Karolinska Institutet

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THE SERVICE PORTFOLIO OF THE ZEBRAFISH CORE FACILITY

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USING THE SERVICES OF THE ZEBRAFISH CORE FACILITY

The zebrafish core facility provides the expertise and infrastructure needed to use the zebrafish model in research. Our goal is to give internal, external, and corporate researchers access to our services within seven days of application. To support your project, we provide all necessary permits, access to commonly used wildtype and transgenic lines, and assistance with complex research workflows. Use of our equipment is free of charge.

HOW TO BECOME A USER:

- Schedule a meeting with the facility head, Lars Bräutigam (zebrafish-office@km.ki.se), to discuss your project needs.
- Attend an introductory tour of the facility.
- We activate your access card.
- You may begin working with embryos up to 5 days post-fertilization.
- Work involving older animals requires zebrafish-specific laboratory animal science training, available through KI (las-edu@km.ki.se).

THE ZEBRAFISH CORE FACILITY AT KAROLINSKA INSTITUTET

The zebrafish core facility was established in 2005 and relocated to modern, purpose-built facilities in 2020. We currently support more than 60 internal, external, and corporate users.

Our team provides services ranging from animal provision to project planning and execution. Standardized procedures and continuous quality control ensure high animal welfare, reliable data, and reproducible outcomes. We collaborate closely with other core facilities to offer integrated workflows tailored to your research needs.

For questions, please contact:

- **Lars Bräutigam, Head of Facility:** lars.braeutigam@ki.se
- **Zebrafish Core Facility Office:** zebrafish-office@km.ki.se
- **Webpage:** https://ki.se/en/research/zebrafish-core-facility

INFORMATION ON ETHICAL PERMITS

Zebrafish embryos younger than five days are not considered laboratory animals under European and Swedish regulations. Experiments performed within this developmental window do not require an ethical license or a laboratory animal science certificate.

You may house, breed, and genotype non-phenotypic zebrafish lines under the facility's ethical permit. Common procedures such as establishing transgenic lines also fall under this permit. Work involving phenotypic lines or non-standard procedures requires a personal ethical license.

STANDARDIZED RESEARCH PIPELINES

The zebrafish core facility provides a set of optimized and adaptable research pipelines based on published standards and in-house experience. These workflows can be modified to meet specific project requirements and integrated with services from partner core facilities.

ZEBRAFISH STRAIN MANAGEMENT

IMPORT AND EXPORT OF ZEBRAFISH LINES

The zebrafish core facility holds all necessary permits to import zebrafish from any country. All imported animals enter our quarantine unit to ensure biosafety.

DELIVERY OF EMBRYOS AND ADULTS

The facility maintains approximately 250 wildtype and transgenic lines. Embryos and adults from common lines can be delivered directly, while delivery of researcher-owned lines requires prior agreement with the line owner. Deliveries are available any day of the week, with up to 3,000 embryos per order. Larger quantities can typically be arranged with two weeks' notice.

HUSBANDRY OF ZEBRAFISH LINES

We provide housing for wildtype, transgenic, and knock-out lines for internal, external, and corporate users. All breeding, embryo rearing, and adult maintenance follow standardized procedures, including a regeneration program to minimize genetic drift. All husbandry is performed by trained facility staff to ensure quality and reproducibility. Detailed animal records are maintained in a remotely accessible electronic database, and all SOPs are available upon request.

GENOTYPING AND SCREENING OF ZEBRAFISH LINES

Our complete genotyping pipeline includes fin-clipping, single housing of fin-clipped animals, PCR, sequencing in collaboration with the KIseq core facility, data interpretation, and sorting of genotyped animals. We also offer screening of embryos for fluorescent markers and the raising of identified carriers.

TATTOOING OF ZEBRAFISH

Facility staff can implant visible elastomer tags under the skin of adult zebrafish to enable long-term individual identification.

DELIVERY OF ANIMALS, TISSUES, AND ORGANS

We provide whole embryos at defined developmental stages, as well as tissues from adult zebrafish. Material can be supplied from common wildtype or transgenic lines, or from researcher-owned lines with owner approval. Samples are available fresh, snap-frozen, or fixed. We also offer embedding of embryos or organs for histological analysis.

CRYOPRESERVATION AND IVF

The facility offers cryopreservation and IVF for zebrafish lines housed at KI or imported from facilities within Sweden or the EU. The workflow follows protocols from the International Zebrafish Resource Center. Sperm quality is evaluated using test-IVF, and at least ten cryo samples are stored in duplicate in isothermal freezers.

GENE ANALYSIS

TRANSIENT GENE KNOCK-DOWN

Gene knock-down is performed using morpholinos that block mRNA translation or splicing. Morpholinos are injected into fertilized eggs and phenotypes can be assessed within hours. We assist with morpholino design, controls, injections, and phenotype analysis.

ESTABLISHING KNOCK-OUT LINES

We generate stable knock-out lines using the CRISPR–Cas9 system combined with duplex guide RNAs, enabling efficient production of homozygous mutants. We provide support with guide RNA design, CRISPR–Cas9 injections, and subsequent raising and genotyping. The facility also offers a standardized protocol to suppress pigmentation in any zebrafish line.

ESTABLISHING TRANSGENIC LINES

New transgenic lines—such as those expressing fluorophores under tissue-specific promoters—can be generated using the Tol2 system. We support construct design, embryo injections, screening, and raising.

TRANSPLANTATION OF CANCER CELLS

Zebrafish embryos provide a transparent and clinically relevant model for xenotransplantation to study tumor growth, metastasis, and drug responses. Most assays yield meaningful data before five days post-fertilization, eliminating the need for ethical permits. Cells can be transplanted into various tissues, including the CNS and cardiovascular system. The facility offers standardized protocols and can perform high-throughput transplantation of hundreds of embryos per hour, following the ZeOncoTest workflow.

We also offer an integrated 3-day pipeline combining transplantation, drug exposure, and high-content imaging, including:

- Transplantation into 2-day embryos
- Screening for successful transplants
- Small-molecule exposure
- Distribution into 96-well plates
- Automated imaging for up to 3 days post-transplantation

HIGH-CONTENT IMAGING

We perform high-content imaging of embryos mounted in 96-well plates using fluorescent or brightfield channels. Video and time-lapse imaging are available. Imaging is conducted using the Aquifer system designed specifically for high-throughput zebrafish applications. We also supply custom 96-well plates with agarose beds for ventral or dorsal mounting.

DRUG EXPOSURE AND TOXICOLOGY STUDIES

We provide pipelines for toxicity testing of small molecules and environmental samples. Analyses include survival, morphology, cardiovascular assessment (e.g., QT-interval measurements), and behavioral evaluation. Automated workflows and standardized toxicology protocols (OECD236, OECD212/215, OECD210, SS-EN-ISO 15088:2008) are available.

INFECTION STUDIES

The facility operates a dedicated BSL-2 laboratory for exposing zebrafish to class-2 pathogens. We hold permits for a broad range of pathogens and assist users in obtaining additional licenses when needed. Embryos can be exposed through immersion or injection, and infections can be monitored in real time using specialized imaging equipment.

BEHAVIORAL ANALYSIS

We offer advanced behavioral analysis tools, including a Noldus DanioVision system with EthoVision software for high-throughput embryo behavior assays, as well as imaging systems for adult zebrafish. Facility staff provide support with setup and execution of behavioral studies.