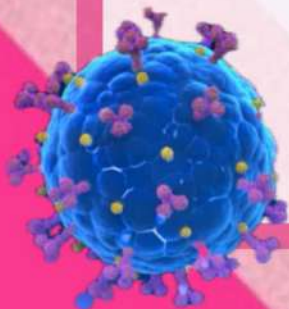




MICROBIOLOGY LAB

Lecture : 1

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Biosafety in Microbiology Laboratory

General Microbiology, second year, 2022
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Risks and Hazards

- Hazards in microbiology lab:

← ممكن تنتقل للإنسان

- Infectious agents: bacteria, viruses, fungi, etc
- Biological: human blood and fluids, human cell lines → الأنسجة، العينات التي بناخدها من المستشفى
- Chemical hazards → حارقة، متطايرة، قابلة للانفجار
- Fire hazards
- Sharps, needles, and glasswares
- Heating hazards
- Radiation hazards → موجودين في كل المختبرات
- Electrical hazards



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Laboratory Safety

- Guidelines developed to protect workers in microbiological labs through:

- Engineering and design controls ب design لاب المايكرو ال ventilation يكون
- Management policies مختلف عن اللابات الأخرى، يكون في شفاطات بتاخذ
- Work practices الهواء (ممكن يكون فيه بكتيريا)لحتى ما ينتقل لبرا
- Safety guidelines and regulations خطوات لازم اتبناها مع احبي نفسي والآخرين

- Microbiology labs (research, teaching, or diagnostic labs) posses risk on: الناس المعرضين للخطر

- Lab workers
- Researchers and students
- Close contact ممكن الدكاترة او احنا بالمختبر ننصاب بأي شي فيو بكتيريا ،، وممكن
- Community ننقلو زملاتنا بالجامعة او حتى أقاربنا لو ما اخدنا الاحتياطات اللازمة

Lab Safety Symbols

بحطو signs معينة عشان لو رحت ع أي مختبر بأي بلد بالعالم تفهم شو الاخطار الموجودة خلف هاي المادة



Barriers

شغلات تستخدمها حتى عملي وقاية من ال infections اللي ممكن تكون موجودة

- **Primary barriers:** physical barriers or personal protective equipment between lab worker and pathogen (gloves, masks, eye goggles, lab coats, head cover, biological safety cabinets) → بتغطي الرأس والشعر شغلات فبرورية حتى عملي حماية
- **Secondary barriers:** structural aspects of the laboratory that make working environment safer against infection (Sinks for hand washing, special containment areas, special air ventilation patterns)



← المشغل يكون خلف الزجاج وفي ventilation system بسحب كلشي
 ← بتعطيني مستوى عالي من الحماية خاصة لو في فايروس عالي الخطورة
 وما إله علاج ..

حتى ما يتأثر
 شعره





Standard Microbiological Practices

- NOT permitted in laboratories:

- Eating
- Drinking
- Smoking
- Handling contact lenses
- Pipetting by mouth
- Storing food and drink

• نحاول نلبس Gloves وننسل دائما



No eating, drinking
or smoking
in this area

Standard Practices

- Wear a lab coat and shoes in the lab
- Roll up loose sleeves. Tie back long hair
- Frequent hand washing (before and after lab)
- Keep lab door closed when working
- Limits on access to the lab space when working
- Keep the lab bench free of unnecessary materials. Don't use the lab bench as a storage area for coats, books, etc
- Care to minimize splashes and actions that may create aerosols
- Decontamination of work surfaces after every use or after any spills
- Keep your work area uncluttered
- Never "horse around" or play practical jokes in the laboratory
- Treat all microbial cultures as if they are pathogens. Better safe than sorry
- When in doubt, ask the instructor!





في مختبرات بتتعامل مع microbes بسيطة وفي مختبرات بتتعامل مع فايروسات خطيرة وما الها أي نوع من العلاج، فقسمو اللابات حسب ال safety بناء على ال microbes الموجودة باللاب..

Biosafety levels (BSL)

- Labs divided into 4 biosafety levels; protective practices increase with each

1. الأيسر Biosafety Level 1 labs - work with least dangerous agents, require fewest precautions
2. Biosafety Level 2 labs
3. Biosafety Level 3 labs
4. الأعلى Biosafety Level 4 labs - have strictest methods because dealing with agents that are most dangerous to human health

• **BSL-1:** microorganisms that don't consistently cause disease in healthy adults like non pathogenic *E. coli* species

• **BSL2:** microorganisms of moderate potential hazard, transmitted by contact, ingestion, puncture

- Salmonella, herpesvirus, human blood

• **BSL3:** microorganisms that cause serious disease, transmitted by inhalation

- M. tuberculosis, yellow fever virus, hantavirus, Y. pestis (plague)
- Containment lab: double door entry; directional airflow; all work in biosafety cabinet

• **BSL4:** microorganisms that cause lethal disease, with no known treatment or vaccine

- Ebola virus, Marburg virus
- Maximum containment lab; positive pressure ventilated suits (moon suits)

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١- بكفي البس lap cote، gloves، face mask، تغسل ايديك

٢- لو كان organism أخطر وممكن يسببلي مرض وممكن يطلع مع inhalation system

٣- لو كان عنا infection caused by inhalation، لازم ventilation system

يكون بعيد عنك

٤- ما اله علاج ولا مطعوم، ال mortality عالية، خطير جدا



Needles stick injury:

يعني انو تغزك إبرة وهاد شي خطير مو بس باللاب

- **NEVER** ما تحاول تفضيها أو تكسرهما
 - recap, bend, or break needles
 - discard needles or sharps into biological waste bags
 - discard needles into regular trash

اله high risk mortality, morbidity على health care workers لأنه احنا ما بنعرف هاي الإبرة من وين جاية او مين استخدمها قبلنا وممكن ينتقلنا ال infection

لو غزتك، بدك تعمل فحوصات وتأخذ أدوية حتى يقاوم وما يصاب ب infection لهيك لازم ننتبه جدا!!!!



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Instruments

اجهزة رح نستخدمها بلاب المايكرو مع انها مو متطورة كثير بس موجودة بكل لاب

- Autoclave
- Oven
- Incubator حتى نعطي good temperature/environment للبكتيريا حتى تنمو
- Fume hood
- Safety cabinet BSL3 بيعطيني
- microscope



Bunsen burner [للتعقيم]



water bath: تثبيت الحرارة

Centerifuge فصل المواد

ميزان دقيق جدًا

دش

بتعطي مستوى معين من CO_2 لبعض البكتيريا

Autoclave: تعقيم

Lab equipment

- Bunsen Burner
- Inoculating loops → حتى ازرع البكتيريا (culture)
- Inoculating needles
- Petri-dishes

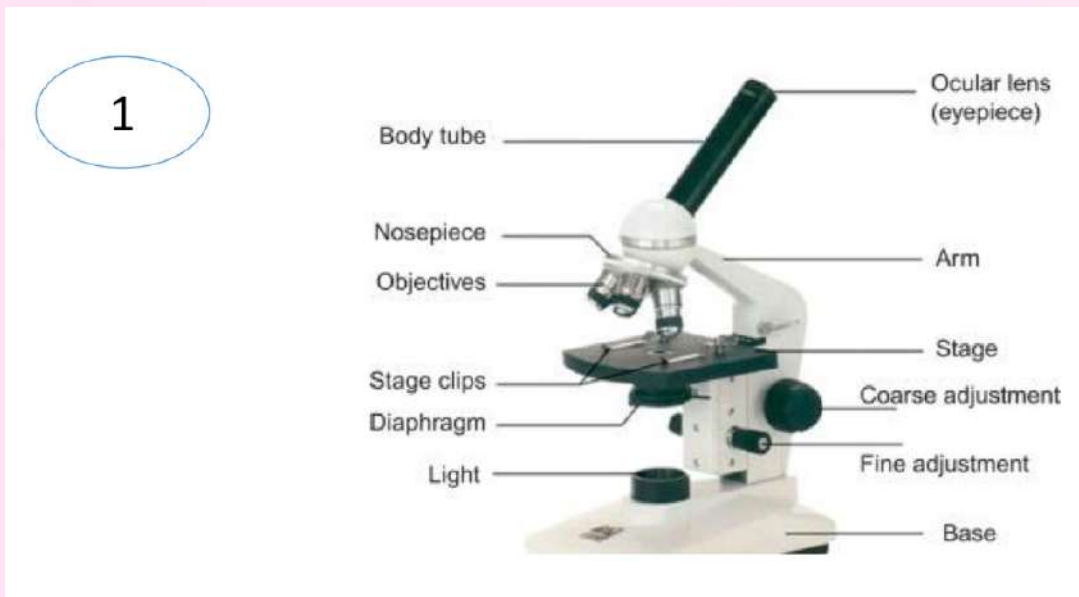
باخذ جزء من sample وبمسح على Petri dish وبحطوب incubater
عدرجة حرارة معينة ليوم او يومين بتبلس البكتيريا تتكاثر وهاي هي الزراعة



هدول stains يستخدمهم لما اعمل gram stain, ممكن تخرب الأوعي



هدول عشان نستوعب المادة النظرية اللي رح نشوفها بالعملية





2

Autoclave

Autoclaves are also known as steam sterilizers, and are typically used for **healthcare or industrial applications**. An autoclave is a machine that uses steam under pressure to kill harmful bacteria, viruses, fungi, and spores on items that are placed inside a pressure vessel.

3

biological safety cabinet (BSC)

An enclosed and ventilated laboratory workspace to provide safety when working with materials that are contaminated by pathogens

4

Bunsen burner

A type of gas burner that produces a safe, smokeless, hot, non-luminous flame that can be used for various scientific experiments





5

water bath

is a laboratory equipment that is used to incubate samples at a constant temperature over a long period of time.

6

Centrifugation

A method of separating molecules having different densities by spinning them in solution around an axis (in a centrifuge rotor) at high speed.

7

Laboratory balances

Used to measure an object's mass to a very high degree of precision.





9

Laboratory incubators

Provide a controlled, contaminant-free environment for safe, reliable work with cell and tissue cultures by regulating conditions such as temperature, humidity, and CO₂

10

Inoculating Loops

inoculating loops and needles (sometimes called microstreakers or inoculating wands) are hand-held devices for inoculating plated or tubed growth media with microorganisms such as bacteria or yeasts prior to incubation, multiplication and growth

11

Culture plate

a low flat-bottomed laboratory container for growing a layer of organisms such as bacteria, molds, and cells on a thin layer of nutrient medium.





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Pipetting

Is the process of using a pipette, whether it's a plastic pipette or a glass pipette, to measure or transfer a small volume of a liquid sample. The liquid sample measured by the pipette is in volumes of milliliters (mL) or microliters (μL).

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Pasteur Pipettes

Pasteur Pipettes, also known as droppers or eye droppers, are laboratory liquid handling tools that are used to transfer small quantities of liquids.

14

Sharp box

Use a sharps bin to dispose of used needles or sharps





بالتوفيق..❤️🌸
—danez

هذا التفرغ صدقة عن روح

"هبة خالد الوريكات"

وبقية شهداء العلم في حادثة التكنو

اللهم ارحمهم واغفر لهم وتقبلهم من الشهداء

الصالحين

نسألكم الدعاء لهم والفاحة

