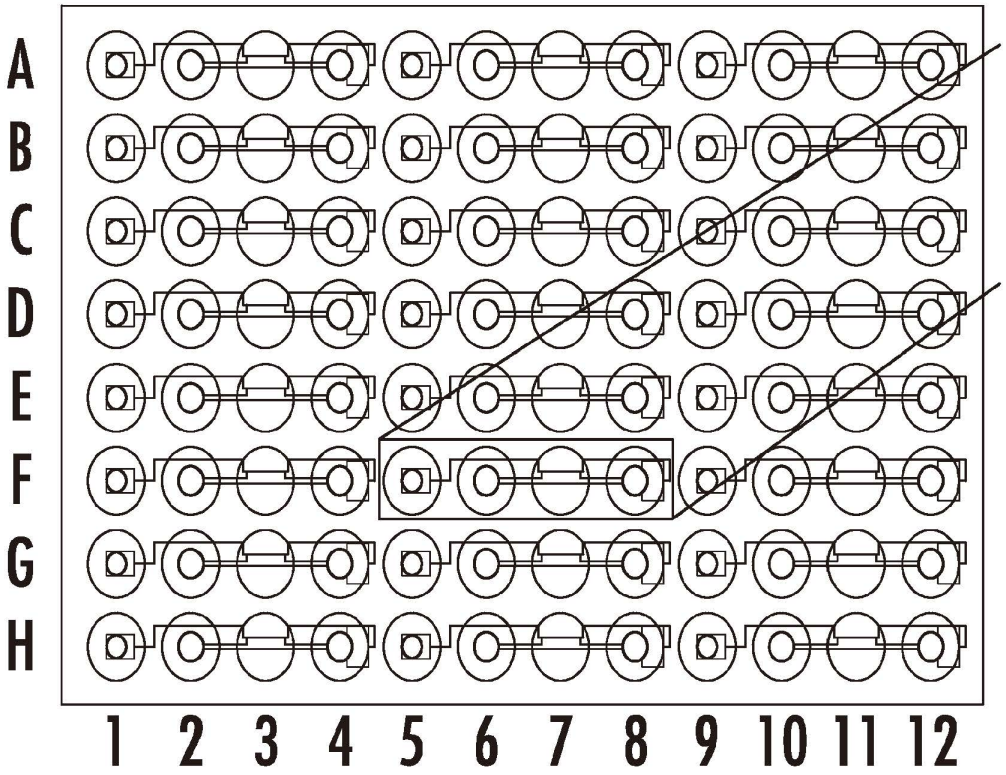


FIG. 1A

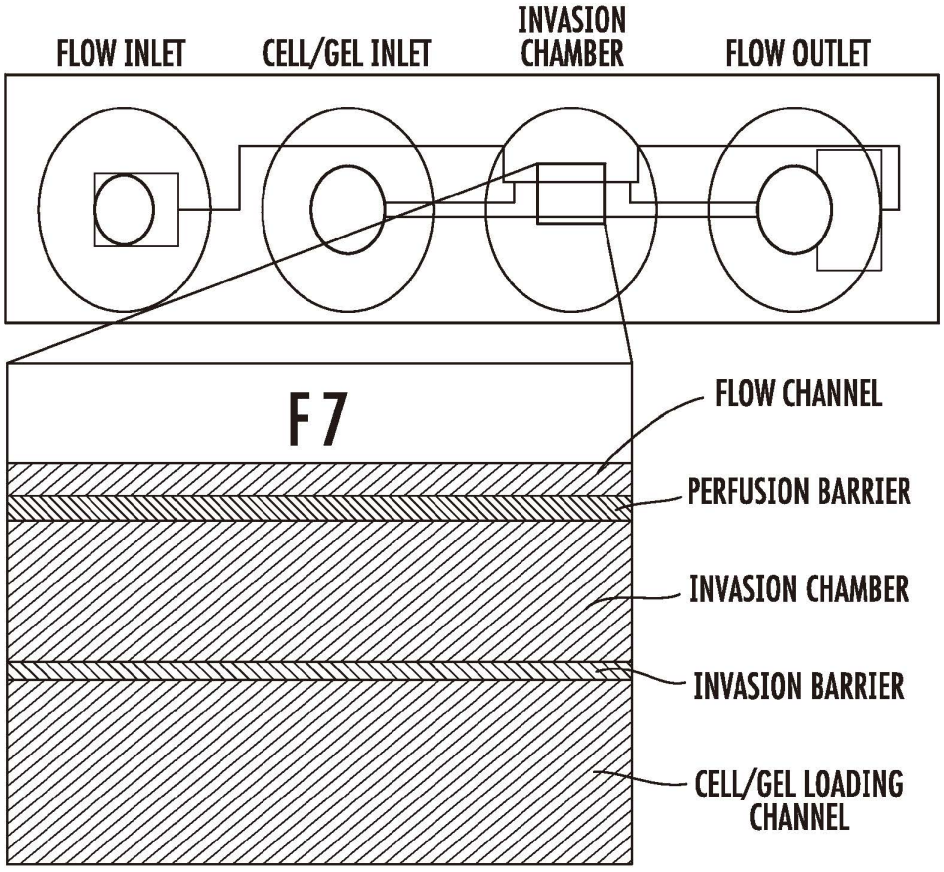

FLOW INLET
CELL/GEL INLET
INVASION CHAMBER
FLOW OUTLET
F7
FLOW CHANNEL
PERFUSION BARRIER
INVASION CHAMBER
INVASION BARRIER
CELL/GEL LOADING CHANNEL

FIG. 1B

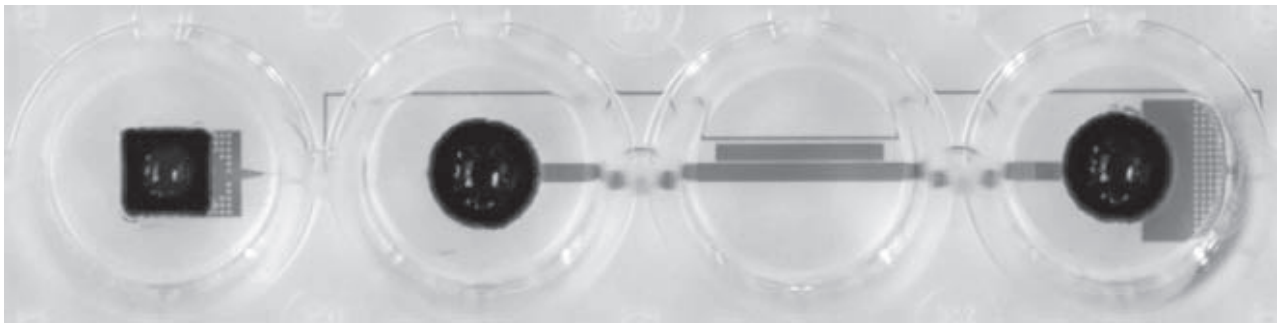


FIG. 2A

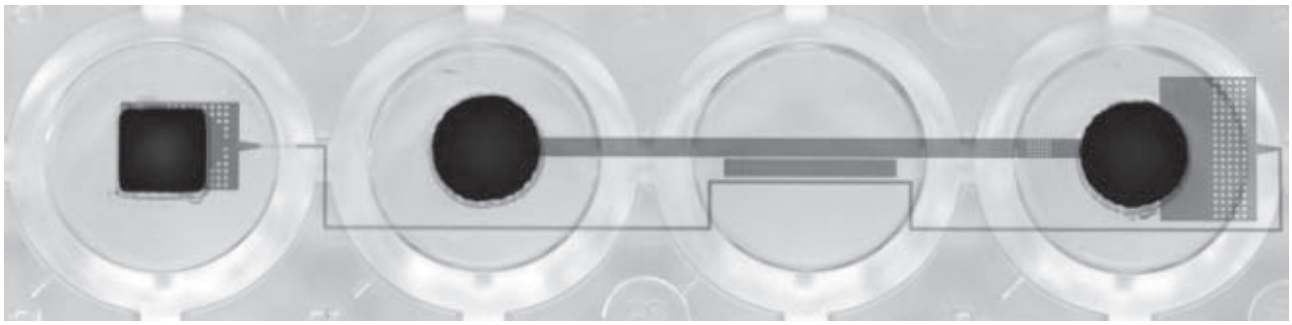


FIG. 2B

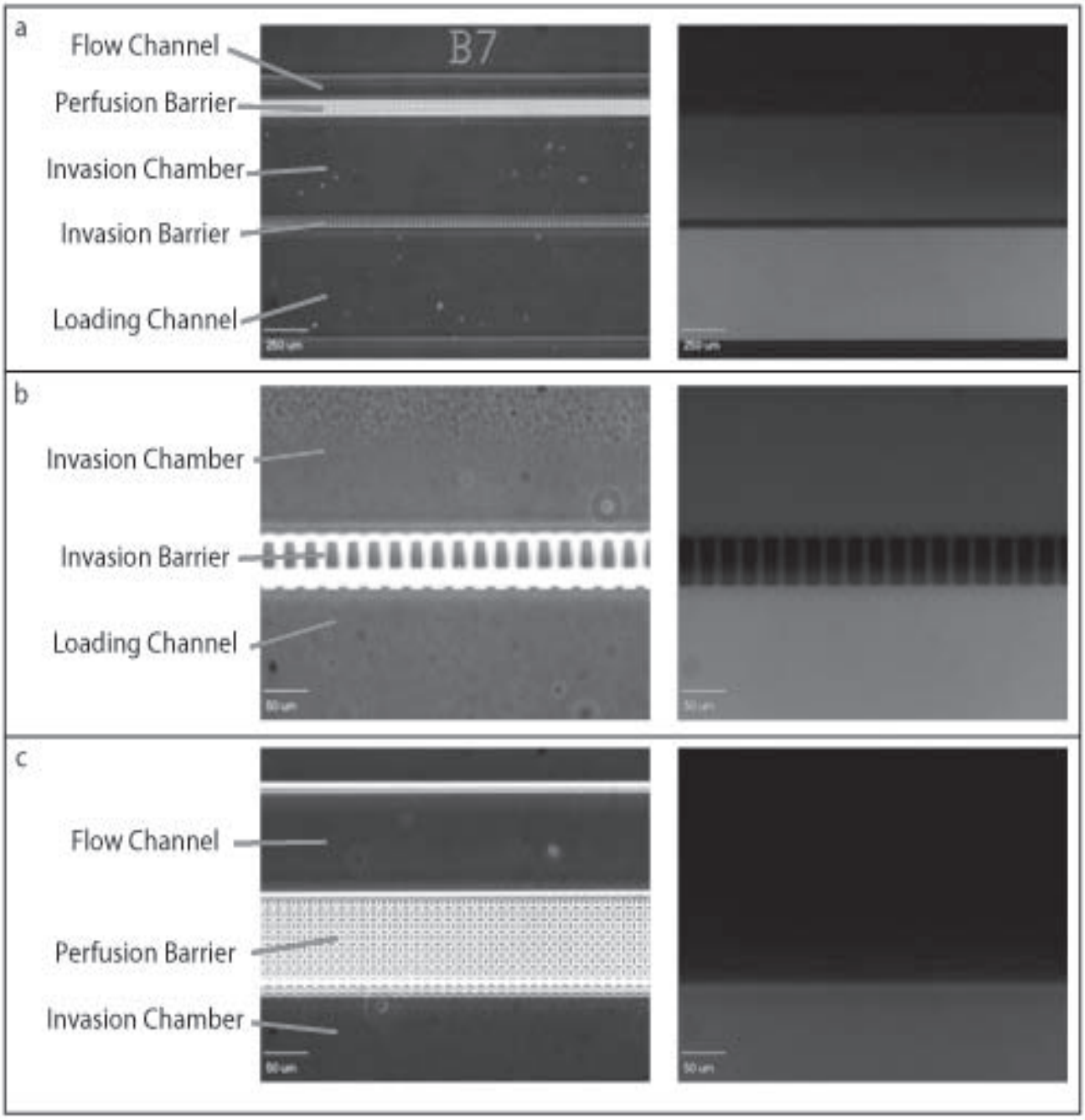

a
Flow Channel
Perfusion Barrier
Invasion Chamber
Invasion Barrier
Loading Channel
B7
b
Invasion Chamber
Invasion Barrier
Loading Channel
c
Flow Channel
Perfusion Barrier
Invasion Chamber

FIG. 3A-C



FIG. 4A

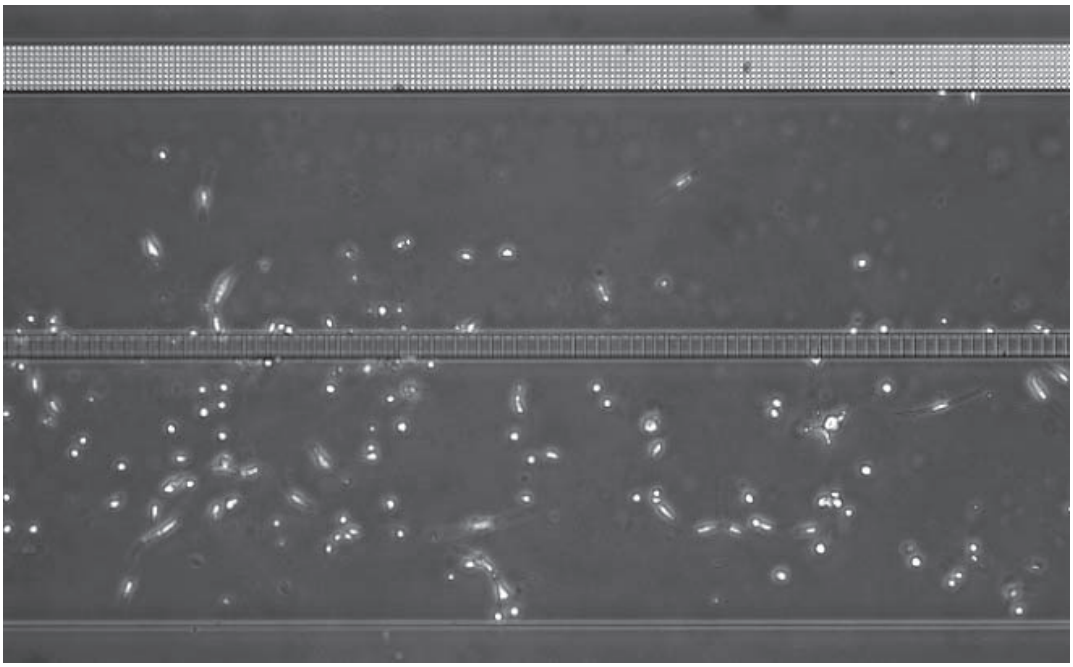


FIG. 4B

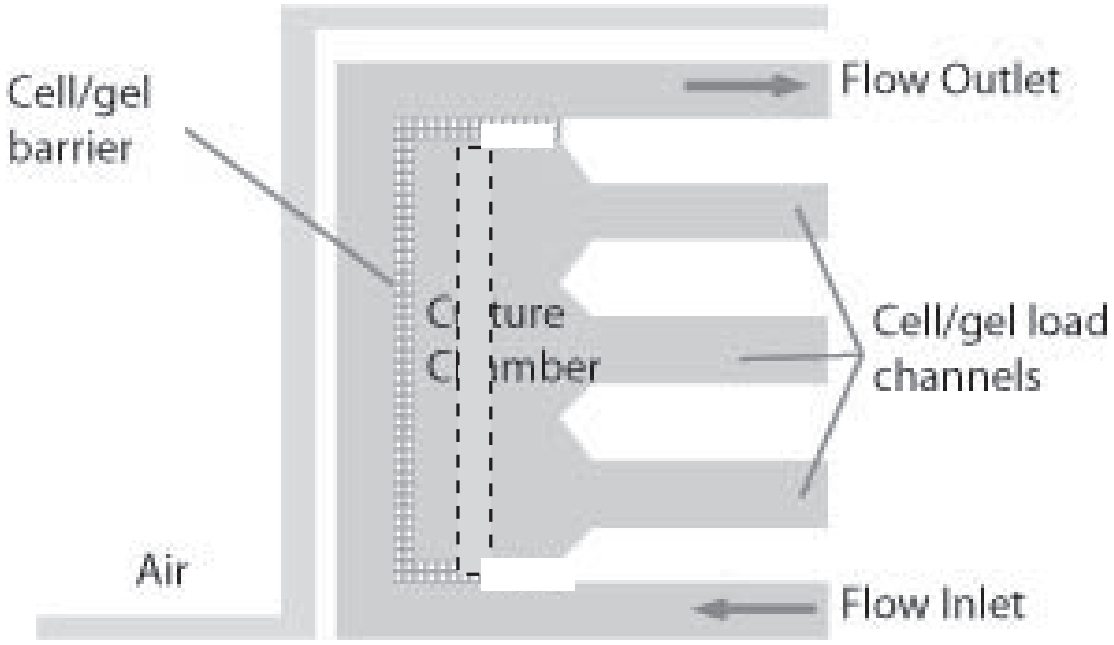

Cell/gel
barrier
Flow Outlet
Cell/gel load
channels
Air
Flow Inlet

FIG. 5A

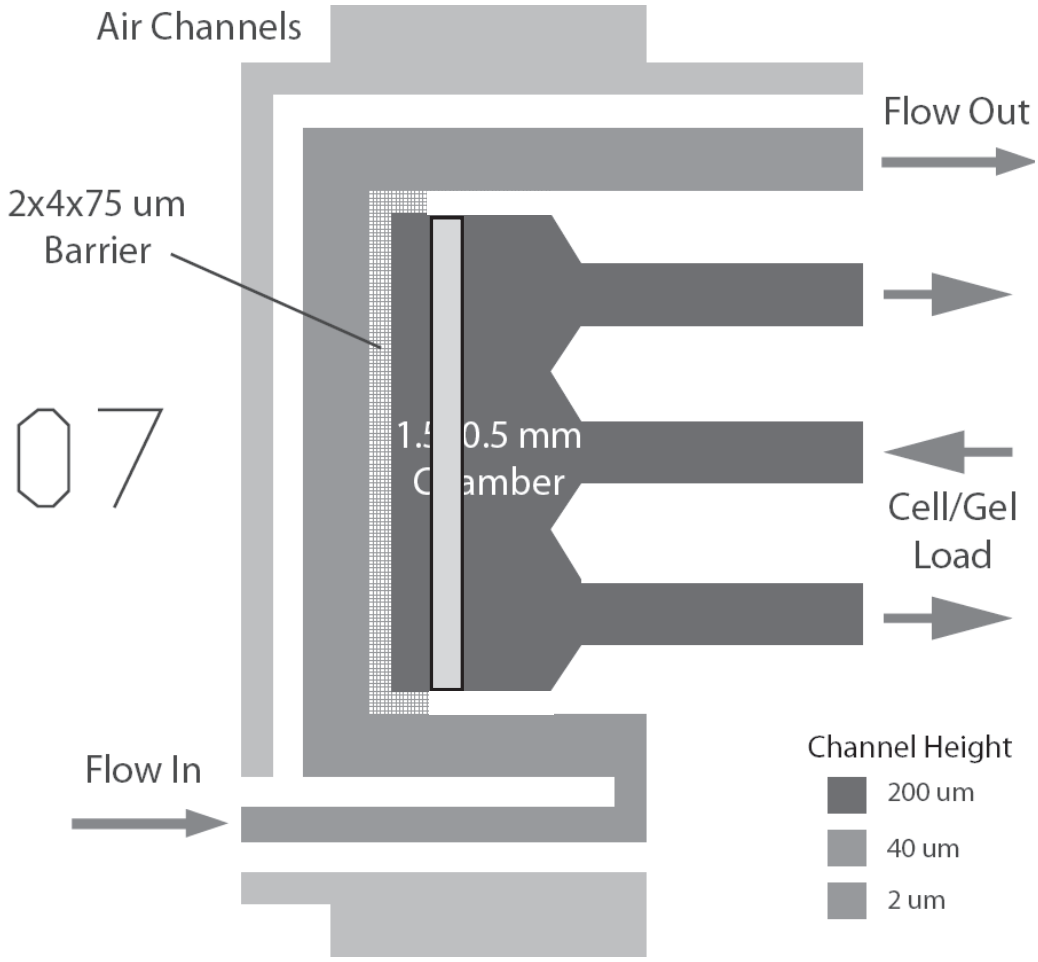

Air Channels
Flow Out
2x4x75 um
Barrier
07
Cell/Gel
Load
Flow In
Channel Height
200 um
40 um
2 um

FIG. 5B

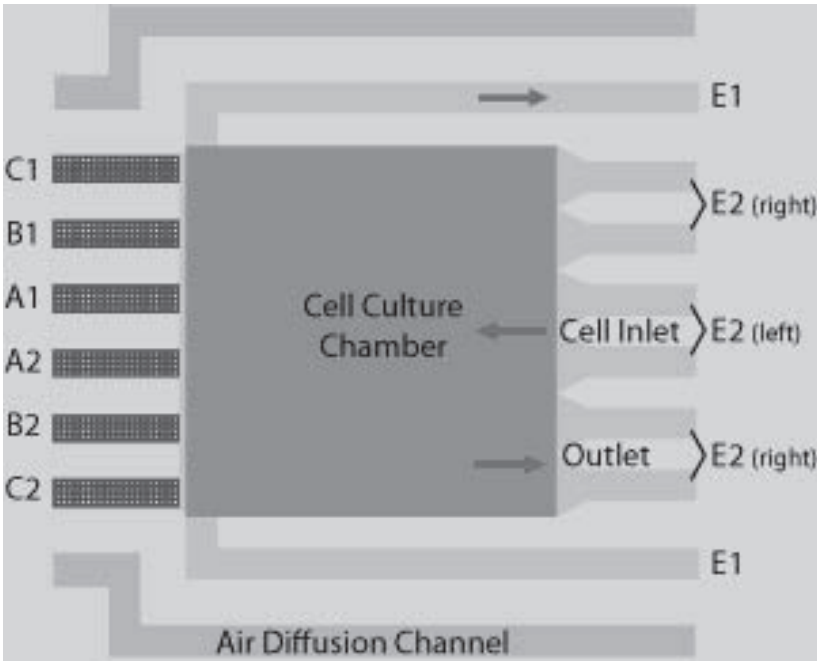


FIG. 6A (SIX WELLS UPSTREAM)

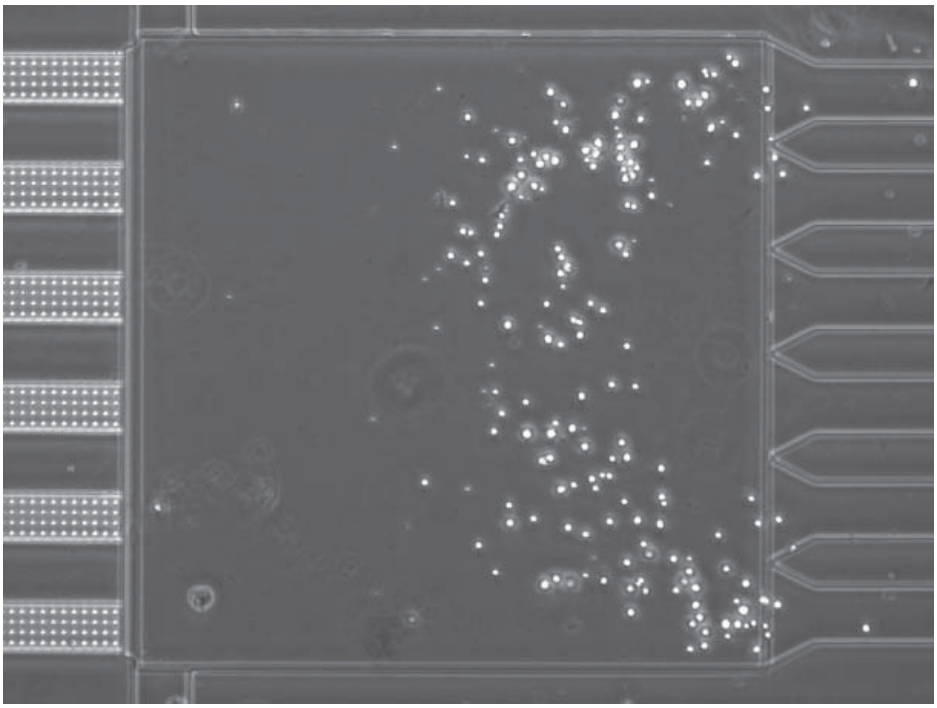


FIG. 6B

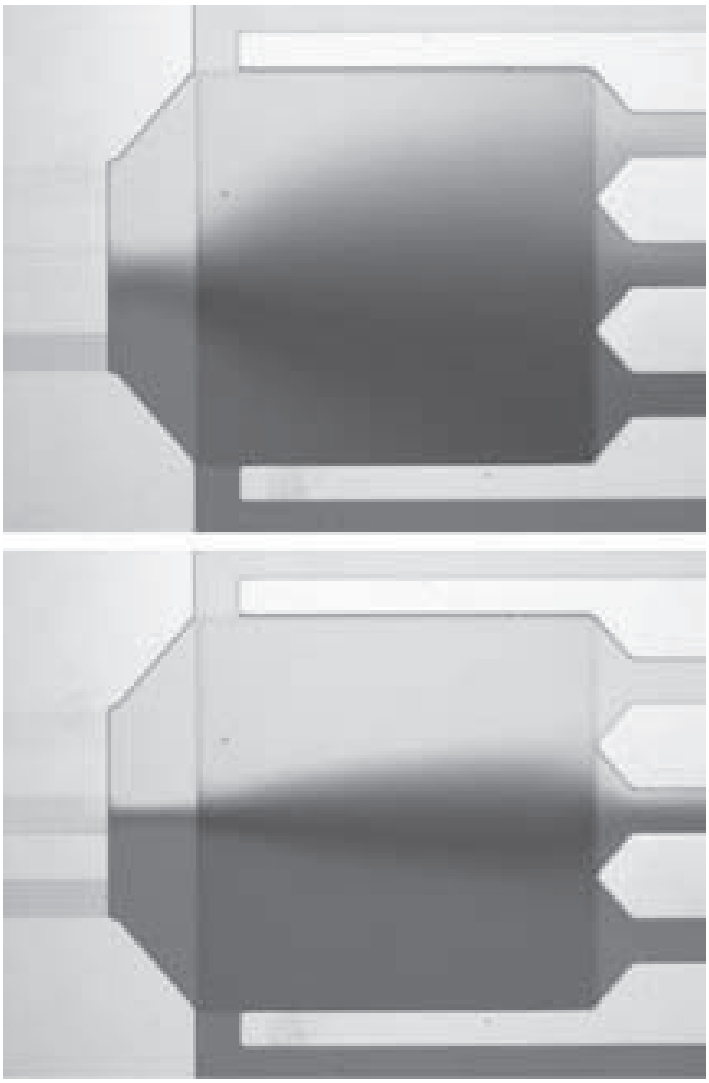


FIG. 6C

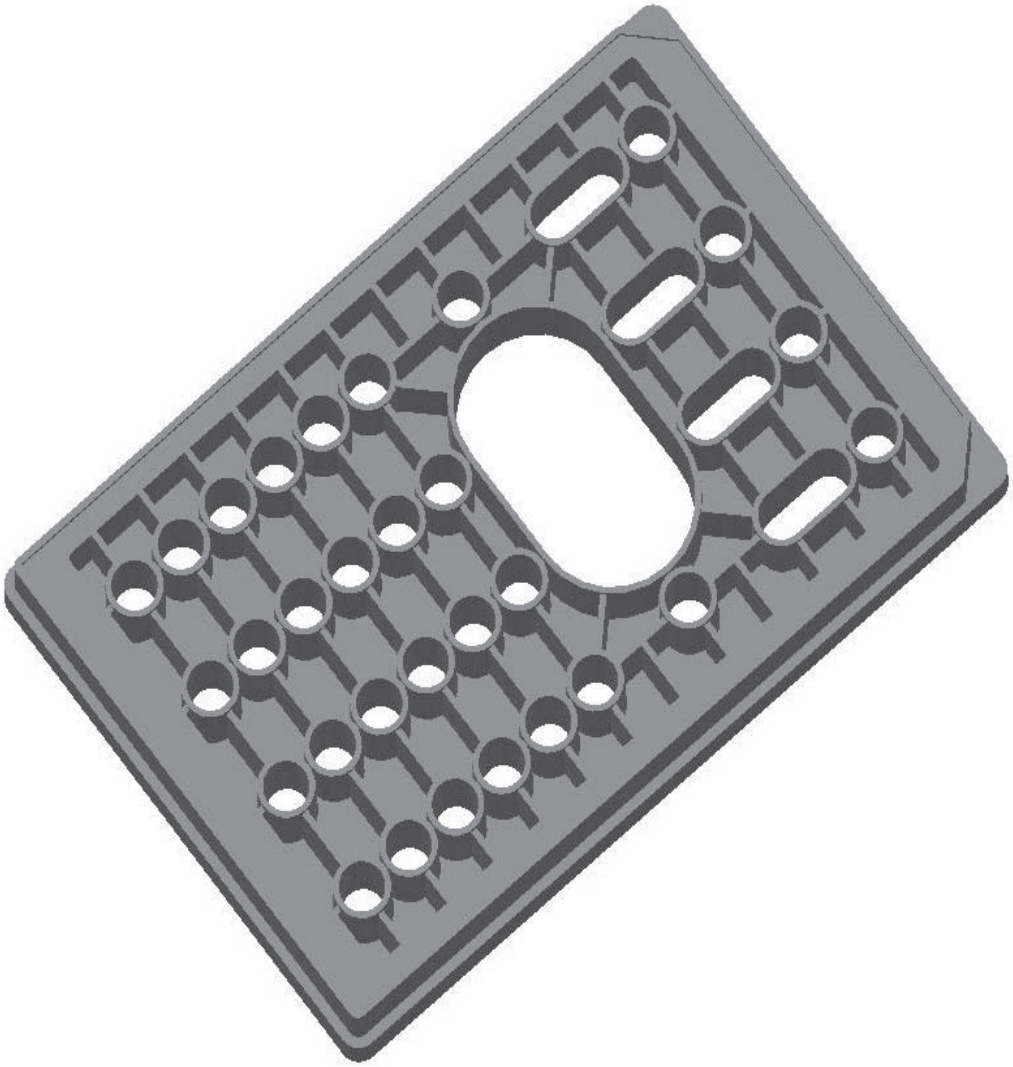


FIG. 7

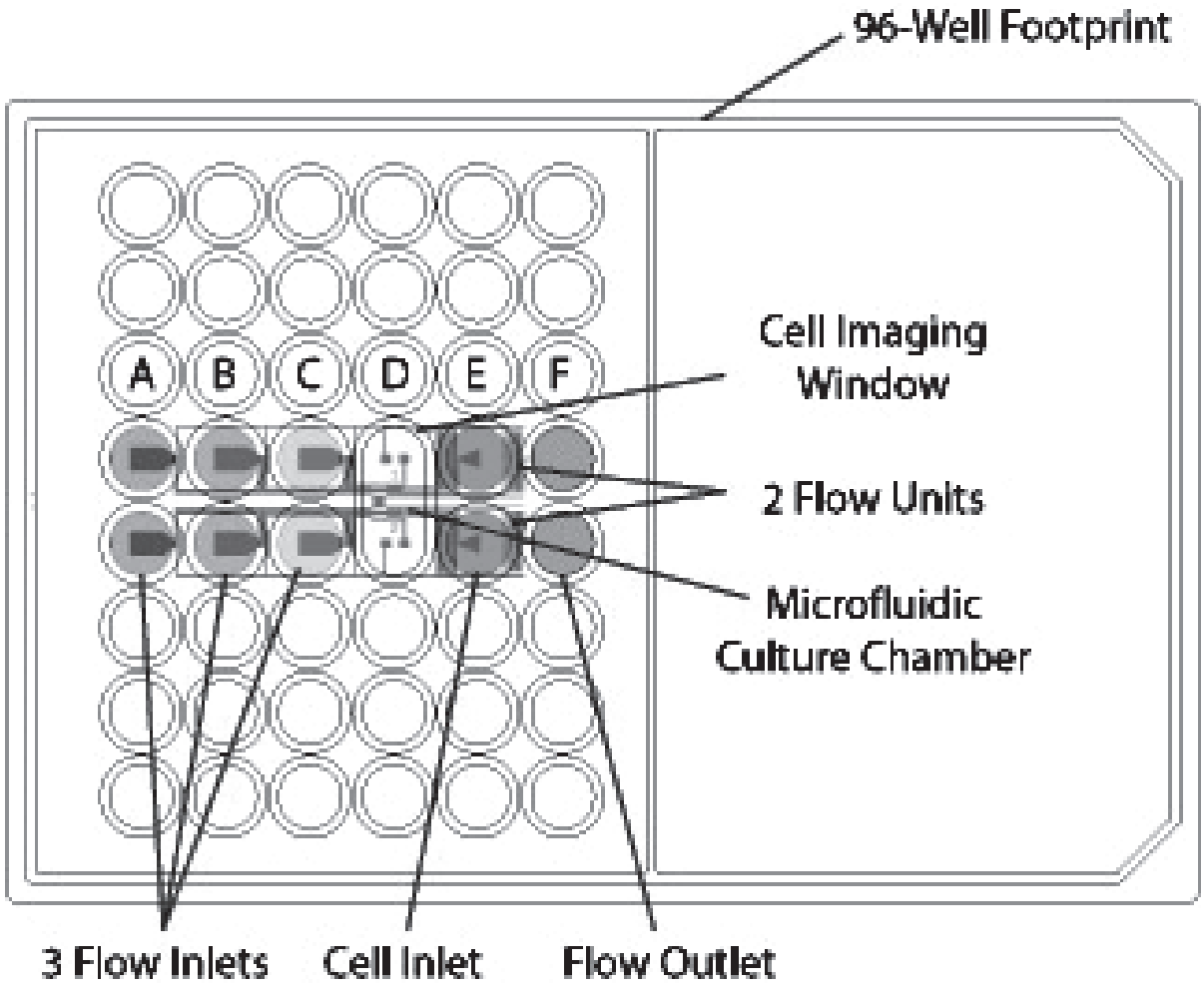

96-Well Footprint
A
B
C
D
E
F
Cell Imaging Window
2 Flow Units
Microfluidic Culture Chamber
3 Flow Inlets
Cell Inlet
Flow Outlet

FIG. 8

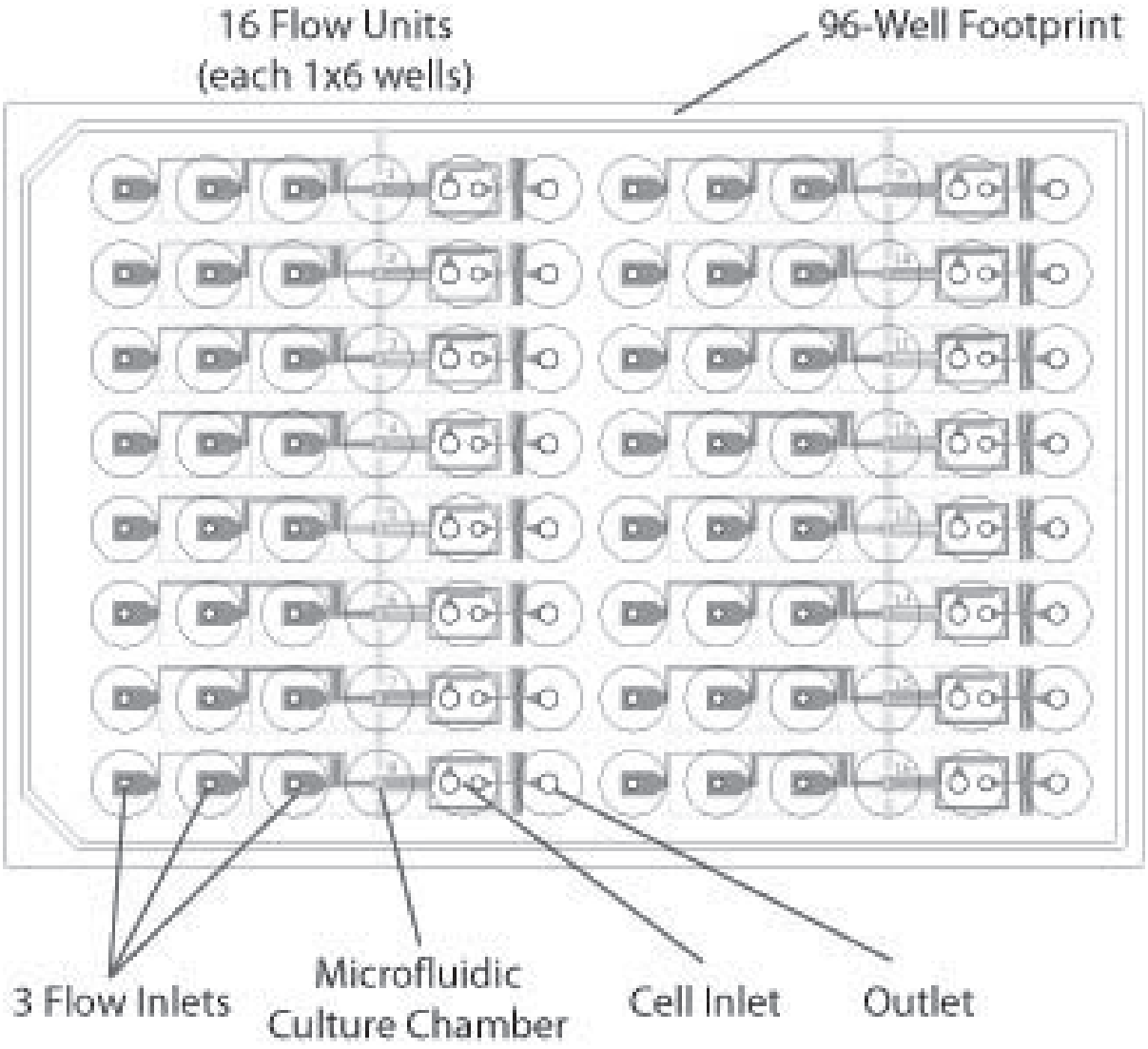

16 Flow Units
(each 1x6 wells)
96-Well Footprint
3 Flow Inlets
Microfluidic
Culture Chamber
Cell Inlet
Outlet

FIG. 9

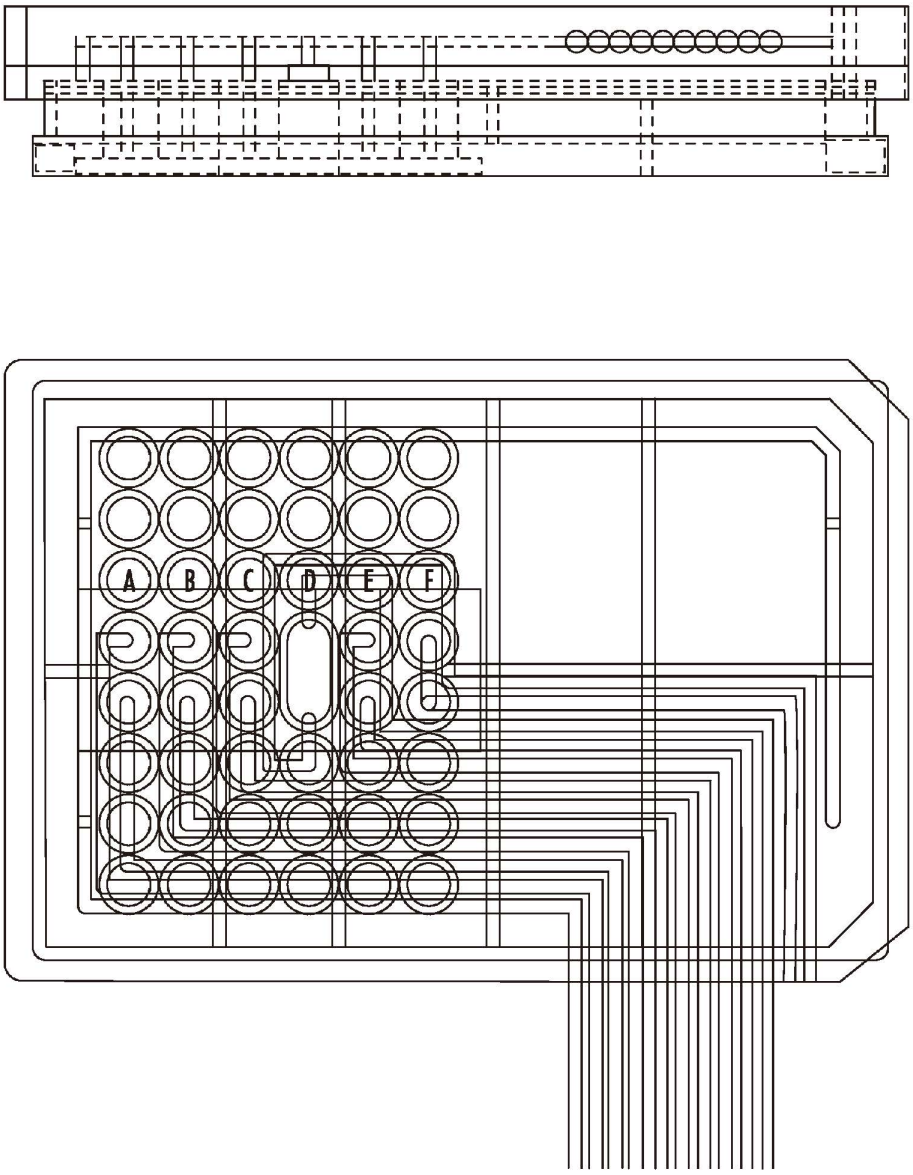


FIG. 10

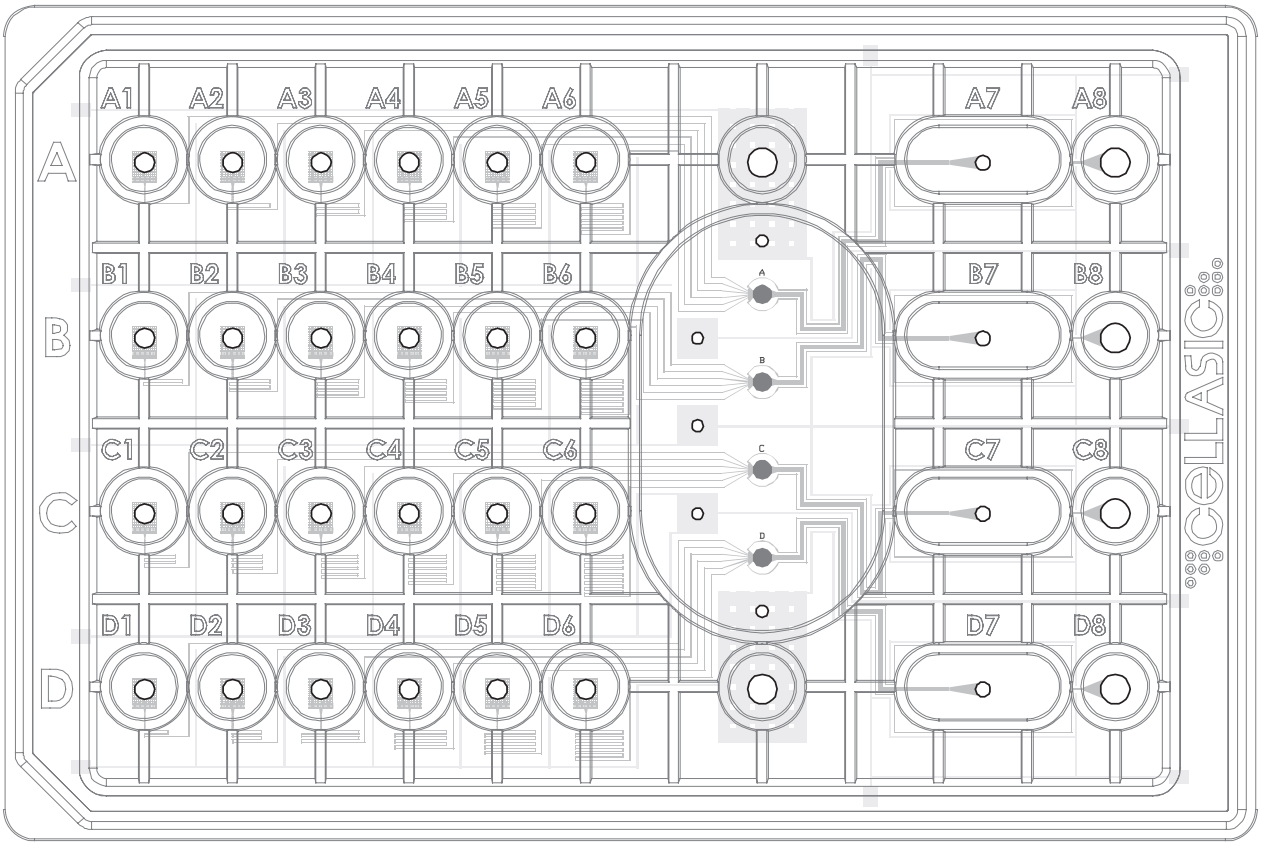

A1
A2
A3
A4
A5
A6
A7
A8
B1
B2
B3
B4
B5
B6
B7
B8
C1
C2
C3
C4
C5
C6
C7
C8
D1
D2
D3
D4
D5
D6
D7
D8
A
B
C
D
cellasic

FIG. 11A



FIG. 11B

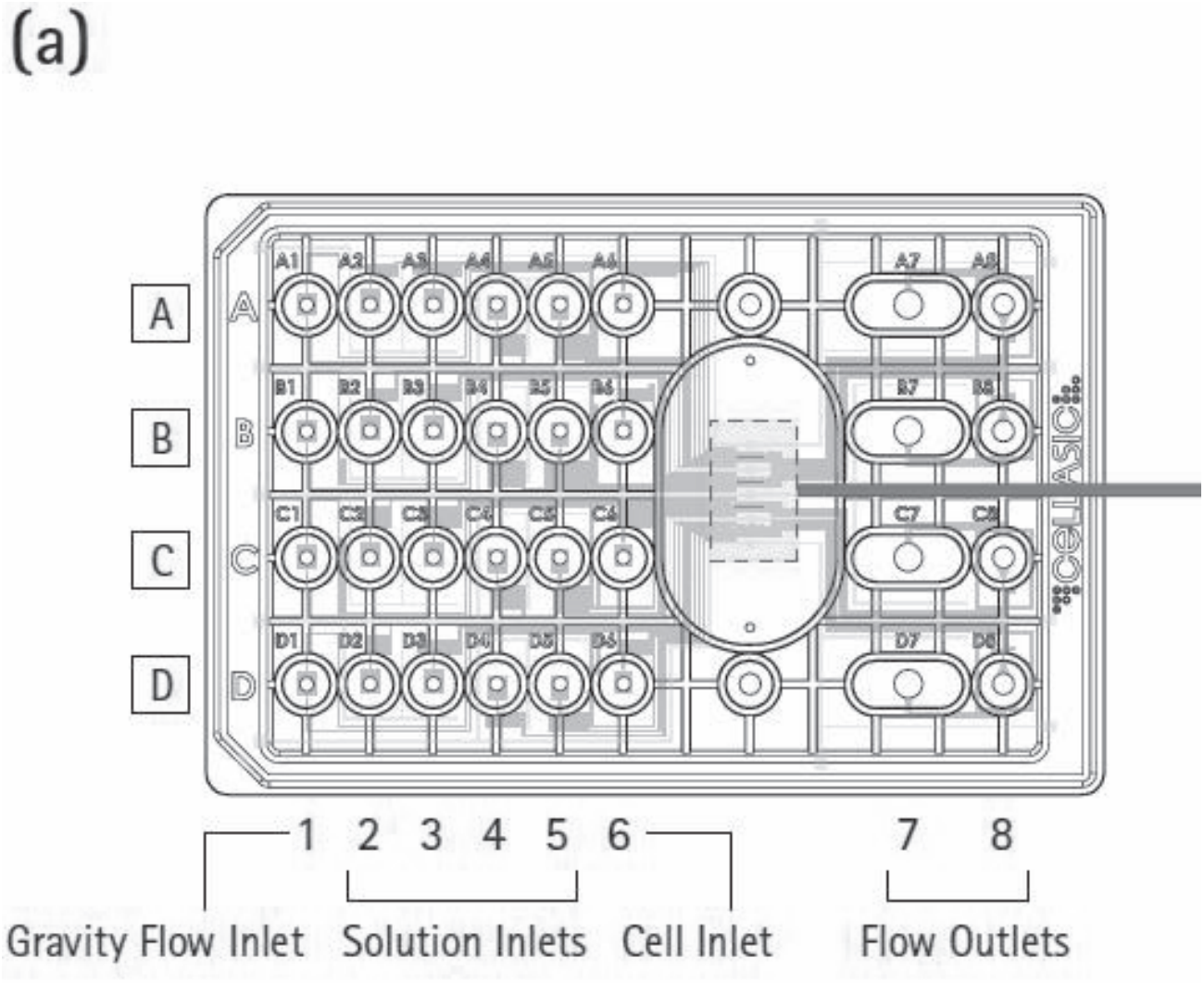

(a)
A
B
C
D
1
2
3
4
5
6
7
8
Gravity Flow Inlet
Solution Inlets
Cell Inlet
Flow Outlets
cell ASIC

FIG. 12A

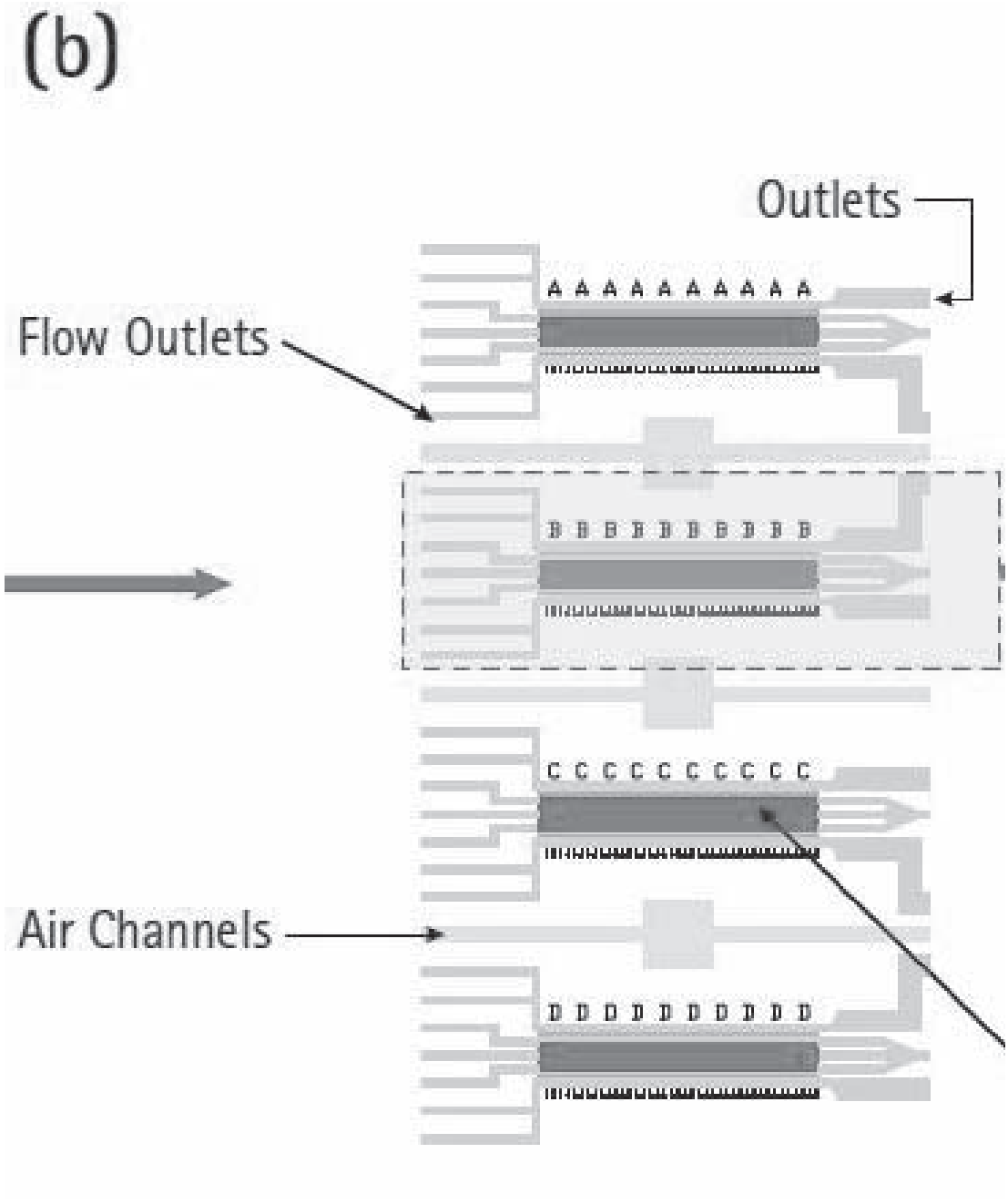


FIG. 12B

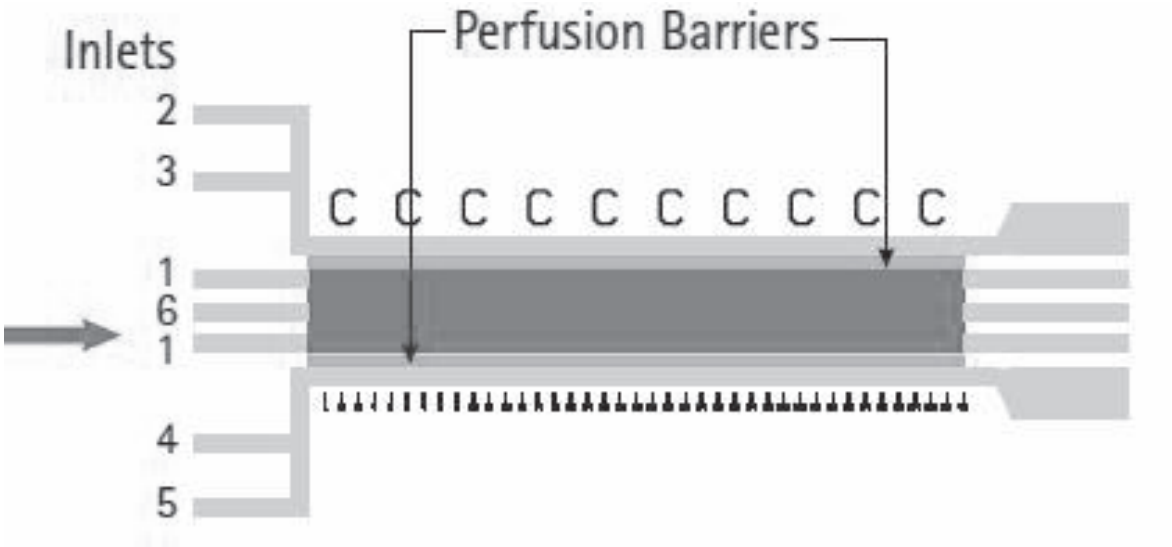


FIG. 12C

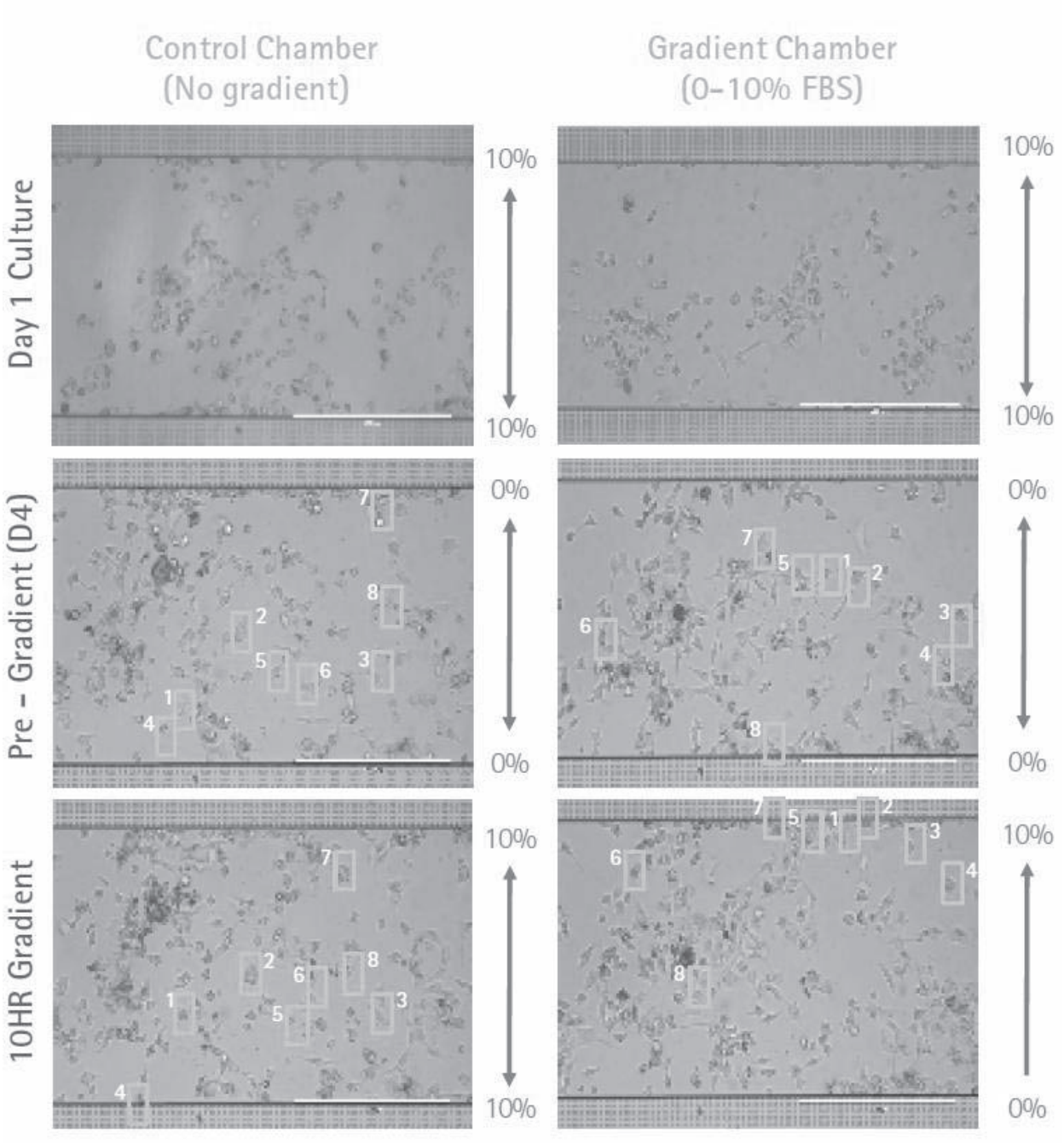

Control Chamber
(No gradient)
Gradient Chamber
(0–10% FBS)
Day 1 Culture
Pre – Gradient (D4)
10HR Gradient
10%
10%
10%
10%
0%
0%
0%
0%
10%
10%
10%
0%

FIG. 13

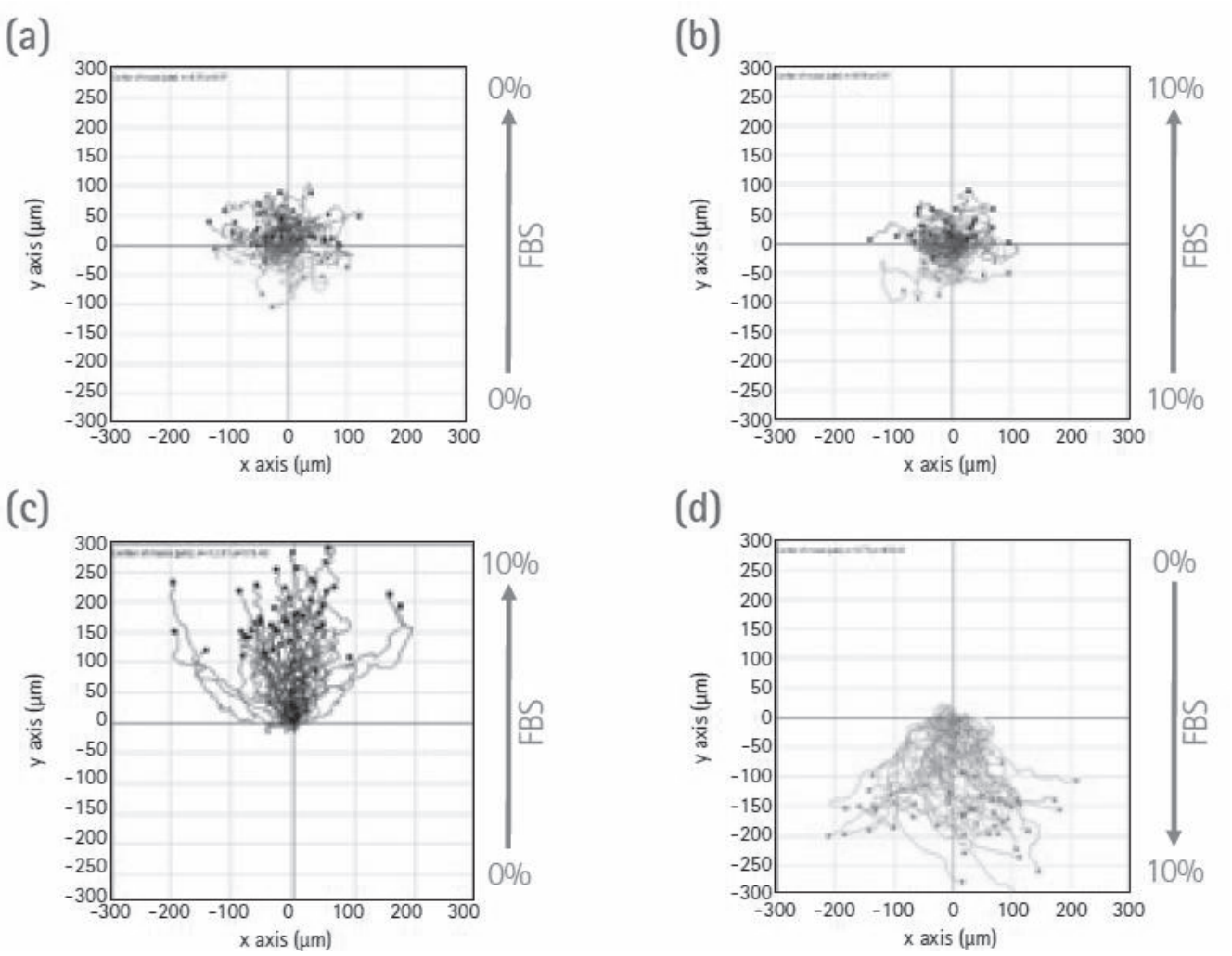

(a)
(b)
(c)
(d)
y axis (μm)
x axis (μm)
FBS
0%
10%
300
250
200
150
100
50
0
-50
-100
-150
-200
-250
-300

FIG. 14

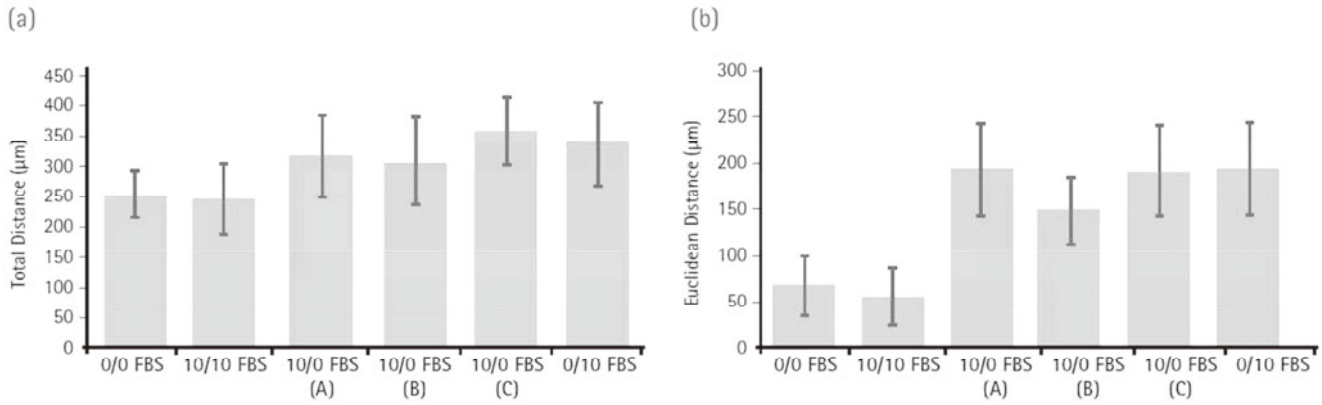

(a)
Total Distance (μm)
450
400
350
300
250
200
150
100
50
0
0/0 FBS
10/10 FBS
10/0 FBS (A)
10/0 FBS (B)
10/0 FBS (C)
0/10 FBS
(b)
Euclidean Distance (μm)
300
250
200
150
100
50
0
0/0 FBS
10/10 FBS
10/0 FBS (A)
10/0 FBS (B)
10/0 FBS (C)
0/10 FBS

FIG. 15

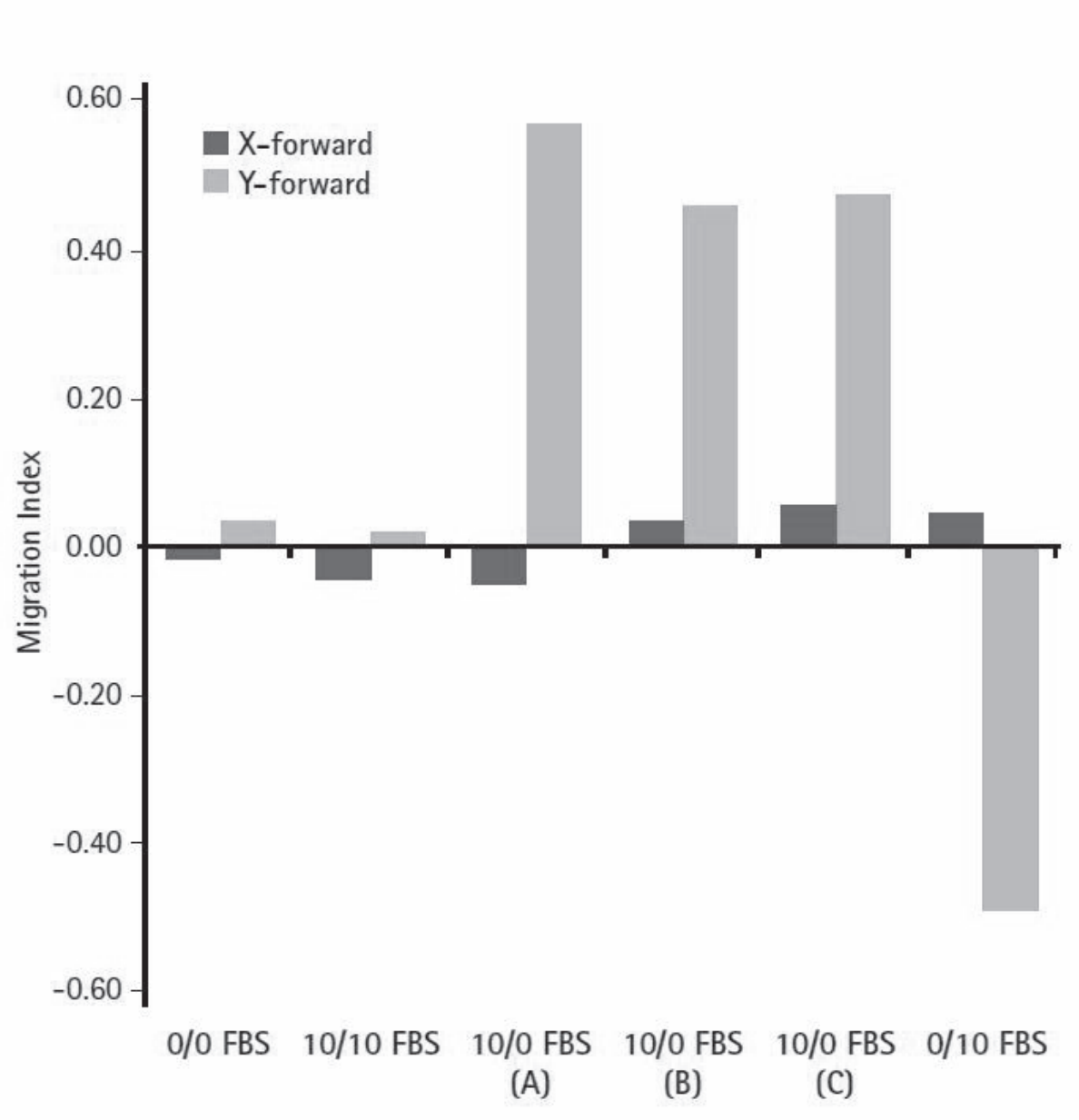

0.60
0.40
0.20
0.00
-0.20
-0.40
-0.60
Migration Index
X-forward
Y-forward
0/0 FBS
10/10 FBS
10/0 FBS (A)
10/0 FBS (B)
10/0 FBS (C)
0/10 FBS

FIG. 16

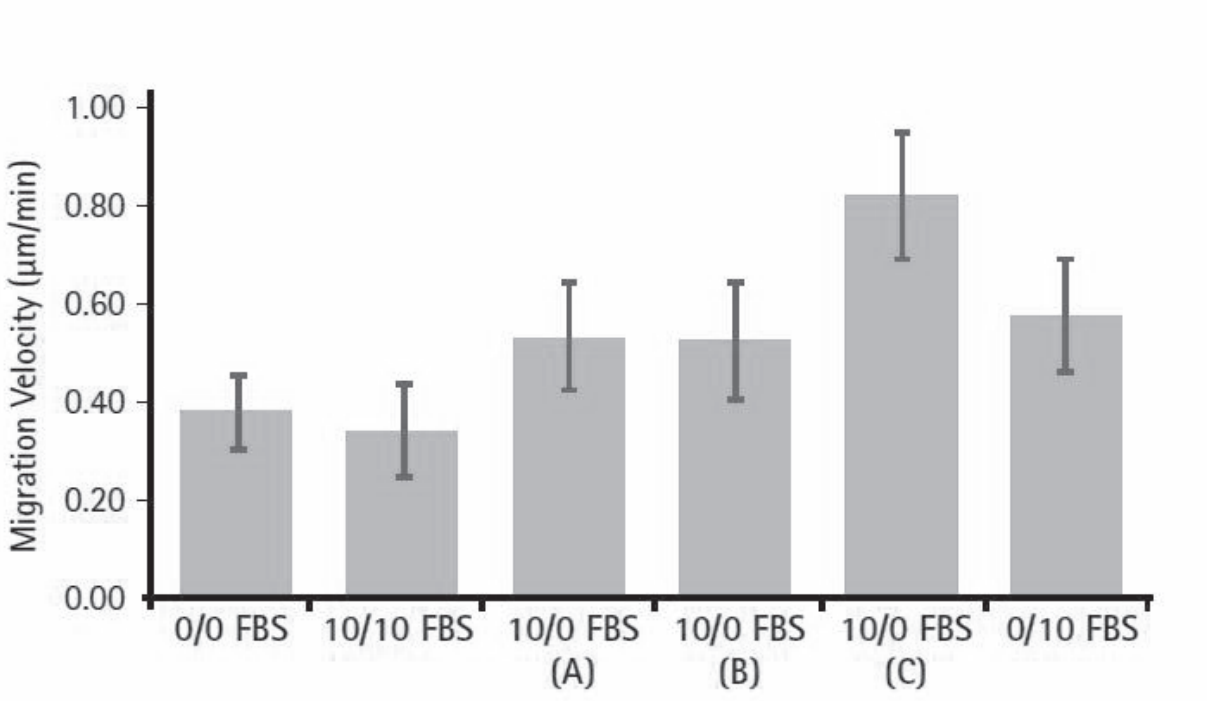

Migration Velocity (μm/min)
1.00
0.80
0.60
0.40
0.20
0.00
0/0 FBS
10/10 FBS
10/0 FBS (A)
10/0 FBS (B)
10/0 FBS (C)
0/10 FBS

FIG. 17

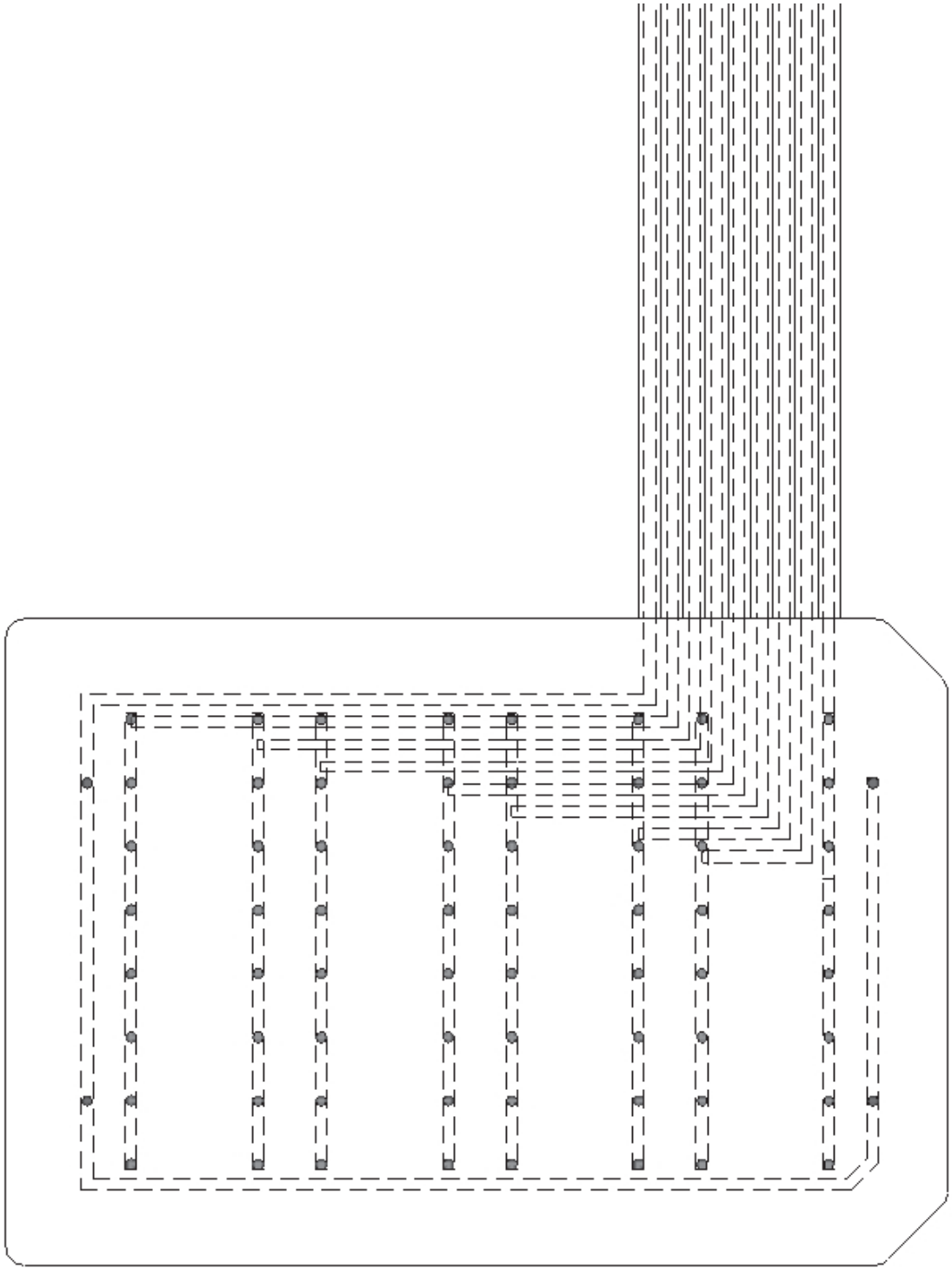


FIG. 18A

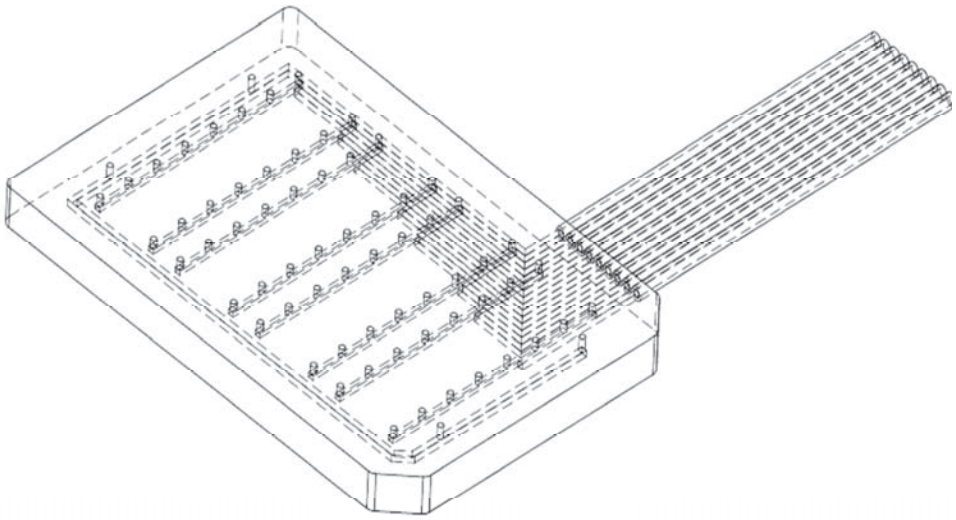


FIG. 18B

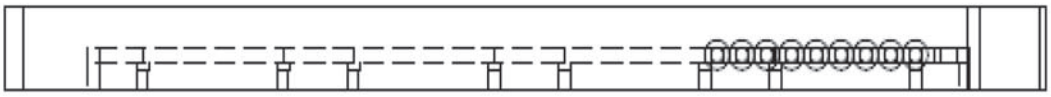


FIG. 18C



FIG. 19

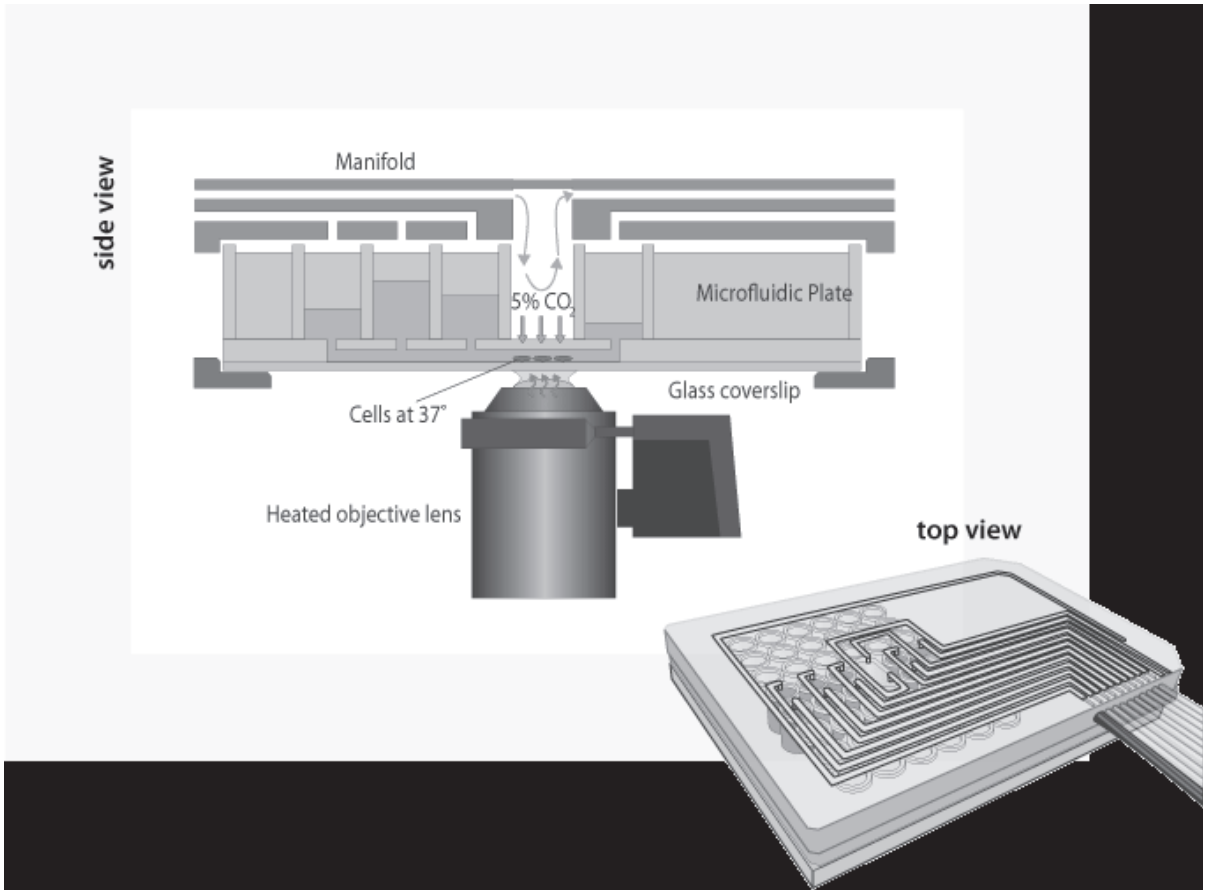

side view
Manifold
5% CO_2
Microfluidic Plate
Glass coverslip
Cells at 37°
Heated objective lens
top view

FIG. 20

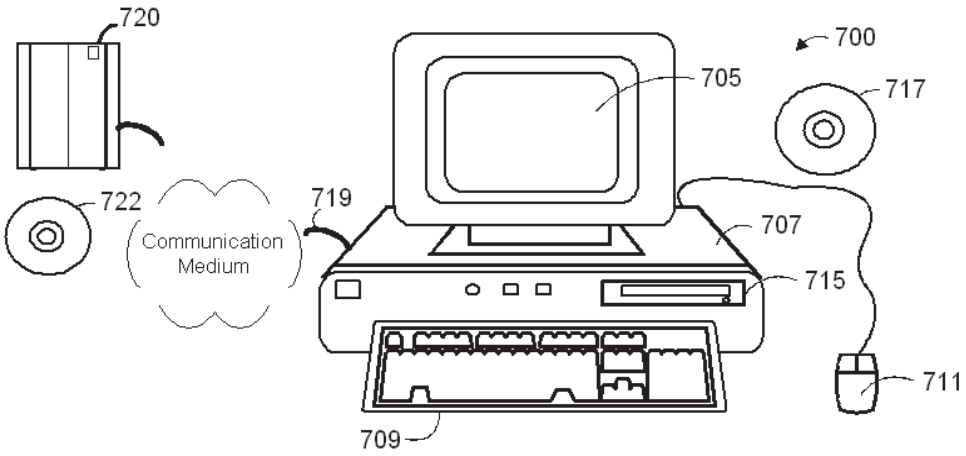


FIG. 21

Disease Classification	
Cardiovascular Disease	Aetherosclerosis; Unstable angina; Myocardial Infarction; Restenosis after angioplasty or other percutaneous intervention; Congestive Heart Failure; Myocarditis; Endocarditis; Endothelial Dysfunction; Cardiomyopathy
Endocrine Disease	Diabetes Mellitus I and II; Thyroiditis; Addisson's Disease
Infectious Disease	Hepatitis A, B, C, D, E; Malaria; Tuberculosis; HIV; Pneumocystis Carinii; Giardia; Toxoplasmosis; Lyme Disease; Rocky Mountain Spotted Fever; Cytomegalovirus; Epstein Barr Virus; Herpes Simplex Virus; Clostridium Deficile Colitis; Meningitis (all organisms); Pneumonia (all organisms); Urinary Tract Infection (all organisms); Infectious Diarrhea (all organisms)
Angiogenesis	Pathologic angiogenesis; Physiologic angiogenesis; Treatment induced angiogenesis
Inflammatory/Rheumatic Disease	Rheumatoid Athritis; Systemic Lupus Erythematosis; Sjogrens Disease; CREST Syndrome; Scleroderma; Ankylosing Spondylitis: Crohn's; Ulcerative Colitis; Primary Sclerosing Cholangitis; Appendicitis; Diverticulitis; Primary Biliary Sclerosis; Wegener's Granulomatosis; Polyarteris nodosa; Whipple's Disease; Psoriasis; Microscopic Polyanngiitis; Takayasu's Disease; Kawasaki's Disease; Autoimmune hepatitis; Asthma; Churg-Strauss Disease; Beurger's Disease; Raynaud's Disease; Cholecystitis; Sarcoidosis; Abestosis; Pneumoconioses
Transplant Rejection	Heart; Lung; Liver; Pancreas; Bowel; Bone Marrow; Stem Cell; Graft versus host disease; Transplant vasculopathy
Leukemia and Lymphoma	

FIG. 22. (TABLE 1)