BY : BARJES ALZIARA

LECTURE 5 :
NORMAL HUMAN MICROBIOTA AND STERILIZATION & DISINFECTION

GENERAL MICROBIOLOGY

Normal Human Microbiota (Flora)

بالبداية راح نحكي عن البكتيريا النافعة اللي بتعيش بجسمنا و اللي اسمها normal flora

الدكتور حكا هاي الصفحة قراءة ذاتية و انه اخذناها باول محاضرة

- **A Large variety of microorganisms colonize human body throughout its entire lives.**

- **Human bodies are actually composed of more bacterial cells than human cells, harbor near 10^14 bacteria, few parasites & viruses.**

عدد خلايا البكتيريا بجسمنا اكثر من خلاينا احنا

- **A stable set of Bacteria genera (commensals), mostly anaerobes (95%), Facultative Aerobes (5%) colonize and effect humans by:**

- **Competing with pathogens & prevent their effects**
- **Providing vitamins or eliminating toxins (Bacteroides)**
- **May harm by causing disease (dental caries)**
- **May cause infection under certain condition: Injury, Surgery..etc.**

هاي البكتيريا الها تأثيرات على اجسامنا زي انها بتنافس مسببات الامراض و و بتفرز بعض الفيتامينات و ممكن تسبب امراض زي تسوس الاسنان او عدوى في بعض الحالات

NORMAL HUMAN MICROBIOTA:

- **the population of microorganisms that inhabit the skin and mucous membranes of healthy normal persons.**

- **provide a first line of defense against microbial pathogens, assist in digestion, play a role in toxin-degradation, and contribute to maturation of the immune system.**

هاي البكتيريا تعتبر خط الدفاع الاول النا برضو بتساعد بالهضم و بالتلخلص من السموم و بتساعد في نضج جهاز المناعة

- **Shifts in the normal microbiota or stimulation of inflammation by these commensals may cause diseases such as inflammatory bowel disease.**

هسه التغيرات اللي بتصير لهاي البكتيريا ممكن تسبب امراض مثل التهاب الامعاء

- **The skin and mucous membranes always harbor a variety of microorganisms that can be arranged into two groups:**

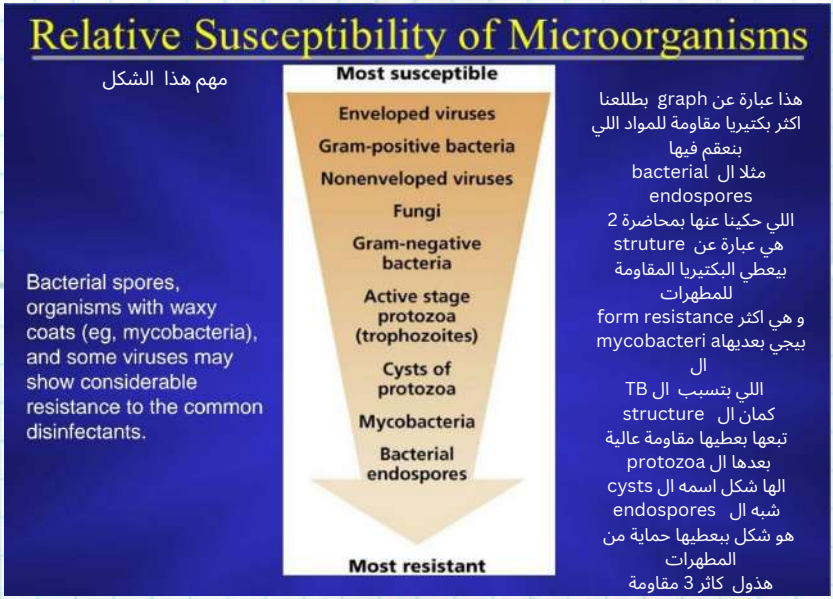
1- **The resident flora consists of relatively fixed types of microorganisms regularly found in a given area at a given age; if disturbed, it promptly reestablishes itself.**

2- **The transient flora consists of nonpathogenic or potentially pathogenic microorganisms that inhabit the skin or mucous membranes for hours, days, or weeks; it is derived from the environment, does not produce disease, and does not establish itself permanently on the surface.**

- **Members of the transient flora are generally of little significance so long as the normal resident flora remains intact. However, if the resident flora is disturbed, transient microorganisms may colonize, proliferate, and produce disease.**

This lecture discusses the most important methods used for killing microbes before they reach patients

Understanding how these methods work



Definition

- **Death/killing of microbial organisms is defined in terms of how we detect them in culture.**
- **it is a loss of ability to multiply under any known conditions.**

Sterilization	**A physical or chemical process that completely destroys or removes all microbial life** عملية التلخلص من كل اشكال microbial life يعني اذا خلصنا من الاقل resistance حتى الاعلى هيك بنوصل لهاي المرحلة
Sterile	**Devoid of microbial life** الاشي اللي صار عليه عملية ال sterilization
Disinfection	**Is the destruction of pathogenic microorganisms by processes that fail to meet the criteria for sterilization** هون بنقتل اغلب ال microbial life يعني 99.9 %
Disinfectants	**liquid chemical or gas used for disinfection (used environmentally)** المادة اللي بستخدمها في عملية الdisinfecion
Aseptic techniques	• **Describes processes designed to prevent microorganisms from reaching a protected environment.** العملية اللي بنمنع فيها البكتيريا من انها توصل لمكان معين زي جسم الانسان في العمليات الجراحية • **It is applied in many procedures used in the operating room, in the preparation of therapeutic agents, and in technical manipulations in the microbiology laboratory.**
Antiseptics	• **Disinfectant agents that can be used on body surfaces such as the skin or vaginal tract to reduce the numbers of microbiota and pathogenic contaminants.** مواد بنقدر نستخدمها على ايدينا بدون ما تسببلنا اضرار و يتم استخدامها في العمليات و هي اللي بنستخدمها في ال aseptic techniuqes • **They have lower toxicity than disinfectants used environmentally, but are usually less active in killing vegetative organisms.**
Sanitization	• **Is a less precise term with a meaning somewhere between disinfection and cleanliness.** هو اقل نوع بعقم و هو نفس التعقيم اللي بنستخدمه في التنظيف زي ديتول • **It is used primarily in housekeeping and food preparation contexts.**
Sepsis	• **Refers to the presence of pathogens in blood or living tissues.** عبارة عن وجود المايكروبات جوا الجسم

Microbial killing

- **Permanent loss of reproductive capability even under optimum growth condition**

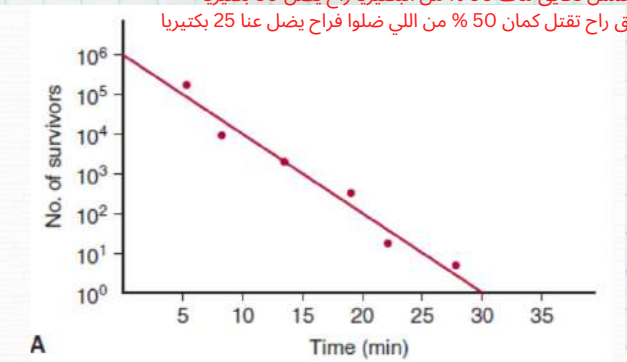
- **Killing of bacteria by heat, radiation, or chemicals is usually exponential with time;**

- **a fixed proportion of survivors are killed during each time increment.**

- **Thus, plots of the logarithm of the number of survivors against time are linear**

عماية قتل ال microorganismis بعد عملية ال sterilization بيعطينا هذا ال curve
اللي يدل على انه كل فترة زمنية معينة راح يصير قتل لنفس النسبة

مثلا عنا 100 بكتيريا حطينا مادة كيميائية مشان تقتل البكتيريا
بعد خمس دقايق مات 50 % من البكتيريا راح يضل 50 بكتيريا
بعد 5 دقايق راح تقتل كمان 50 % من اللي ضلوا فراح يضل عنا 25 بكتيريا

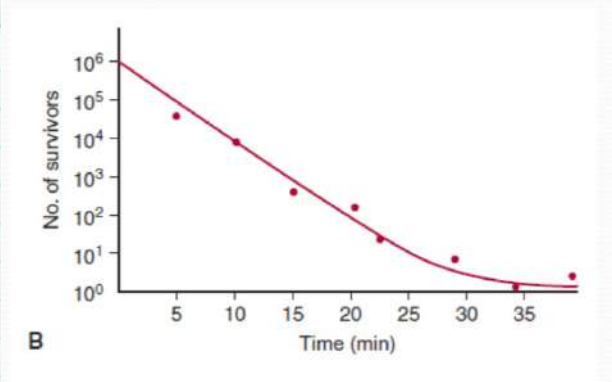


Death rate:

- **Exposure time, type of organisms, microbial load, environment, concentration, organic matter**

هاي العوامل اللي بتفرق معك في العملية
اولا الوقت لو تحط المعقم وقت اكثر بتزيد عملية التعقيم
ثانيا نوع الكائن زي ما قلنا بال graph اللي فوق انه في انواع اكثر مقاومة من انواع اخرى حتى لو حيطناهم بنفس المدة
ثالثا كمية المايكروبات يعني لو عندك سطح عليه مليون مايكروب غير سطح عليه 20
رابعا البيئة يعني الحرارة و ال ph و الرطوبة
خامسا التركيز برضو كلما زدنا تركيز المادة راح يزيد القتل
اخيرا ال organic matter زي لما يكون في blood مع ال microorganism
راح تقل الفعالية في عملية sterilization

- **If the microbial population includes a small proportion of more resistant forms (spores), the later stages of the curve are flattened , and extrapolations from the exponential phase of killing may underestimate the time needed for achieving complete sterility.**



يرضو لو كان عنا spores راح ياخر هذا عملية ال sterilization
و راح يصير عندي flattened
في نهاية ال curve و ممكن ما يصير عنا قتل كامل لكل المايكروبات

STERILIZATION

- **The availability of reliable methods of sterilization has made possible the major developments in surgery and intrusive medical techniques that have helped to revolutionize medicine over the last century.**

- **Furthermore, sterilization procedures form the basis of many food preservation procedures, particularly in the canning industry.**

PHYSICAL METHODS TO INHIBIT MICROBIAL GROWTH

عمليات االل sterilization بتقسموا لمجموعتين اساسيات physical and chemical

A- Sterilization Methods:

1. **Heat**
2. **Cold**
3. **Desiccation** (**The drying out of a living organism**)
4. **4. Radiation**

Physical Methods to Inhibit Microbial Growth

1- HEAT:

اذا عرضنا بروتين لحرارة عالية بيصيرله denaturation
نفس الاشي بيصير للمايكروبات مشان هيك بتموت

- This is the most practical, efficient and inexpensive method of sterilization of those inanimate objects and materials that can withstand high temperatures (**material is itself resistant to heat damage**).

- A temperature of 100 °C will kill all but spore forms of bacteria within 2–3 minutes in laboratory-scale cultures; a temperature of 121°C for 15 minutes is utilized to kill spores.

الحرارة اول طريقة مشان نعقم فيها و هي ارخص طريقة و فعالة جدا
نقطة مهمة انه الحرارة اللي بتموت عندها اغلب المايكروبات هي 100 سيليسيوس
و بتقعد من دقيقتين لثلاث لكن ما بتموت ال spores
مشان نقتل ال spores بدنا درجة 121
و راح تقعد ربع ساعة مشان تقتلهم

1. Sunlight :

الشمس بتعقم الجو بشكل طبيعي بسبب حرارتها
و طبعا عندك الاشعاع اللي بتصدره برضو بقتل المايكروبات

- Direct sunlight is a natural method of sterilization of water in tanks, rivers and lakes.

- Direct sunlight has an active germicidal effect due to the combined effect of ultra violet and heat rays.

الحرارة بشكل عام تقسم ل dry و moist

2-Dry Heat :

هاي الحرارة فعالة في حالات المختبر لانه بتقدر تتحكم بدرجة الحرارة

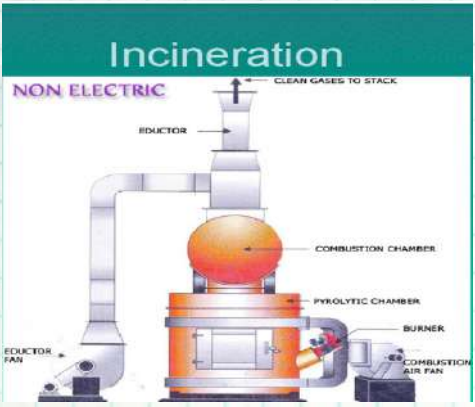
- **Direct Flaming :**

Inoculating loop wire, the tip of forceps are held in a Bunsen flame till they become red hot.

- **Incineration :**

This method is used to destroy contaminated cloth, animal carcasses and pathological materials.

هاي حرفيا محرقة اي اشي بفوت فيها بتحول لرماد بنستخدمها لندمر الاشياء الخطيرة فالمختبر و اعدام بعض الحيوانات



هون بنستخدم هواء ساخن
مش بخار في فرق لانه البخار مرتبط بالمي
الهواء ساخن مش فعال كثير و ما راح يعمل
sterilization

- **Hot-air Oven:**

This method is applicable to metals, glassware and to some heat-resistant oils and waxes that are immiscible in water.

Conditions:

- 171°C for at least one hour

- 160°C for at least two hours

- 121°C for at least sixteen hours

A major use of the dry-heat sterilizing oven is in preparation of laboratory glassware.

3-Moist heat :

دائما بخار المي اله تاثير اكبر لانه بدخل ع البكتيريا بشكل
احسن مشان هيك راح يوصل لكل المناطق و يسبب
denaturation
بشكل اكبرللبكتيريا فهو احسن من ال dry heat

- **Moist heat in the form of water or steam is far more rapid and effective in sterilization than dry heat**

- **because reactive water molecules denature protein irreversibly by disrupting hydrogen bonds between peptide groups at relatively low temperatures.**

- **Most vegetative bacteria are killed within a few minutes at 70°C or less, although many bacterial spores can resist boiling for prolonged periods.**

هون اغلب البكتيريا العادية بتموت ع حرارة 70
اما ال spores بتموت ع حرارة الغليان بس بدها وقت
طويل مشان تموت

لو بدنا نقسمها ع حسب ل
اقل من 100 زي pasteuraization
مساوية لل 100 زي boiling
اعلى من 100 زي autoclave

Moist Heat:

هاي احسن من البسترة بس
ما بتعمل sterilization لانه بعض ال spores ممكن
تضل تغلي لمدة 5 ساعات

1-Boiling :

the vegetative forms of most pathogens are quite easily destroyed by boiling for 30 minutes (metal and glass).

عملية تسخين بعض المواد الغذائية تحت ال100
الهدف من هو قتل اغلب البكتيريا الممرضة بدون ما
نغير بطبيعة المواد و بنحافظ عليها زي ما هي
تستخدم على الحليب و الاجبان

2-Pasteurization :

- **Is the use of heat at a temperature sufficient to inactivate important pathogenic organisms in liquids such as water or milk, but at a temperature lower than that needed to ensure sterilization.**

- **heating milk at a temperature of 74°C for 3 to5 minutes or 62°C for 30 minutes kills the vegetative forms of most pathogenic bacteria that may be present without altering its quality.**

- **Obviously, spores are not killed at these temperatures.**

Pasteurization is a process used in preserving heat sensitive foods such as milk, beer, and other beverages.

هون صرنا بدرجة فوق ال 100
و اكبر مثال عليها طنجرة الضغط
مبدأ عمله انه برفعلنا الحرارة بشكل كبير و بنفس الوقت
بطلع الهواء بضل البخار اللي بقتل المايكروبات بشكل
كبير طبعا هذا الحكي كله بوجود ضغط اللي برفع الحرارة
اكثر و اكثر

3-Autoclave (Steam Under Pressure) :

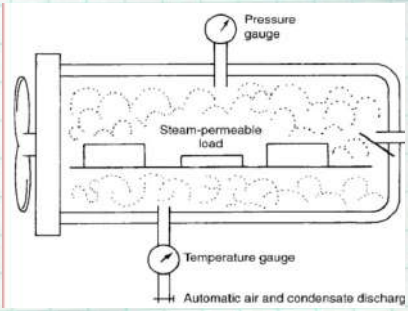
- **Bacteria are more quickly killed when moist and because steam Provides a means for distributing heat to all parts of the sterilizing vessel.**

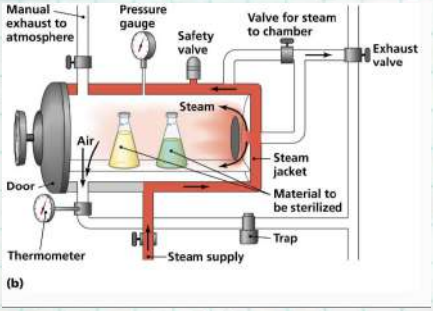
ال pressure بس برفع الحرارة مش هو اللي بقتل

- **At sea level, steam must be kept at a pressure of 15 lb/sq in (psi) in excess of atmospheric pressure for 15 minutes to obtain a temperature of 121°C; autoclaves or pressure cookers are used for this purpose.**

- **It kills vegetative microorganisms, bacterial endospores (may survive 5 hours of boiling, but can be killed in 4 minutes in autoclave) and viruses as long as they are not protected by pus, feces, vomitus, blood...etc.**

Simple form of downward displacement autoclave





- **the normal sterilization time is 10 to 15 minutes to account for variation in the ability of steam to penetrate different materials and to allow a wide margin of safety.**

- **The effectiveness of autoclaves depends on the absence of air, pure saturated steam, and access of steam to the material to be sterilized.**

- **Pressure per se plays no role in sterilization other than to ensure the increased temperature of the steam.**

Microwaves

ال microwave بوصل الحرارة لاقل من 100 مشان
هيك ما بعمل sterilization

- **The use of microwaves in the form of microwave ovens or specially designed units is another method of disinfection.**

- **These systems are not under pressure, but they but can achieve temperatures near boiling if moisture is present**

- **These procedures cannot be considered sterilization only because heat-resistant spores may survive the process**

2- COLD :

في اغلب الحالات تنزيل الحارة ما بقتل البكتيريا بس
بيصير الها inhibtion
للنمو و بس بنستخدمها بحفظ الطعام

- **Most microorganisms are not killed by cold temperature and freezing, but their metabolic activities are slowed, greatly inhibiting their growth.**

- Slow freezing: causes ice crystals to form within cells and may rupture the cell membrane and cell walls of some bacteria.

- Rapid freezing: using liquid nitrogen is a good way to preserve foods, biologic specimens and bacterial cultures.

- Thawing foods: allows bacterial spores to germinate and M.O. to resume growth. So, freezing of thawed foods is an unsafe practice. Food poisoning: from endospores of C. botulinum or C. perfringens.

هون بنعمل تجفيف للمواد فالبكتيريا بتنشف و بتموت

3. DRYING AND DESICCATION:

- 4/5 of the bacterial weight is due to water.

- Therefore drying in air has deleterious effect on many bacteria.

- This is unreliable method, spores are unaffected by drying.

برضو ما بنوصل sterilization لانه ال spores
بتتحمل التجفيف

For many centuries, foods have been preserved by drying. any microorganisms remain viable when lacking moisture and nutrients, although they cannot reproduce.

بما انه مش كل اشي راح نستخدم عليه حرارة طلعنا
بطريقة ال radiation

Non-Ionizing Radiation

(**Ultraviolet-UV and Low energy Infrared rays**)

تعتبر اشعة خفيفة

UV in the wavelength range 240 to 280 nm is absorbed by nucleic acids and causes genetic damage.

بتعمل damage لل microorganisms
بس مش كلهم و هي تاثيرها بكون ع dna

• Poor ability to penetrate.

• UV lamp: useful for reducing the number of M.O. in the air.

تستخدم في المستشفيات في الكافيتيريا و حضانات الاطفال و غرف العمليات مشان البكتيريا اللي فالجو

- used in newborn nurseries, operating rooms, laboratories, elevators, cafeterias and classrooms. Sterility may be maintained in a hood or cabinet, many biologic materials such as sera, vaccines..etc. Needs 12-24 hours exposure.

• UV is a mutagen, can cause skin and eye damage

هي تعتبر تعقيم خارجي سطحي فما الها خطورة كبيرة الا في حالة التعرض الها بشدة ممكن يسبب ضرر للعين

• Infrared rays: Sterilization of prepacked itemssuch as syringes and catheters.

الاشعة تحت الحمراء iinfrared ray ال
بتعقم المواد المعبأة في المحاقن و الانابيب القسطرية

Ionizing radiation

Cathode and gamma rays

بتستخدم اشعة غاما اللي بتخترق الاجسام بشدة

direct damage to DNA and produces toxic free radicals and hydrogen peroxide from water within the microbial cells.

تعتبر خطيرة و ممكن تسبب cancer
فما بنستخدمها ع الانسان
تستخدم بغرف خاصة و في تجارب خاصة برضو

Cathode and gamma rays from cobalt- 60 are widely used in industrial processes, including the sterilization of many disposable surgical supplies such as gloves, plastic syringes, specimen containers, some foodstuffs, and the like, because they can be packaged before exposure to the penetrating radiation

ULTRAVIOLET

MECHANICAL

عملية تنقية السوائل بالذات صعب نوصل فيها لل sterilization و غالبا بنستخدمها للمواد الكبيرة و المقاومة للحرارة

1. Filtration:

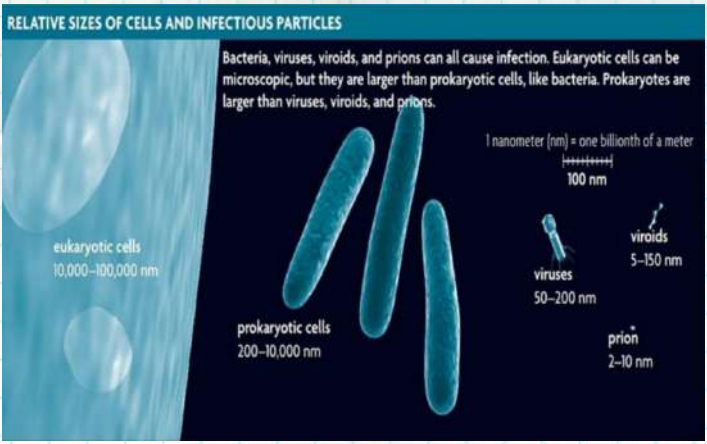
- **Filtration helps to remove bacteria, viruses and cells from large volumes of fluid, especially fluid containing heat-labile components such as sera, solution of sugars and antibiotics.**

- **A pore size of 0.2µm is effective because filters act not only mechanically but by electrostatic adsorption of particles to their surface.**

- **If viruses must also be removed, a much smaller pore size around 20 nm is needed.**

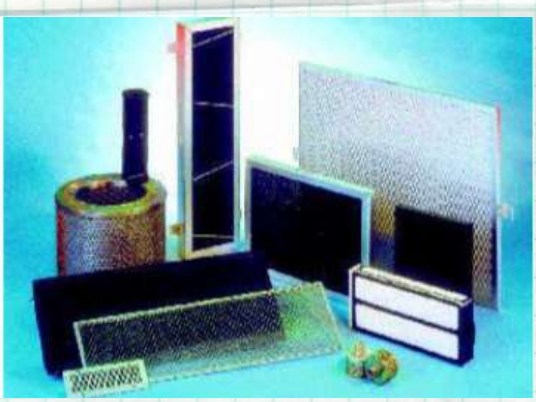
- **Prions are not removed by filtration.**

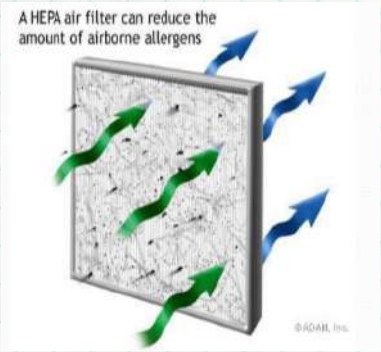
MEMBRANE FILTERS



(**HEPA**) **Filters – High Efficiency Particulate Air filters are used in biological safety cabinets, in operating rooms and patient rooms to filter the air that enters or exits the room.**

Using Nitrocellulose Membranes/Pore Sizes 0.01-0.22µm.





MEMBRANE FILTERS

2. Washing and scrubbing

هاي عملية تعقيم بستخدموها الكادر الطبي بالعمليات
اول اشي بغسل بعدين بستخدم مواد معقمة

Sanitization: mechanical removal microbes from inanimate object

Degermation: reduce number of microbes on the skin

عبارة عن موجات بتعمل ضرر بالمايكروبات بس ما بتوصل sterilization و تستخدم في عيادات الاسنان

3. Ultrasonic and Sonic Vibration:

- High frequency sound waves beyond the sensitivity of human ears are called as ultrasonic waves.

-They have the property to disrupt the cells but the results have been variable.

- Gram negative rods are more sensitive to ultrasonic vibration where as Gram positive cocci, spores of fungi and bacteria are resistant to the vibration.

- Ultrasonic devices are used as a means of cleaning and sterilizing delicate equipment and in dental clinics

- However, most of them are not reliable for routine use.

GAS

A number of articles, particularly certain plastics and lensed instruments that are damaged or destroyed by autoclaving, can be sterilized with gases.

بعض المواد بستخدم عليها التعقيم بالغاز مثل البلاستيك و بعض العدسات اللي ممكن تضرر بحرارة ال autoclaving

هذول امثلة على استخدام الغاز في ال sterilization

هذا مثال بسيط على تأثير الغاز على ال microoragnism

Ethylene oxide	Gaseous atmosphere	Formaldehyde
دايما بتاثر على ال DNA و بالتالي عملية تصنيع االبروتين It is an alkylating agent that inactivates microorganisms by cross link DNA and protein.	Inhibits the growth of microorganisms by altering the atmosphere. الاوكسجين الموجود بالجو ممكن يؤثر في البكتيريا ال anaerobes زي ما حكينا قبل	Aqueous Solution 37%. Formalin, 2% Aqueous Glutaraldehyde: used in preservation of tissue biopsies بنستخدمه في الحفاظ على الانسجة من التعفن
• About 4 to 6 hours and must be followed by a prolonged period of aeration • inflammable and potentially explosive gas. هذا الغاز يعتبر قابل للانفجار مشان هيك لازم ندير بالنا و احنا بنستخدمه	Obligate anaerobes in atmosphere containing oxygen.	برضو بنستخدمه بتطهير غرف المرضى decontaminate larger areas such as patients'rooms. Long Exposure Time (10-24 Hours)
• Plastics, optics, electrics and artificial heart valves certain plastics and lensed instruments الاشياء اللي بنتسخدم عليها هذا النوع اي اشي ما بتحمل حرارة من بلاستيك و اجهزة كهرباء و عدسات الخ • It is an effective sterilizing agent for heat-labile devices		ال ethylene oxidase و ال formaldehyde يعتبروا من المواد اللي ممكن توصل لل sterilization بنعقم الغرف فيهم بانه نجيب اسطوانة غاز تحتوي عليه و بنعقم الغرفة و هذول الغازين قويين لدرجة انهم ممكن يقتلوا ال spores و لكن بدهم مدة مشان نوصل ال sterilization مع ميزتهم انهم معقمات قوية معهم شوية سلبيات اولهم انهم time consuming و بيوخذوا وقت مشان يعقموا بشكل كامل ثانيا هو انهم خطرين على اجسامنا فهم من المواد عالية السمية ممكن يسبب التهابات جلدية او حتى cancer مشان نتجنب هذا الحكي لازم نهوي الغرفة المعقمة بالغاز قبل ما نفوتها

Oxidizing agents :

ال H2O2 يعتبر good sterilizing agent
اول اشي بنجيبه بصورة liquid
بعدها بنعرضة لاشعاع معين اللي بحوله لسحابه من المواد اللي فيها particals و بالتالي بتعمل ضرر لكل ال microorganism

- **Hydrogen peroxide (H2O2)**
- **Ozone (O3)**

ال O3 بيستخموها في تعقيم قوارير المياه

Both agents are useful in sterilization and have selective uses.

B. CHEMICAL AGENTS:

هاي مواد موجودة في كل المستشفيات و البيوت زي مواد التنظيف اللي فيها مواد كيميائية

(**Chemical Control of Microbial Growth**)

1. **Alcohol**
2. **Halogens**
3. **Chlorine**
4. **Hydrogen Peroxide**
5. **Surface-Active Compounds**
6. **Glutaraldehyde and Formaldehyde**
7. **Phenolics**
8. **Phenol carbolic acid**

Alcohol

- **alcohols are protein denaturants that rapidly kill vegetative bacteria when applied as aqueous solutions in the range 70 to 95% alcohol.**

بشتغل على انه يعمل denaturation للبروتين
و دائما بستخمه مع ال water
مشان هيك احسن نسبة لفعاليته هي 70%

- **They are inactive against bacterial spores and many viruses.**

بقدر بقتل كل البكتيريا باستثناء ال spores

- **the lethal process requires water molecules.**

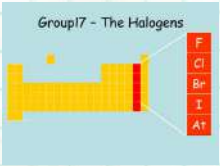
ال ethanol و isopropyl همه اكثر نوعين مستخدمين
و بنستخدمهم في تطهير الجلد

- **Ethanol and isopropyl alcohol (70–90%) are widely used as skin decontaminants before simple invasive procedures.**

- **Alcohols are more effective combined with purified water— 70% isopropyl alcohol or 70% ethyl alcohol is more effective than 90% alcohol, because the higher water content allows for greater diffusion through the cell membrane.**

زي ما حكينا توافر المياه في التعقيم بالكحول اشي اساسي و نسبة الكحول لما تكون 70% احسن من 90 % لانه نسبة الماء اعلى فائدة الماء انه بزيد ال diffusion

Halogens



IODINE

اليود موجود بكل المستشفيات هو عبارة عن oxidizing agent
يعني بعمل oxidation للبكتيريا

- **iodinating or oxidizing essential components of the microbial cell.**

غالبا يستخدم مع الكحول و بخلطهم مع بعض مشان يعطي مفعول اقوى

- **Its original use was as a tincture of 2% iodine in 50% alcohol, which kills more rapidly and effectively than alcohol alone.**

- **hypersensitivity reactions and of staining materials with which it comes into contact.**

- **Tincture of iodine has now been largely replaced by preparations in which iodine is combined with carriers (povidone) or nonionic detergents termed Iodophors.**

مع تطور الصناعة تطور معها اليود و صار providone
و اللي يعتبر اكثر فعالية
ما بوصل مرحلة ال sterilization

- **These are less allergenic than inorganic iodine preparations, they should not be used on patients with a history of iodine sensitivity**

بنستخدمه على ال skin و اعراضه الجانبية اانه ممكن يصير حساسية في الجلد و راح ينصبغ الجلد بلون بني

CHLORINE

الكلور يعتبر قوي و بوصل لدرجة ال sterilization
و لكنه مضر للانسان مشان هيك بنستخدمه فقط لتعقيم المياه و برك السباحة

- **Chlorine is a highly effective oxidizing agent, which accounts for its lethality to microbes.**

- **In concentrations of less than one part per million, chlorine is lethal within seconds to most vegetative bacteria, and it inactivates most viruses; this efficacy accounts for its use in rendering supplies of drinking water safe & in chlorination of water in swimming pools.**

- **it is the agent of choice for decontaminating surfaces and glassware that have been contaminated with viruses or spores of pathogenic bacteria as a 5% solution called hypochlorite.**

يعتبر احسن اختيار لتعقيم الاواني و الاسطح الملوثة
ال sodium hypochlorite هو شكل الكلور اللي بنستخدمه في بيوتنا

- **Sodium hypochlorite is very commonly used. Common household bleach is a sodium hypochlorite solution and is used in the home to disinfect drains, toilets, and other surfaces.**

برضو بنستخم الكلور في تعقيم المنزلي
يعني في تطهير المصارف و المراحيض و الاسطح الملوثة

Hydrogen Peroxide

حكينا عن استخدام الperoxide كمطهر غازي
هسه بدنا نستخدمه ك liquid

- **It is a powerful oxidizing agent, oxidizes cell components.**

برضو بعمل oxidation للبكتيريا
بحيث بدخل بهيئة H2O2 و بتحول ل H2O و -O2
و هو قوي جدا خصوصا ل anaerobes
و لكن بكميات كبيرة ممكن يقتل كل البكتيريا حتى ال spores

- **Highly reactive oxygen radicals**

- **Although it acts rapidly against many bacteria and viruses, it kills bacteria that produce catalase and spores less rapidly.**

- **Hydrogen peroxide has been useful in disinfecting items such as contact lenses that are not susceptible to its corrosive effect.**

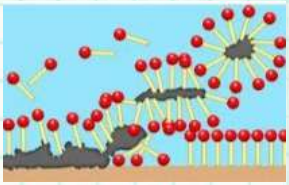
Surface-Active Compounds:

بسموها ال Quats المركبات الرباعية

- **Surfactants: Hydrophobic and hydrophilic groups of surfactants act on lipids of bacterial membranes and can also be effective disinfectant against enveloped viruses.**

هاي المواد بتشتغل على ال cell membrane
و بتعمل ضرر لل phospholipidbilayer
و تعبر اضعف طريقة
و غالبا تستخدم للارضيات

- **Cationic detergents, particularly the quaternary ammonium compounds “Quats” such as benzalkonium chloride, are highly bactericidal in the absence of contaminating organic matter..**



Glutaraldehyde and Formaldehyde

- **These are alkylating agents highly lethal to essentially all microorganisms.**

نفس ما بنستخدمهم ك gases
برضو ممكن نستخدمهم ك liquid
و برضو بشتغلوا على الDNA

- **Cross protein and DNA together**

- **Formaldehyde**

- **gas is irritative, allergenic, and unpleasant, properties that limit its use as a solution or gas.**

هو قوي جدا لكن استخدامه قليل بسبب اعراضه الجانبية

- **<u>Formaldehyde vapor</u>, an effective environmental decontaminant under conditions of high humidity, is sometimes used to decontaminate laboratory rooms that have been accidentally and extensively contaminated with pathogenic bacteria. It is bactericidal, sporicidal, and virucidal.**

بخار الفورمالديهايد
مطهر بنستخدمه لما يكون في رطوبة
و ممكن نستخدمه لتطهير غرف المختبرات اللي تلوثت من
مسببات امراض

Phenolics

Phenol (carbolic acid) :

شبه الكحول من ناحية انه يعمل denaturation للبروتين
لكن يعتبر خطير في حالة استخدامه على الجلد مباشرة

- **protein denaturant**
- **bactericidal agent.**
- **Environmental contamination , too toxic to skin and tissues.**
- **They are the active ingredient in many mouthwash and sore throat preparations.**

غالبا يستخدم في علاج التهاب الحلق او كمطهر للفم
لكن ما نبلعه لانه toxic

- **2 diphenyl compounds, hexachlorophene and chlorhexidine, have been extensively used as skin disinfectants.**

اشتقينا مركبين بنقدر نستخدمهم على الجلد
ال hexachlorophene و ال chlohexidine

- **Hexachlorophene is primarily bacteriostatic. Incorporated into a soap,**

Hexachlorophene
يتم دمجه مع الصابون و هو معقم بكتيري فعال

- **Chlorhexidine has replaced hexachlorophene as a routine hand and skin disinfectant and for other topical applications. (mild in human skin)**

chlohexidine
استبدلنا ال Hexachlorophene فيه
و هو مطهر للايدين
و يعتبر اخف ع جلد الانسان

- **Chloroxylenol is the principal ingredient in Dettol, a household disinfectant and antiseptic.**

ال Chloroxylenol
هو مادة الديتول الاساسية

A ideal and perfect disinfectant would offer:

1. Complete sterilization

2. Broad spectrum activity

3. Without harming other forms of life

4. Be inexpensive, and

5. Non-corrosive.

Hand washing : A simple way to prevent infection.

Hand washing is a simple habit that can help keep you healthy. Learn about the benefits of good hand hygiene, as well as when to wash your hands and how to clean them properly.

- **Chemical disinfectants are classified on the basis of their ability to sterilize:**

1. High-level disinfectants kill all agents except the most resistant of bacterial spores. (Chlorine, sodium hypochlrite, antiseptic H2O2) Aldehyde

2. Intermediate-level disinfectants kill all agents (not spores). (Alcohol,phenol and halogen(I,F,Cl)

3. Low-level disinfectants are active against most vegetative bacteria and lipid-enveloped viruses.

4. (most organisrn, except TB and bacterial spore)Quats