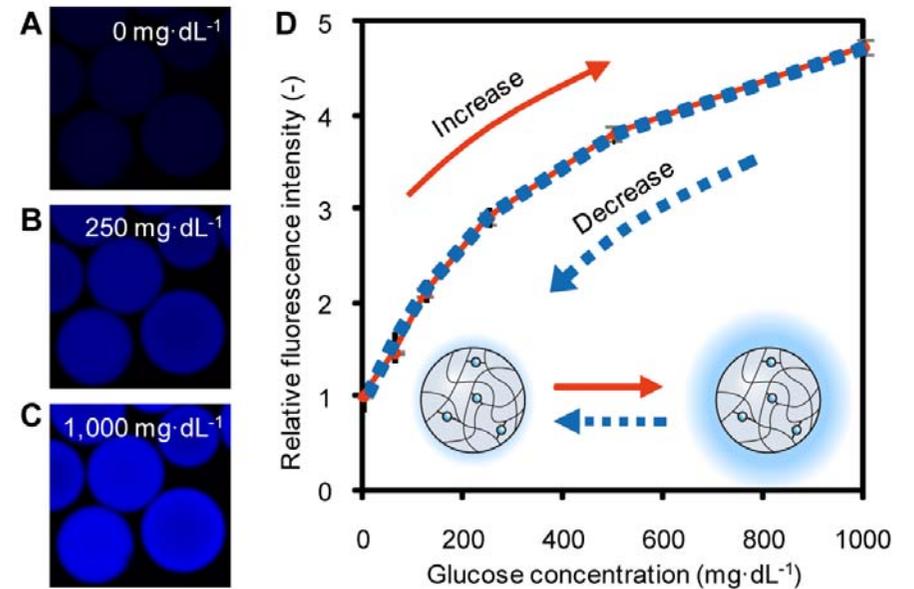
T. Kawanishi et al. *Journal of Fluorescence*, vol. 14, No.5, 2004



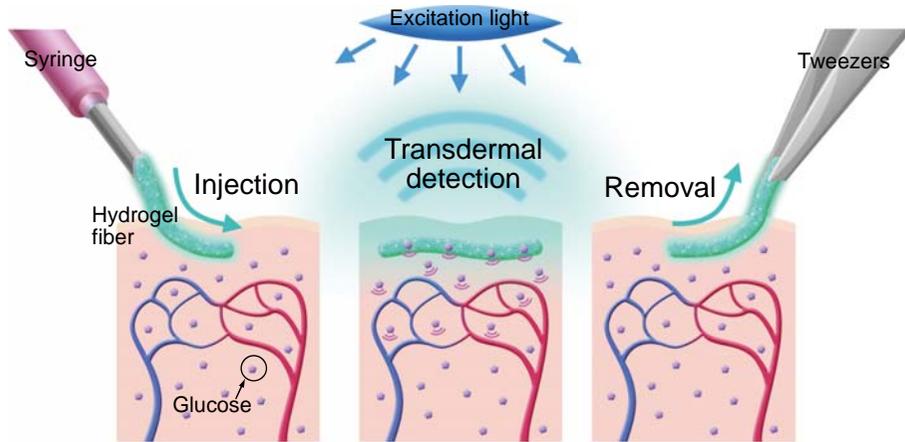
蛍光ゲルビーズ外観と粒径分布



グルコース応答能



ビーズからファイバーへ



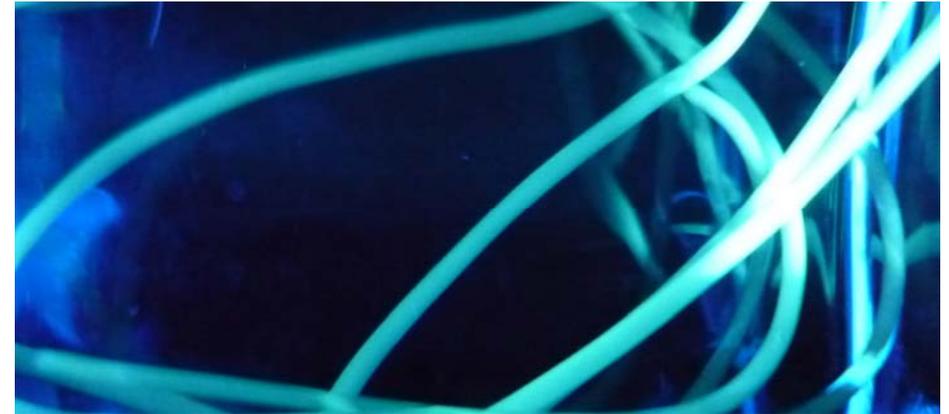
PNAS 2011

細長いファイバー

Samples: PAM, PAM with PEG

Diameter: $956 \pm 9 \mu\text{m}$

Excitation light: 405 nm / Emission light: 488 nm

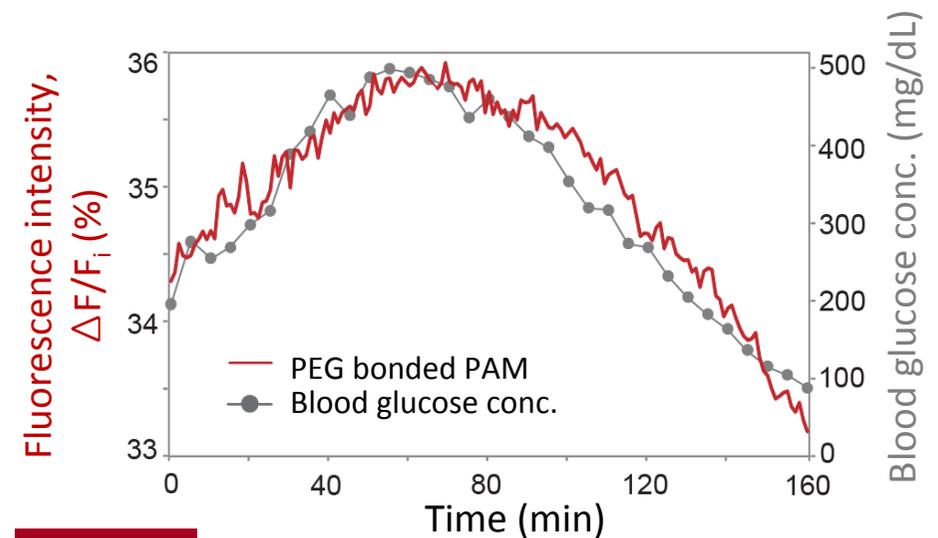


ファイバーの埋め込み



PNAS 2011

140日後も計測に成功!



PNAS 2011

取り外しも簡単!

