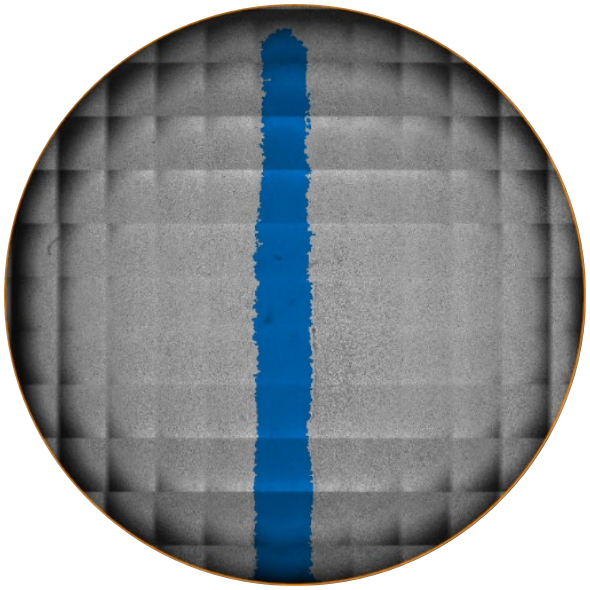
>> Cell Migration and Scratch Assays

Cell migration plays a crucial role in various biological processes, from embryonic development to wound healing to cancer disease progression. Scratch assays on Axion BioSystems' AI-powered **Omni and Lux live-cell imaging platforms** offer real-time, automated visualization and quantification of cell migration, reducing manual intervention and increasing the throughput and reliability of your assays.



Read these **selected publications** to learn how Omni can support your research:

Comparative analysis of cryopreserved adipose stem cells expanded in hollow fiber bioreactor versus conventional tissue culture flasks

Ren G, Sørensen MB, et al. Scientific Reports. (2024)

Cryopreservation increases the accessibility of "off-the-shelf" cell therapies. In this study, the properties of adipose-derived stem cells expanded in tissue culture polystyrene (TCP) and a hollow fiber system (HFB) were compared after cryopreservation—an important consideration as the choice between TCP and HFB affects scalability, reproducibility, and clinical effectiveness.

Highlights:

- Under various culture conditions and during cryopreservation, the expression of most surface markers, clonal capacity, tri-lineage differentiation, and activation of human dermal fibroblasts remains stable.
- The expression of surface markers CD105, CD248, and CD274 is influenced by the expansion methods and the freezing-thawing process, leading to changes in the clonal distribution.
- This study demonstrates that the freeze-thaw process does not affect the production of fully functional adipose-derived stem cells in either system. However, it does lead to some differences in the subpopulations of cells between the two systems.

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Willaertia lysate: A hydrobiome-biosourced ingredient with multi-site antioxidative and antiaging properties

Santos MD, Rorteau J, et al. Cosmetics. (2024)

Aging is characterized by the thinning and weakening of the skin, which is linked to a reduction in the number of epidermal cell layers. This study aims to assess the effectiveness of an innovative ingredient, *Willaertia* lysate, using a multi-scale approach that includes both cellular and advanced 3D skin models.

Highlights:

- The results indicate that *Willaertia* lysate, originally derived from thermal spring waters in the French Alps, can stimulate cell migration.
- It also enhances the quality and quantity of the extracellular matrix in both aged skin and young skin exposed to UV radiation, bringing it to a level similar to that of unexposed young skin.
- Finally, it reduces tyrosinase activity and melanin production, as well as lowers oxidative stress following UV exposure, by decreasing exposome markers like protein carbonylation and lipid peroxidation.

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MicroRNA-409-3p/BTG2 signaling axis improves impaired angiogenesis and wound healing in obese mice

Bestepe F, Ghanem GF, et al. The FASEB Journal. (2024)

Worldwide there is a rise of metabolic syndrome, consisting of increasing waist circumference and dysfunctional angiogenesis, and linked to the increasing prevalence of type 2 diabetes. In the skin of patients with nonhealing wounds and diabetes, researchers demonstrated that miR-409-3p is dysregulated.

Highlights:

- Compared to the non-wound skin samples, miR-409-3p levels are increased within the wound tissue of patients with type 2 diabetes.
- In the presence of high glucose, neutralization of miR-409-3p promotes endothelial growth and migration *in vitro* and improves wound closure and angiogenesis in human skin organoids.
- Dorsal skin wound closure, blood flow, and angiogenesis are promoted by miR-409-3p.

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Topical probiotic formulation promotes rapid healing in dog keratinocyte cells: A promising approach for wound management

Barthe M, Osman-Ponchet H. International Journal of Molecular Sciences. (2023)

As a strategy for wound healing to decrease microbial resistance to disinfectants and antibiotics, the use of probiotics has gained increasing attention. This study employed *in vitro* scratch assays to explore the potential of a non-medicinal topical probiotic bacteria cocktail in enhancing wound healing in dogs.

Highlights:

- A dose-dependent increase in cell migration appears to be influenced by both the formulated and non-formulated probiotic bacteria cocktails, as well as the vehicle.
- The probiotic-based topical cocktail demonstrated a 20% increase in wound closure at a concentration of 750,000 CFU/ml.
- The findings indicate that in wound healing there are potential beneficial effects of the probiotic-based topical cocktail.

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Deficiency of miR-409-3p improves myocardial neovascularization and function through modulation of DNAJB9/p38 MAPK signaling

Bestepe F, Icli B. Molecular Therapy-Nucleic Acids. (2023)

Angiogenesis plays a crucial role in tissue repair after a myocardial infarction (MI), a process that is worsened in cases of insulin resistance or diabetes. The researchers in this study investigated how metabolism regulates miR-409-3p in relation to angiogenesis following a heart attack.

Highlights:

- miR-409-3p plays a key role in promoting the angiogenic processes of endothelial cells and is dysregulated after MI.
- The discovery of DNAJB9 as a new target of miR-409-3p offers valuable insights into how miR-409-3p influences endothelial cell angiogenic responses.
- The research demonstrates that there is a significant increase in phosphorylation of p38 MAPK signaling, a pathway that modulates endothelial cell migration, because of their endothelial cell-specific knockout of miR-409-3p genetic miR409^{ECKO} mouse model.

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MicroRNA-375 repression of Kruppel-like factor 5 improves angiogenesis in diabetic critical limb ischemia

McCoy MG, Jamaiyar A, et al. Angiogenesis. (2022)

Peripheral artery disease (PAD) is a condition where the arteries in the limbs become blocked. Researchers identified miR-375 to be significantly downregulated in humans and mice during progression to critical limb ischemia by comparing plasma samples from diabetic humans with PAD and mouse models of PAD.

Highlights:

- Inhibition of miR-375 results in anti-angiogenic effects, while overexpression of miR-375 promotes angiogenesis in endothelial cells *in vitro*. This leads to increased endothelial cell migration, proliferation, sprouting, and the formation of vascular networks.
- Intramuscular delivery of miR-375 enhances blood flow recovery in the hindlimbs of diabetic mice and promotes the growth of new blood vessels and the formation of arteries in muscle tissues.
- Using RNA sequencing and prediction algorithms, researchers identified Kruppel-like factor 5 (KLF5) as a direct target of miR-375. Silencing KLF5 with siRNA produces effects resembling those of miR-375 overexpression, both *in vitro* and *in vivo*, by influencing regulatory changes in NF-kB signaling.

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