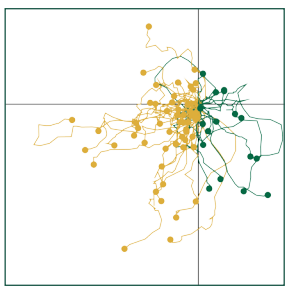
CellDirector®

Microfluidic Cell Migration and Morphogenesis Assays

SAVE HOURS!
NEW Automated Software
Tracking Tool™ PRO



gradientech

The CellDirector assay makes it possible to analyse true cell chemotaxis and to distinguish between chemotaxis and random cell migration. The amount of high-quality data generated is truly impressive. This is the best method for analyzing cell migration currently available.

Dr. Pär Gerwins
MD, Prof. in Vascular Biology,
Uppsala University, Sweden

Stable gradients and simple handling

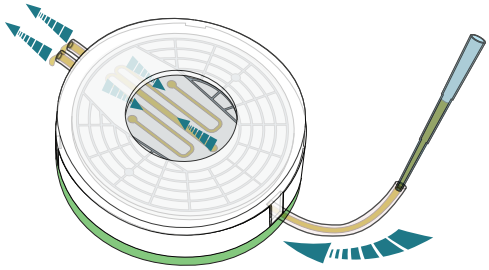
Chemotaxis - crucial in biology
Cells in the body secrete and respond to gradients of a large number of substances, such as growth factors, cytokines and extracellular matrix components – this is the way cells communicate *in vivo*. Chemotaxis, the unidirectional movement of cells towards a chemoattractant, plays crucial roles in biological processes such as immune responses, embryogenesis, wound healing and cancer metastasis.

Bridging *in vitro* and *in vivo*
CellDirector assays enable you to analyse live cell responses at high resolution and with full control of the chemotactic environment, thereby bridging the gap between *in vitro* and *in vivo* experiments. With a minimum of external equipment, CellDirector assays offer you the ability to get started quickly and perform high-quality research experiments at low start-up costs.

CellDirector® 2D

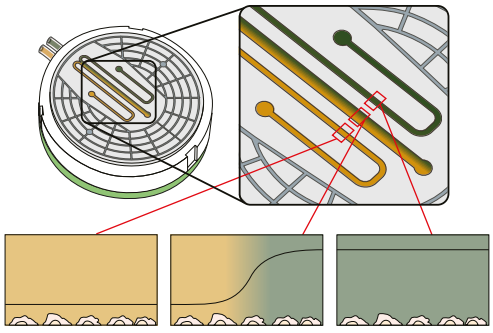
Principle of operation

Loading of cells



Cells are seeded in a single step by injecting the cell suspension through the outlet tube.

Gradients and cell culture models

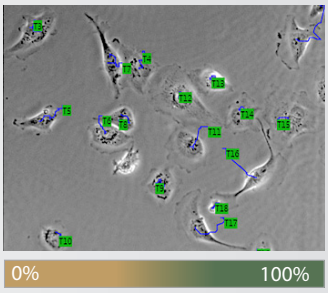


The injected cells adhere and 2D chemotactic cell responses are measured in the gradient region. Non-gradient cell behavior is measured in the control regions.

Applications

- Neutrophil and macrophage chemotaxis
- Metastatic cancer cell chemotaxis
- Chemotaxis of endothelial cells
- Cell differentiation

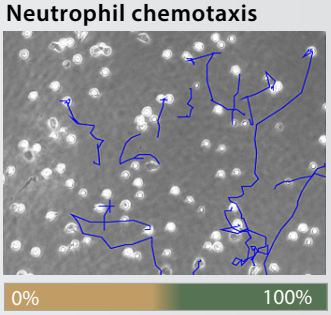
Cancer cell chemotaxis



In vivo, metastatic cancer cells detach from their original site, travel through the vasculature and proliferate at a second site.

Chemotaxis is believed to play an important role during intravasation, extravasation and metastasis of cancer cells.

Neutrophil chemotaxis



Neutrophils are fast migrating cells that are attracted to sites of injury to help fight infections.

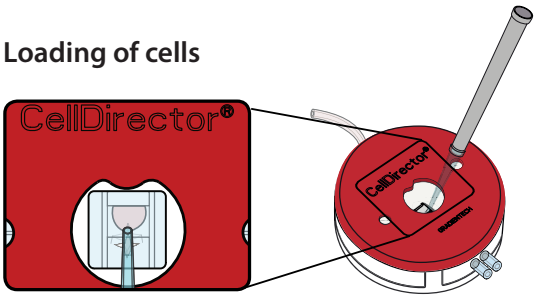
Chemotaxis of neutrophils towards chemical signals released by other cells is essential for the functions of the immune system.

CellDirector® 2D features	Benefits
Constantly replenished cell media Gas permeable	Excellent cell culture conditions
Controlled gradients Live cell tracking Individual migration paths	High-quality results
No assembly needed, simple to handle, very few manual steps	Quick set-up for new users High reproducibility Generates results fast
Use with or without coating	Easy transfer of your standard cell culture protocol

CellDirector® 3D

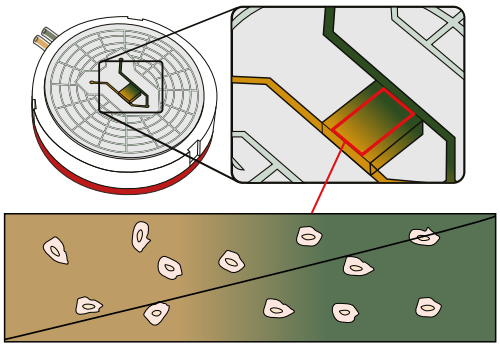
Principle of operation

Loading of cells



The cell-matrix mixture is injected into the cell culture chamber with a standard pipette through the cross-shaped slit.

Gradients and cell culture models

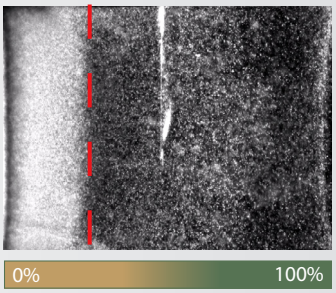


Cells, spheroids or small tissue samples are embedded in the 3D matrix. A linear gradient is formed through the matrix, allowing for cell responses under *in vivo*-like conditions.

Applications

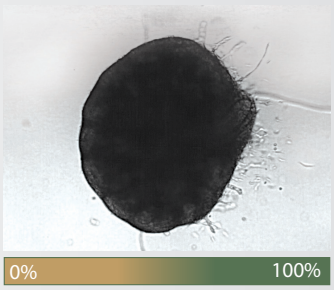
- Initiation and suppression of angiogenesis
- Determination of MIC for microorganisms
- Axon guidance
- Stem cell migration and differentiation

Minimum inhibitory concentration (MIC)



The MIC is the lowest concentration of an antibiotic that will inhibit the growth of a microorganism. The MIC for *E. Coli* is here determined by applying a gradient of an antibiotic, indicated by the sharp transition between living and dead cells.

Blood vessel formation

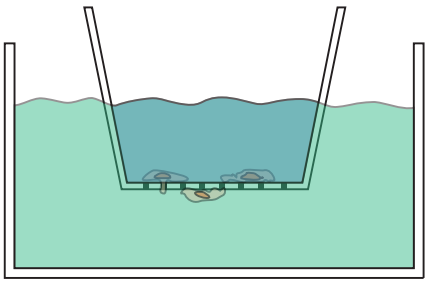


Blood vessel formation, from pre-existing vessels or via vasculogenesis, is initiated and controlled by chemical gradients, here exemplified by directed vessel formation from an embryonic mouse kidney in a 3D matrix.

CellDirector® 3D features	Benefits
Cell culture in 3D	Bridges the gap between *in vitro* and *in vivo* experiments Allows culture of small tissue samples and spheroids
Controlled gradients Live cell tracking	High quality results
Constantly replenished cell media Gas permeable	Excellent cell culture conditions
No assembly needed, simple to handle, very few manual steps	Quick set-up for new users High reproducibility Generates results fast
Compatible with many 3D matrices	Easy transfer of your standard cell culture protocols

Boyden chamber

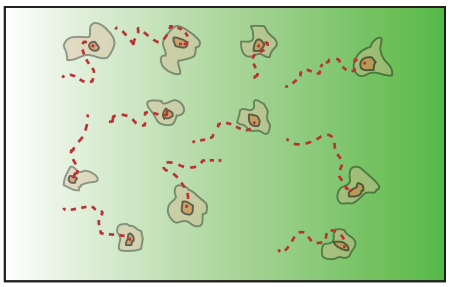
Migration through membrane pores in a constantly changing gradient. Only end-point data available.



Traditional cell migration analysis methods such as the **Boyden chamber** are end-point methods, and thus have various limitations: The gradients are not well-established or controlled, live cell tracking is not possible and chemotaxis cannot be distinguished from random cell migration.

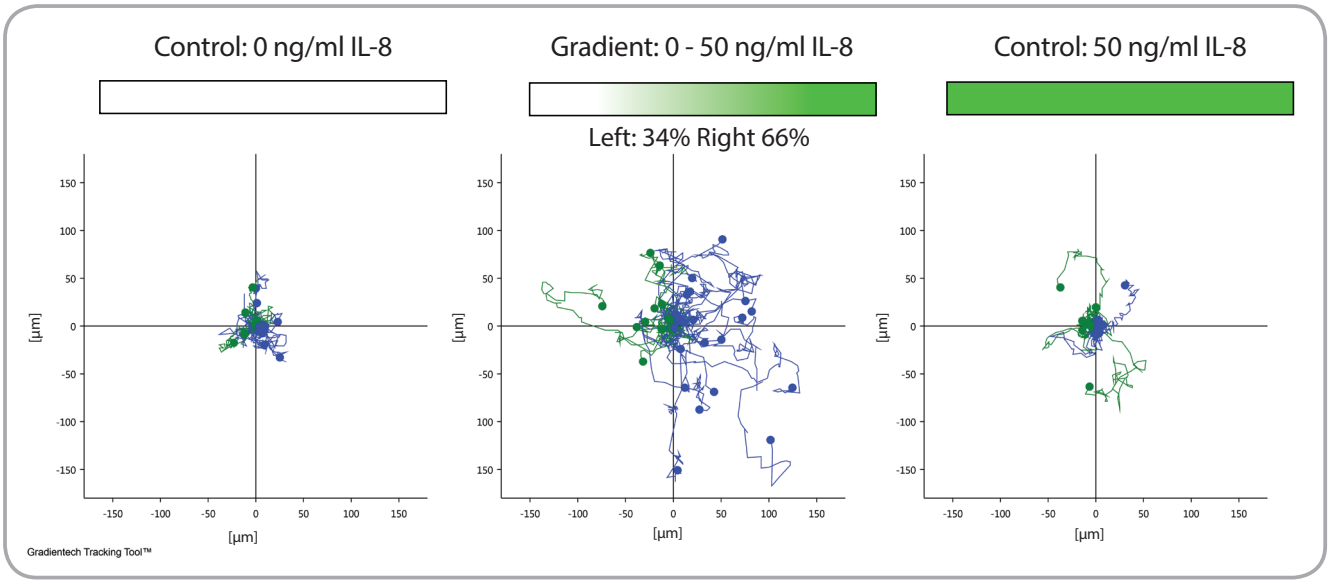
CellDirector®

Migration in a controlled and well-established gradient. Time-lapse imaging provides migration data throughout the whole experiment (start-to-end).



CellDirector helps you overcome all these limitations and generates research results of the highest quality. CellDirector assays for chemotaxis and morphological cell response studies offer you to mimic physiological cell culture conditions with full control of the chemotactic environment.

Boyden chamber	Features	CellDirector®
✓	Analysis of single cells	✓
×	Well-established and controlled gradients	✓
×	Get migration velocities, distances and directionality	✓
×	Distinguish chemotaxis from random cell migration	✓
×	Live cell tracking, get individual migration paths	✓
×	Analysis of complex 3D cell cultures	✓

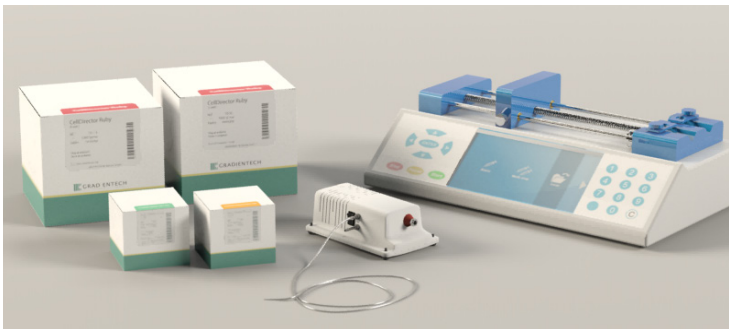


One single experiment with CellDirector 2D confirms that human neutrophils migrate towards a stable gradient of IL-8. CellDirector 2D contains not only a gradient region, but also control regions with 0% and 100% of the chemoattractant.

CellDirector® Start-Kits

CellDirector experiments require a minimum of equipment in addition to your imaging microscope. A Start-Kit will allow you to quickly set up your first CellDirector experiments.

The Start-Kit can be ordered with CellDirector 2D or CellDirector 3D assays and provides you with material for running 20 high-quality experiments.



A Start-Kit includes:

CellDirector® 2D or 3D (20 assays)	» Syringes and tubes for every assay » All items are delivered sterile
Gradient Marker FITC 20K (1ml) Gradient Marker TRITC 20K (1ml)	» Dilute 1:20 in the cell media containing your gradient substance » Enables direct visualisation of gradient direction
Vacuum 104	» Reduces the risk of bubble formation during the experiment

Complementary products recommended:

Fusion 100	» Syringe pump providing accurate fluid flows for CellDirector » Touch screen interface
CellDirector® Holder	» Fits microtiter plate frames » Holds CellDirector in place when using a motorised stage

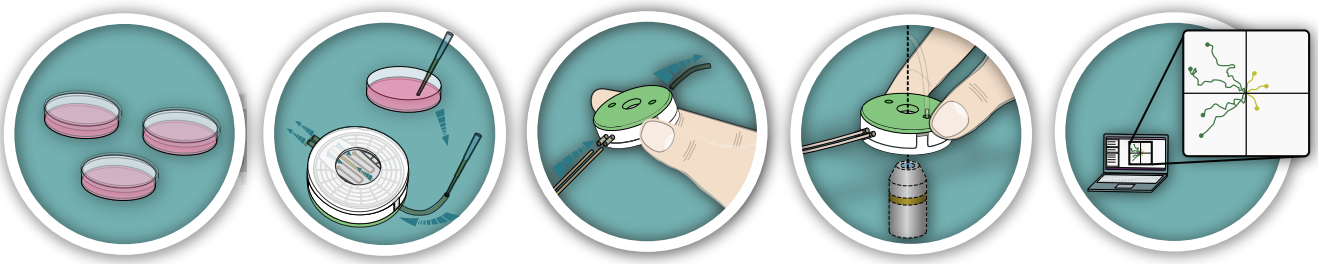
Required equipment:

- Upright or inverted time-lapse microscope
- A standard lab bench degassing chamber (only for CellDirector 3D)

Recommended equipment for your microscope:

- Cell culture incubator
- Motorised x-y stage

CellDirector® - Quick and easy set-up



1. Culture your cells in an incubator

2. Load your cells into CellDirector

3. Apply steady-state gradient by connecting the tubes

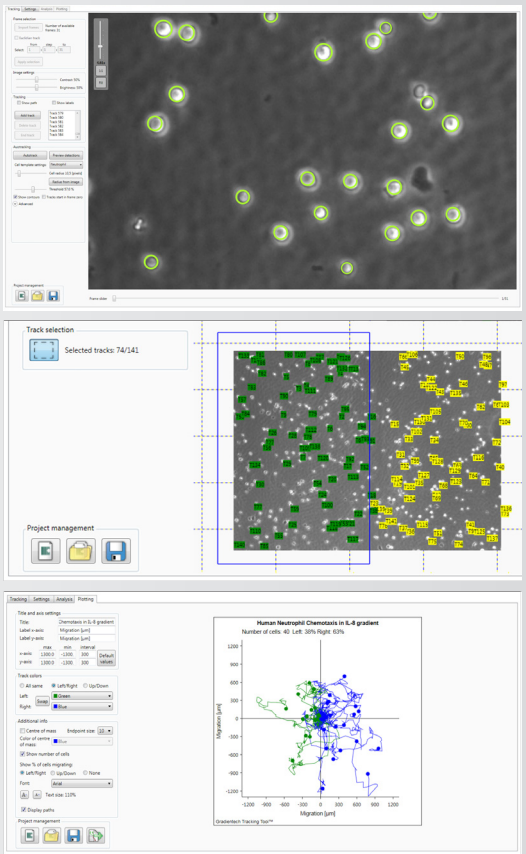
4. Place CellDirector in a microscope and collect images

5. Analyse and get true chemotaxis results

Tracking Tool™ PRO

Tracking Tool PRO software is the latest within automated cell identification and cell tracking analysis. Install the software, use a software ticket and quickly analyse your cell migration and chemotaxis image data. Tracking Tool PRO is a stand-alone software based on GPU programming, which results in very short analysis times even for massive image sequences. Specific care has been paid to its intuitive and simple workflow, while still giving you full control of the automated features.

Save hours with automated analysis and maintain the quality, accuracy and user control of manual cell tracking.



» **Tracking Tool™ PRO** shows outstanding automated cell identification and tracking results compared to other software solutions

» **Save hours** compared to manual tracking

» **Stand-alone software** without plug-ins makes it simple to use and quick to get started

» Includes FREE manual cell tracking

» **Specific project file format** (.gtt) lets you return to saved work at any time to add and delete tracks, or customise the plot

» **Unlimited analysis** per software ticket for each image sequence

» Handles standard image formats (.jpg and .tiff)

» **Contains unique Area Selection Tool**: analyse chemotactic cell responses in various parts of the gradient with just a few clicks

Tracking Tool™ PRO features	Benefits
Intuitive, stand-alone software	Quick set-up and easy to use
State-of-the-art automated cell tracking	Save hours with maintained quality & accuracy
Handles .tiff and .jpeg image sequences	Acquire images with any type of microscope
Saves all work within a single project file (.gtt)	Return to your saved work and customise at any time
Special area selection tool	Analyse cell responses in various parts of the gradient with just a few clicks
High-resolution plots	Exported plots are ready for publication

Order information

CellDirector assays

CellDirector 2D (10 assays/box)	11-001-10
CellDirector 3D (10 assays/box)	10-001-10

Accessories

CellDirector Holder	70-001
Fusion 100	90-001
Vacuum 104	91-001
Vacuum 104 US	92-001
Vacuum 104 AUS	93-001
Vacuum 104 UK	94-001

Gradient visualisation

Gradient Marker FITC 20K	80-001
Gradient Marker TRITC 20K	81-001

Software

Tracking Tool™ PRO	31-001
TTP-10, 10 tickets	31-001-10
TTP-50, 50 tickets	31-001-50

All listed Gradientech products are for research use only.

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MAR003-03 Product Brochure