

Activity-Based Risk Assessment Form

Name of Department MBI Microscopy Core
 Name of Laboratory MBI Microscopy Core
 Name of Researcher/LO All

Location of Lab Level 9 & 10 T-Lab
 Name of PI All
 Name of Activity/Experiment NA

No	Description/Details	Hazards	Possible Accident / Ill Health & Persons-at-Risk	Existing Risk Control (Mitigation)	Severity	Likelihood (Probability)	Risk Level	Comments	Additional Risk Control	Person Responsible	By (Date)
1	LSM 710 & Leica SP5 and Nikon A1Rs in laser confocal mode	pain when eye gets struck by fast scanning laser beam	the confocal beam has no special collimation and moves fast, hence it is not capable of causing permanent damage in the eye (for single photo machines). Reaction is pain, visual artifacts which may last days, headaches, dizziness	SOPs: do not run laser with no specimen in place	1	2	2	the same scan mechanism that makes permanent damage virtually impossible also makes it more likely to be struck by the beam as it moves rapidly across space	none planned - laser license covers risk, warning placards have been fitted	LIU Jun 710, Mak Kah Jun A1Rs, Chin Jasmine Spinning Disks	in place
2	Spinning Disk in laser mode	multiple laser dots scanning across the retina	beam intensity is low and scan is very fast, no permanent burn damage can be caused	laser license & SOP: do not engage laser without specimen in place	1	2	2	If laser is on without specimen in place, one can look into the lens	none	CHIN Jasmine	in place
3	Olympus TIRF in laser mode	medium power laser beam can reach eye during calibration	local injury of the retina from static beam	laser license & SOP: do not engage laser without specimen in place	2	2	4	it only can happen when equipment is faulty - users are trained to report if they accidentally damaged the equipment	penalties for users who do not report damages	MAK Kah Jun	in place
4	STORM in laser mode	high power laser beam can reach eye	medium area damage of the retina	laser license & training for calibration & laser goggles provided & instrument SOPs	2	2	4	without instrument damage, the beam will not exit forward toward the user but instrument damage has occurred in the past	goggles in place, warning signs in place, shield to be installed by January 2015	MAK Kah Jun	Shield delivered - install January 2015
5	SIM scanner	high power laser beam can reach eye during calibration	medium area retina damage	ban of user-based calibration & laser goggles provided & laser license & three-times-a-week maintenance	2	3	6	calibration is strictly off limits for users	all measures and rules in place, additional shield with OD3+ will be installed by January 2015	LIU Jun	January 2015
6	PALM & iLAS2 in laser mode	forward exiting TIRF beam when laser interlocks are tampered with	strong irritation and local damage of retina due to strong laser beam	system are laser-locked, beam will interrupt when doors are opened	2	1	2	users have repeatedly tampered with the interlocks and do not remove the tampering when done with work	penalties for users who are found tampering with the interlocks	CHIN Jasmine iLas2, MAK Kah Jun ELYRA & Olympus TIRF	in place
7	lamp houses	very hot lamp houses when in operation	skin burns upon touching casing of arc burner houses and incandescent housings. No risks for LED and solid state housings	user are informed during training that housing is hot, housing is not under user maintenance	1	3	3	has occurred repeatedly but damage is very, very light	slow replacement of incandescent light houses by cold LEDs, all new HID sources have fans and are cold	MAK Kah Jun	upon demand when current systems are phased out
8	arc burners and UV sources	UV light emitted from burner can damage skin and injure eyes after extended exposure	360nm light causes protein damage and can cause DNA damage. It also injures the unprotected eye	burners are strictly forbidden to open housings of burners. Our burners also have a deep UV cutoff but need to deliver 360nm light	2	1	2	no direct eye exposure if specimen is properly mounted	users are strictly forbidden to open housings of burners. Our burners also have a deep UV cutoff but need to deliver 360nm light	CHIN Jasmine and MAK Kah Jun	in place
9	mechanical motorized stages	fingers and hair can get caught in fast moving stage frame	clamping and pulling risk, motors are strong enough for user not being able to overwhelm them	SOPs: users should only engage automatic stage modes once experiment is set up	1	2	2	biggest hazard is being trapped	none	admin of microscope	in place
10	microinjectors	pricking hazard with fine glass needle, severed skin, glass residue in skin, worst case sample injection into victim	the mechanical injury will be nearly negligible. Biosafety risk can be substantially higher but cannot be assessed and is not part of the microscopy schedule	follow simple safety procedure of not touching sample once set up - use mechanics and motors to drive and manipulate sample	1	1	1	covered by sharps schedule - hazard is much bigger as long as outside of the injector	follow SOPs, do not engage drive while touching the sample	MAK Kah Jun	in place
11	Sharps	breaking cover slips can cut	local skin injury due to thin glass fragments	standard sharps handling schedule	1	2	2	covered by sharps schedule	none	user	in place
12	fire extinguishing system	oxygen shortage, soot inhalation, flame injury in case of fire	strong irritation, burns, death in case of fire	siren & FM200 exothermic suppressor system & sprinkler & automated door opener	3	1	3	microscopy core is certified	we prohibit the use of personal audio devices inside the rooms in order to be able to hear the alarms	fire schedule SPFD & MAK Kah Jun for maintenance	in place
13	Shrapnel and explosions	glass fragments from hot XBO lamps and chemical reactions	eye injury, skin injury due to shrapnel penetration	no chemical waste allowed in microscopy core, we phased out all XBO burners	2	1	2	no longer possible	individual labs can still use XBOs	user	in place
14	poisons	chemicals used are alcohol, Isopropanol and immersion oils	oils are mildly toxic upon ingestions	we offer disposal bins for wipes with oil on it and for over slips with oil on it	1	1	1	we have toxic immersion oils but we do no longer offer them to the users	standard oils only, alcohols evaporate	user	in place
15	tripping hazard	user can fall over cables and installation as the rooms are dark and cramped	head and body injury, cuts, fractures	instrument back sides are chained off for that purpose	2	1	2	instruments can safely be operated in complete darkness	room lights and flashlights are offered	CHIN Jasmine	in place
16	electric shock	shock from touching mains power with wet hands	nerve damage, heart failure	all power rails are inaccessible, all ports carry error current circuitry	1	3	3	error circuits and certified outlets prevent severe damages	all measures in place	MAK Kah Jun	in place
17	air quality	contamination of air con air	lung irritation, poisoning	we have a two stage filter system in place and monitor the air quality	1	1	1	monitors on central bench	all working	MAK Kah Jun	in place
18	powering up a system	electric shock	electric injury	containment & FI	1	1	1		all working	admin of microscope	in place
19	powering up lasers	light irritation	eye irritation	casing, switches	1	1	1		all working	admin of microscope	in place
20	powering up TIRF system	laser irradiation	eye injury	casings, shields, fiber armour, SOPs	2	1	2	laser training, N3 license, goggles	all working	user	in place
21	handling immersion oil	laser irradiation	eye injury	casing, interlock, goggles, SOPs	3	1	3	N3 license, large shields	all working	user	in place
22	handling immersion oil	ingestion and contact	irritation and poisoning	small bottles, applicators, SOPs, low toxicity oils	1	1	1		all working	user	in place
23	lens cleaning	irritation	irritation by cleaning agent	safe cleaners provided, limited quantity	1	1	1		all working	user	in place
24	CO2 handling	O2 displacement & CO2 saturation	inebriation, lack of oxygen	flow limiter, air mixer, containment	2	1	2	O2 and CO2 alarms, SOPs	all working	user	in place
24	Optical table handling	trapping risk due to descent of heavy table	crushing of fingers	handling prohibition, SOPs	2	1	2	confine operation to administrator	all working	admin of microscope	in place
25	handling pressurized bottled air	projectile	impact injury	SOPs, confinement	2	1	2	clamps, vices	all working	user	in place
25	handling pressurized bottled air	poisoning	poisoning	SOPs, room ventilation	1	1	1		all working	user	in place
26	third party accessories in Core microscopes	mechanical, electrical, chemical	injury, shock, etching, or poisoning	license, registration, and accessory SOPs	2	2	4	install are safety measures & SOPs	all working	registered user	in place
27	third party machinery in microscopy rooms	mechanical, electrical, chemical	injury, shock, etching, or poisoning	registration and SOPs and Ras	2	1	2	publish SOPs and Ras	all working	registered user	in place

28	optical traps	Infrared laser beam	eye injury	SOPs, metal casing, interlock	3	1	3	N3 license, use beam trap and marker	all working	user	in place
29	assisted bookings	unauthorized usage	eye injury	SOPs, administrator	2	1	2	follow admin instructions	all working	admin & user	in place
30	chaperone usage	unauthorized usage	eye injury	SOPs chaperone	2	1	2	OSHE training, chaperone instructions	all working	two users (min.)	in place
31	daytime experiments	experiment & instrument danger	eye injury, poisoning, disease	SOPs of experiment and instrument, licensing	2	1	2	user training	all working	user	in place
32	nighttime experiment	experiment & instrument danger	eye injury, poisoning, disease, trapping	SOPs of experiment and instrument, advanced license	2	1	2	training, emergency phone, buddy	all working	min. of two users	in place
33	maintenance	machinery still operating	eye injury or shock	SOPs, PPE, provided tools	2	1	2	buddy system, power off	all working	min. of two admins	in place
34	cleaning	machinery still operating	shock	SOPs, provided tools	2	1	2	F1 switch	all working	administrator	in place
35	steam vacuum cleaner	heat and evaporation	steam burns and fumes	SOPs, do not use on spills	1	1	1		all working	administrator	in place
36	isopropanol cleaning	vapours	irritation	SOPs, curfew	1	1	1		all working	contractor	in place
37	using the index matcher	chemicals	irritation by ingestions	SOPs & training	1	1	1		all working	user	in place
38	using the cold insert	chilled components	freeze burn	SOPs, training, casing	1	1	1		all working	user	in place
39	Refilling of cleaning ethanol (EtOH)	Sharp edges from broken glass bottle	Cuts by broken glass fragments	Transport EtOH bottle in secondary container. Glass fragments should be collected using forceps or duster and dustpan, and not by hand. Dispose of any broken glass fragments immediately into Sharps bin provided.	1	2	2		None	administrator	in place
		Chemical spillage	Accidental spillage can cause possible exposure to flammable chemical	Wear proper PPE when handling the chemical. Work within the Flammable Fume hood and lower the protective sash to an appropriate level.	1	2	2		None	administrator	in place
		Fire hazard	Accidental spillage can cause possible exposure to flammable chemical	Transport EtOH containers in secondary container.	2	1	2		None	administrator	in place
40	refill of humidifier bottle	Sharp edges from broken glass bottle	Cuts by broken glass	Glass fragments should be collected using forceps or duster and dustpan, and not by hand. Dispose of any broken glass immediately into Sharps bin provided.	2	1	2		None	user	in place
		Electrical hazard from wet wires	Exposure to live electrical contacts of wires with water spills can cause electrical shock or burns	Put humidifier bottle as far as possible from the system when refill. Slowly refill with MilliQ water. Put tissue at the area of humidifier bottle.	2	1	2		None	user	in place
41	Mounting of microinjector capillaries	Physical injury	Puncture wounds by glass splinters	Use of safety goggles. Glass fragments should be collected using forceps or duster and dustpan, and not by hand. Dispose of any broken or used glass capillaries immediately into Sharps bin provided.	2	1	2		None	user	in place
		Physical injury	Fingers or hair can be trapped by motorized parts, crush hazard	Keep hands off motorized parts before moving the joystick. Do not reach into areas where your hand may become trapped.	1	1	1		None	user	in place
42	Operating the movement of the microinjector	Physical injury	Puncture wounds by glass splinters	Use of safety goggles. Be aware any contact between the capillary and another object might trigger a shattering of the capillary. Injection should be done inside the incubation enclosure. Glass fragments should be collected using forceps or duster and dustpan, and not by hand. Dispose of any broken or used capillaries immediately into Sharps bin provided.	2	1	2		None	user	in place
43	Disposal of used microinjector capillaries	Physical injury	Puncture wounds by glass splinters	Dispose of any broken or used capillaries immediately into Sharps bin provided.	2	1	2		None	user	in place
44	Disposal of immersion oil waste	Chemical hazard	Waste may be hazardous	Waste disposal bin with lid to minimize exposure	1	1	1		When full, the waste bin bag is handled with PPE (gloves)	user	in place
45	Disposal of biological specimen at the end of experiment	Biological hazard	Waste can cause lab acquired infections	Waste is to be transported in secondary container back to the lab bench or tissue culture room and disposed according to individual laboratory's SOP	1	2	2		None	user	in place
46	Closing chamber door	Physical injury	Fingers or hair can be trapped by the closing chamber door	Keep fingers and hair away from the closing chamber door.	1	1	1		None	administrator	in place
47	Using on-stage incubator	Possible electric shock	Exposure to live electrical contacts of defective/faulty equipment can cause electrical shock or burns	Use of power plugs with safety mark certification. Regular maintenance checks for frayed or worn electrical cords.	2	1	2		Regular check performed by Microscopy Core staff to ensure there is no exposed live wire.	Liu Jun	in place
		Water spill	Water can be spilled from the water bath	Use only De-ionized water / Milli Q water for water bath and add water of controlled amount with a pipette.	1	2	2		None	user	in place
		Physical injury	Fingers or hair can be trapped by on-stage incubator	Hold only the top of the incubator and make sure fingers or hair is not trapped before clipping in.	1	1	1		None	user	in place
48	Using optical table	Physical injury	Fingers can be trapped by the moving table top	Avoid direct pressing against the table top and keep away from the gap between the table top and the table frame.	1	1	1		None	user	in place
		Physical injury	Pressured air bursting out from tempered pump and tubings	Keep away from the air pump for the optical table	1	1	1		None	user	in place
		Biological/Chemical hazard	Pump oil leakage might cause skin irritation if allergic to it	Keep away from the air pump for the optical table	1	1	1		None	user	in place
49	Cleaning weather chamber	Physical injury	Fingers or hair can be trapped by closing doors of the weather chamber	Close weather chamber doors after mounting sample on stage, making sure no fingers or hair is trapped.	1	1	1		None	user	in place

		Fire hazard	Fire due to EIOH used as cleaning agent	Cleaning EIOH stored in secondary container to contain any spills. Small amount of cleaning EIOH in microscope room.	2	1	2		Automated door and fire alarm. Use of personal audio device is prohibited inside the rooms in order to be able to hear the alarm. Sprinkler and FM200 exothermic suppressor system in place.	user, MAK Kah Jun	in place
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Conducted by Microscopy core team

Approved by

Name Dr. Felix Margadant

Signature _____

Approval date 3.10.2016

Next Revision date 2.10.2019
 (Maximum 3 years)

		Likelihood		
		Likely	Possibly	Unlikely
Severity	Low	3	2	1
	Med	6	4	2
	High	9	6	3

Risk = Likelihood x Severity

RISK	DECISION PROCESS
< 3	RISK ACCEPTABLE
3, 4	CONSIDER ADDITIONAL RISK CONTROL
> 4	ADDITIONAL RISK CONTROL REQUIRED

Likelihood

- 1 Unlikely Not likely to occur (has not occurred in the PI's Lab or similar Lab setup.)
- 2 Possible Possible or known to occur (has occurred in the PI's Lab or Similar Lab setup.)
- 3 Very Likely Common or repeating occurrence (has occurred repetitively in the PI's Lab or similar Lab setup.)

Severity

- 1 Low (e.g. No injury, injury or ill-health requiring first aid treatment only - includes minor cuts and bruises, irritation, ill-health with temporary discomfort)
- 2 Medium (e.g. Injury requiring medical treatment or ill-health leading to disability – includes lacerations, burns, sprains, minor fractures, dermatitis, deafness, work-related upper limb disorders)
- 3 High (e.g. Fatal, serious injury or life-threatening occupational disease – includes amputations, major fractures, multiple injuries, occupational cancer, acute poisoning and fatal diseases)

Severity - Consider the magnitude/severity of the consequences of the Risk Factor occurring and then list this as 3 (High), 2 (Moderate) or 1 (Low).

Likelihood - Team should rely upon their experience and consider realistic scenarios. Listed below are examples of factors that may be considered in determining the likelihood.