Agenda

"A Proposal to Enhance the Diagnostic Capacities of A Group of Neurological Disease in Animals with Emphasis on their Pathology and Epidemiology "

Jordan University of Science and Technology

Irbid, Jordan

27-29th of March, 2022

Coordinator and PI of the Regional Workshop: Nabil Hailat, DVM, Ph.D., JUST

Sunday, March 27

TIME	ACTIVITY	SPEAKER
9:30-10:00	Registration	
10:00-10:30	Opening Ceremony – 6 welcoming speeches, 5 minutes each	Dean of Scientific Research , **JUST** Representative of **Tunisia** Representative of **Egypt** Dean of Tiaret University, **Algeria** Representative of **Turkey** Representative of **Afghanistan** Dean of the Faculty of Veterinary Medicine, **JUST**

Session 1:

Chair: Dr. MOHAMED ELSHAHIDY Co-chair: Dr. HOUARI HEMIDA

10:30-11:00	Neuroinvasion and SARS-CoV-2 neuropathology with emphasis on animal models	**Dr. Tawfik Aboellail, Colorado state, College of Veterinary Medicine and Biomedical Science. USA.**
11:00-11:30	Coffee and Tea break	
11:30-12:00	Comparative study of the effect on the reliability of rabies diagnostic tests ;FAT, RTCIT and RT-PCR depending on the quality of the reservation of samples.	**Dr. IMED TURKI** **Dr.Habib Kharmachi, Tunisia**
12:00-12:30	Prion Disease in Dromedary Camels, Algeria	**Dr. Mehdi Boucheikhchoukh, Algeria**
12:30-1:00	Rabies in Afghanistan	**Dr. Momammad Behsoodi, Afghanistan**
01:00-02:00	Lunch, Restaurant	

Session 2: **Chair: Dr.** MEDIHA KHABOU		**Co-chair:Dr.Essam Hawa**
02:00-02:30	Rabies and west Nile virus in Turkey	**Dr. Sabri Hacioglu, Turkey**
02:30-03:00	Parasitic infestation in the brain of sheep and goats	**Dr.Rami Mukbel , JUST-Jordan**
3:00-3:30	Cenurosis in West Algeria	**Dr. Belhamiti Taher, Algeria**
3:30-4:00	Common neurological disease in the pets in Jordan from the point of view of the privet sector	**Dr.Alaa Shehadeh, Private sector, Jordan**
4:00 – 04:15	Wrap-up and Discussion	
7:00	**Group Dinner**	

Monday , March 28

TIME	ACTIVITY	PERSON RESPONSIBLE
Session 3: **Chair: Dr.** IMED TURKI		**Co-Chair: Dr.** Belhamiti Taher
9:30-10:00	Rabies pathology/IHC	**Prof.Corri brown**
10:00-10:30	Epidemiology of Rabies in Algeria	**Dr. Houari Hemida, Algeria**
10:30-11:00	West Nile Virus and rabies	**Dr. Sabri Hacioglu, Turkey**
10:00-10:30	Neurological Disease in Afghanistan	**Dr. Syed Sher Shah Sadaat, Afghanistan**
11:00-11:30	****	**Dr.Mohamed Ahmed,Egypt**
11:30-12:00	Veterinary services at the ministry of agriculture	**Dr.Essam Hawa**
12:00-1:00	Lunch, Restaurant	
Session 4: **Chair: Dr. Sabri Hacioglu**		**Co-Chair: Mehdi Boucheikhchoukh**
1:00-1:30	Nervous Disease in animals	**Dr. fetheddine Rezig**
1:30-2:00	Diagnosis of neurological disease in farm animals	**Prof. Sameh Abutarboush**
2:00-02:30	Listeriosies	**Dr.Shereen Khlouf**
2:30-3:00	Rabies in Tunisia : past, present, future	**Dr. Mediha Khamassi**
2:00-2:30	Rabies in human	**Ministrey of health**
2:30-3:00		**Dr.Qusai Alkhateeb**
3:00-3:30		
3:30-3:45	Coffee Break	

3:45-4:30	Discussion and Wrap Up, Path Forward
5:00	Bus back to Hotel
	Dinner, in Yarmouk University Street

An opening ceremony, as planned in the agenda, was conducted where representative of different participating countries gave a short speech about the importance of the training regional workshop. Participants from Algeria, Tunisia, Egypt, Afghanistan, Turkey and Jordan attending and contributed to the activities of the workshop. Veterinarians and agriculture engineers/animal production, from the Ministry of Agriculture-Jordan, Agricultural National Research Center, Amman and Irbid Municipalities, veterinarians from the private sector and undergraduate and graduate students from the faculty of veterinary medicine participated in the workshop activities, discussions and recommendations.

Dr. Shereen Khlouf (first picture left)also introduced the outline of the training workshop, the participating countries and topics to be discussed in this regional workshop



Prof. Nabil Hailat, (middle picture) the principle researcher gave an overview of animal diseases and their relation to climate changes and food security, after he had a welcoming speech.Dr. Aloudoan, (right picture), the Director of agricultural Directorate, Ministry of Agriculture, from Irbid governarate talked about the importance of capacity building of veterinarian in diagnosing animal and zoonotic dieases.

Dr. Hailat then addressed the triangle of one health concept; human health, animal health and environmental health and link these subjects to starvation and poverty, unemployment and food security. Dr. Hailat gave examples of animal diseases that are related to climate changes such as Crimean-Congo Haemorrhagic Fever which emerged recently in Iraq. He presented the transmission routs from animals to humans where animals do not show any clinical signs. He discussed also other similar diseases that are affected by the climate changes and the great need to face animal disease national and regionally with capacity building and development of veterinary services and research, as well as increasing and empowering laboratory diagnosis of these diseases. Below are some of the slides presented to show how the disease is transmitted.

Climate Change

I. Health
- A. Human health
- B. Animal Health
- Environmental Health

One Health = Integrated Ecosystem

- II. Food security
- III. Starvation and Poverty
- IV. Unemployment

WHO builds capacity of rapid response team in Iraq with a focus on Crimean-Congo haemorrhagic fever

Iraq, 22 March 2022 – The World Health Organization (WHO), in cooperation with the Ministry of Health in Iraq, concluded today a three-day workshop aimed at building the capacity of the country's rapid response team (RRT) in field investigation and response, with an emphasis on the recent outbreak of Crimean-Congo haemorrhagic fever (CCHF).

حمى النزفية في العراق.. 55 مصاباً و12 وفيات منذ بداية العام

- وفاة جديدة بالحمى النزفية في العراق..
- ومخاوف من موجة وبائية
- 17 مايو 2022 - 17:00 بتوقيت أبوظبي

Another paper was presented by the Director of veterinary services at Irbid governerate -Jordan.

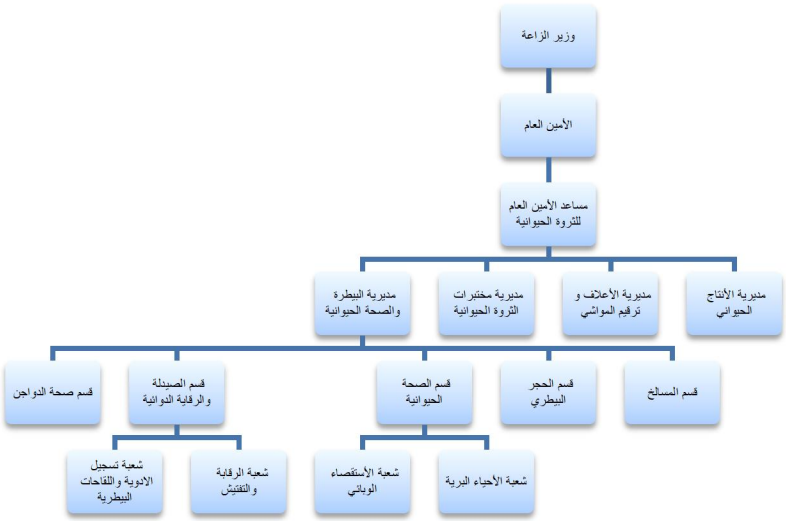
Dr. Areej Athamneh, Director of Veterinary services at Irbid governorate presented the national rabies control plan and challenges in Jordan. She started her talk by presenting the administrative scheme of the Ministry of agriculture headed by the Minister of Agriculture as shown below. She also presents the stages of the ministry activities and plan to keep Jordan free from rabies.

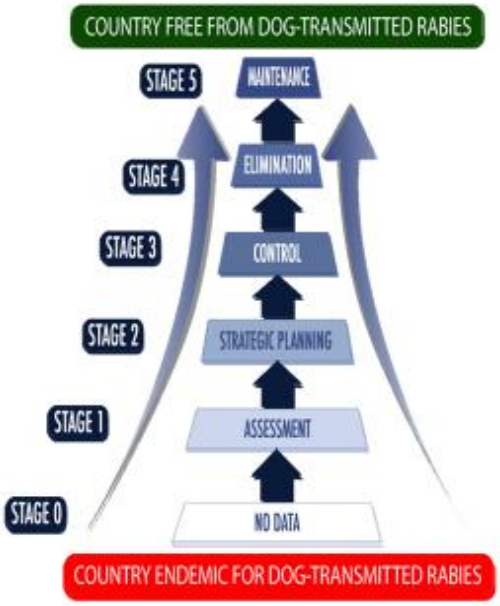
National Rabies Control Plan and Challenges in Jordan

وزارة الزراعة

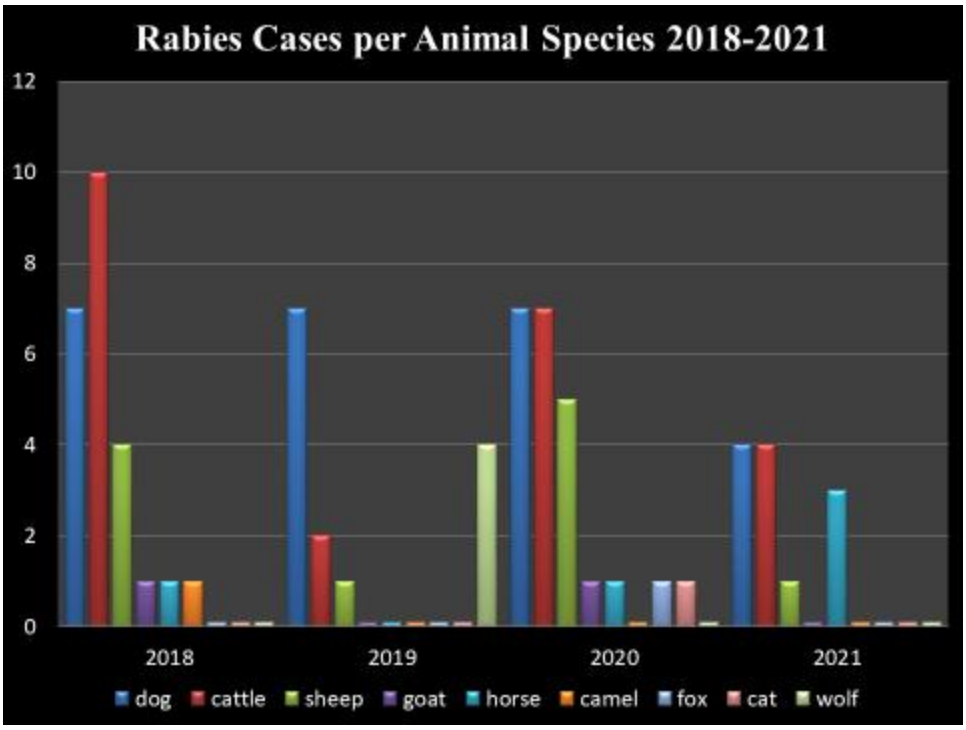
National Rabies Control Plan
and Challenges in Jordan

Presented by
Dr. Areej Athamneh





In the figure below, Dr Athamneh presented the number of rabies cases in Jordan from 2018 to 2021. Twenty-four, 14, 23, and 12 cases were reported in 2018, 2019, 2020 and 2021 respectively. Dogs, Cattle, sheep were the most common rabid animals reported. The main governorates which had rabies are Amman, Irbid and Mafraq, and in 2018 Jordan valley.



- Regulations update
- Vaccination program

Small project funded by MoA 100,000 JD to purchase vaccines

- Collaboration between stakeholders

A collaborative One Health approach and a coordinated multi-sectoral surveillance system are essential to rapidly identify and respond to zoonotic disease events within a country

Ministry of Agriculture

Ministry of Health

Ministry of Local Administration

Greater Amman Municipality

Princess Alia Foundation.

Electronic Integrated Disease Surveillance System EIDSS

Program sponsored by the U.S. Defense Threat Reduction Agency (DTRA).

EIDSS

- Human Surveillance
  - Case-based reporting
  - Aggregate reporting
  - Syndromic surveillance (case-based, aggregate)
- Veterinary Surveillance
  - Case-base reporting (livestock, avian)
  - Aggregate reporting (cases, actions)
  - Active surveillance (livestock)
- Vector Surveillance
- Outbreaks
- Laboratory Diagnostics
- Data Analysis
- System Administration

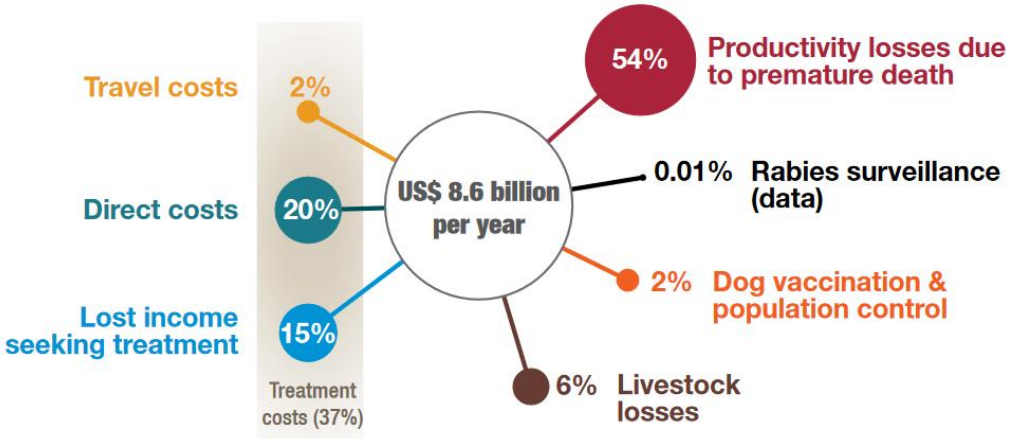
Challenges for the control of rabies in Jordan

- Stray dogs
- Budget shortage
- Wild animals
- Define responsibilities of stakeholders

- **Dr. Sabri HACIOGLU,** Head of Rabies and Virological Diagnosis Laboratories, Veterinary Control Central Research Institute, Turkey: Rabies diagnosis and control strategies. Dr. Sabri gave some international background about rabies as follows:

- Rabies is estimated to cause 59 000 human deaths annually in over 150 countries, with 95% of cases occurring in Africa and Asia.

- 99% of rabies cases are **dog-mediated** and the burden of disease is disproportionately borne by rural poor populations, with approximately half of cases attributable to children under 15.
- Rabies; that is transmitted to humans from domestic animals such as dogs, cats, cattle, sheep, goats, horses, donkeys, and wild animals such as wolves, foxes, jackals, pigs, bears, marten, skunks, and weasels, resulting in death.
- Rabies is a disease that is irreversible after clinical symptoms develop and results in death, but can be prevented if the right vaccine is administered after exposure to rabies risk.
- The overall economic cost of dog-mediated rabies is estimated to be US$ 8.6 billion. Major costs associated with **dog-mediated rabies** vary by region but include losses in productivity due to premature death, cost of PEP and direct costs to the medical sector and bite victims.



- **Rabies control programs** are being implemented in many countries, with great success being seen with improved dog vaccination coverage, improved accessibility to PEP, and reduced human deaths.
- While effective, the cost of animal vaccination programs and programs to eliminate stray dogs often prohibits their full implementation in much of the developing world. In even the most prosperous countries, the cost of

an effective dog rabies control program is a drain on public health resources. For example, the estimated annual expenditure for rabies prevention *in the United States is over US$300* million, most of which is spent on dog vaccinations.

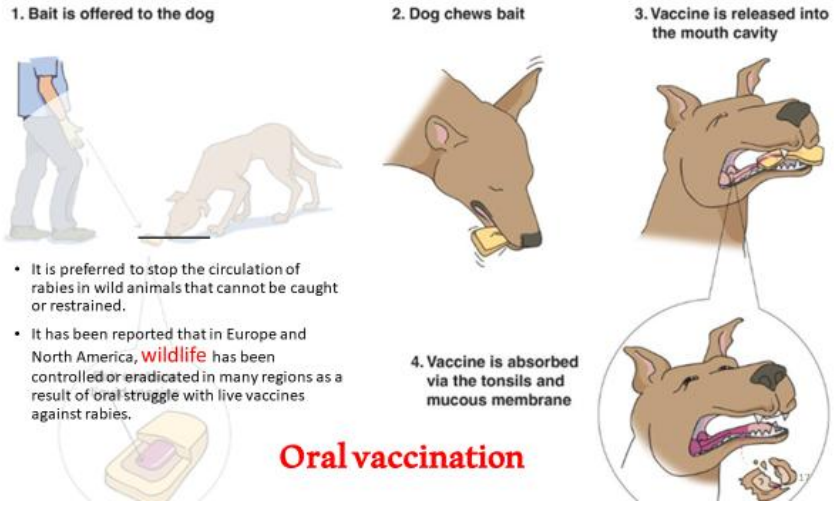
- Scientists have shown that once 70% of dogs are vaccinated, rabies can be successfully controlled in an area and human deaths can be prevented.
- The global community aims to eliminate human deaths from dog-mediated rabies by 2030.
- Dr. Sabri HACIOGLU compared different diagnostic techniques for rabies as shown in the table below.

	Test	Passive surveillance	Active surveillance	Clinical diagnosis	Sample types	Notes
Molecular	Reverse transcriptase polymerase chain reaction (RT-PCR)	++	++	+++	Brain Skin biopsy Saliva	Used as a primary diagnostic assay with sequencing and as a confirmatory test
	Hemi-nested RT-PCR	++	++	+++	Brain Skin biopsy Saliva	Used as a primary diagnostic assay with sequencing and as a confirmatory test
	Real-time RT-PCR	+	+++	+++	Brain Skin biopsy Saliva	Used as a primary diagnostic assay
	Direct fluorescent antibody test (DFAT)	+++	+++	+++	Brain Skin biopsy	• Primary "gold standard" test • Recognized by OIE and WHO
Antigen	Direct rapid immuno-histochemistry test (DRIT)	+++	+++	+++	Brain Skin biopsy	• Primary test • Recognized by OIE and WHO
	Indirect rapid immuno-histochemistry test (IRIT)	-	++	++	Brain Skin biopsy	Can also be used for antigenic typing studies
	Immuno-chromatographic test (i.e. lateral flow devices)	-	+	+	Brain	• Potentially low-cost • Transportable • Variable sensitivity and specificity

Digital PCR ??

Prevention of rabies:

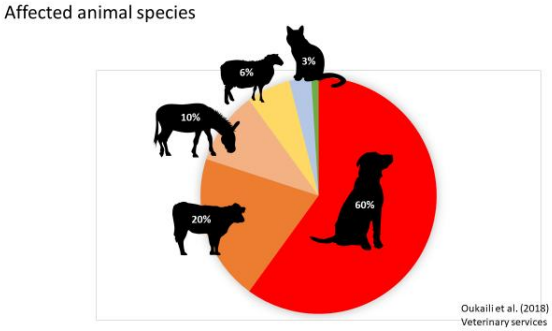
- To prevent epidemics by breaking the transmission cycle of rabies, 70% of the dog population should be vaccinated annually.
- Things to pay attention:
  - Mortality rate in the dog population, high birth rates, inability to control dogs, Serosurvey, unvaccinated dog transfers, unknown population size, difficulties in catching and vaccinating stray dogs.
  - It is aimed to stabilize or reduce the population size of stray dogs.
  - With this type of control, it is aimed to prevent the transmission of rabies from the infected population to the susceptible population.
  - Public Health education and awareness.

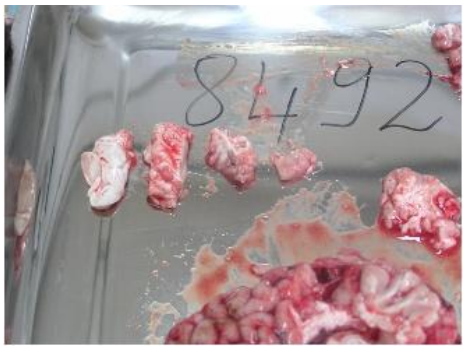


Pr. Médiha KHAMASSI KHABOU and Pr. M'hammed BENZARTI National School of Veterinary Medicine of Sidi Thabet, Tunisia gave a présentation on
« Rabies in Tunisia: past, present, futur »

- The first thing that **Dr. Médiha KHAMASSI KHABOU** said that the cost of rabies in Tunisia is about 5 million US$; 85% of it goes to post exposure prophylaxis. She also stated that there was no national program in records regarding rabies before 1982. In 1882, a national program for rabies control started and in 1992 a massive vaccination also started. Mandatory control legislation was also started in 1985. Between 1961 and 1981 there was no strategy or monitoring plans present for rabies in Tunisia. In addition there was no reference laboratory to diagnose rabies and no mandatory vaccination program as well. The average human rabies cases was 16 cases per year and 250 cases for animals as confirmed by laboratory diagnosis. Between 1982-87, there was an assistance from WHO to start a national rabies control program with three main objectives; dog vaccination by the Ministry of Agriculture, post exposure prophylaxis by the Ministry of Health and dog population control by the ministry of local affairs. It is worth to note that in 1985 there was zero human case of rabies. From 1988-1991 only ring vaccination around outbreaks was conducted. In 1991 and 1992 there was about 25 human cases of rabies and also an increase in animal rabies.
- From 1992 until now, there is a mass vaccination campaign across Tunisia free of charge for dogs owned by persons and mandatory vaccination for doge 3 months an older. It is conducted by national veterinary services and it is from

door to door. In 1992 until now there about only 3 cases of human, and an average of 100 cases in dogs and 50-75 in other animal species. The distribution of animal cases were as 60% dogs, 20% cows, 105 donkeys, 6% sheep and 3% cats. Dogs are considered the main reservoir. The highest number of cases were reported in April and May (spring) and the least number was in summer. Therefore the vaccination started in November, December and January of each year and mainly in the central and north of Tunisia where the main population density of dogs are present compared to the South (desert area). More cases were also reported from areas around Pastuer reference diagnostic laboratory. A three kilometer distance was reported that a rabid dog can transfer the disease to other animals. The diagnosis of rabies in Tunisia relay mainly on Direct Immunoflurecent Assay or/ cell culture and virus isolation. The collected four samples from the brain of suspected animal (gray matter-cerebrum, hippocampus, midbrain and cerabelum). They smash the four samples and make impression on glass slide and conduct the DIA.





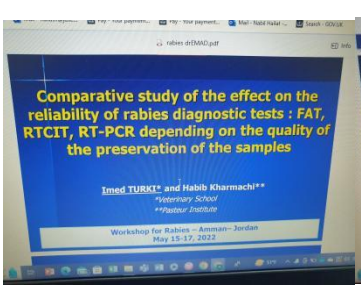
- **Control of Rabies in Tunisia:**

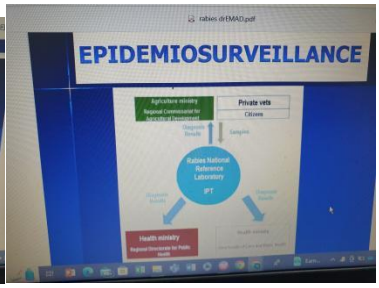
1. Sanitaory measures:
   A. Following animals that bite humans for 15 days, especially owned dogs
   B. Following animals (stray dogs), if they bite humans, they are culled.
   C. Animals that have clinical signs and nerves signs, are followed by veterinary surveillance, until they die.
2. Dog vaccination:
   The veterinary services were vaccinating large number of stray dogs following door to door strategy and visiting murals areas on two days per weak. They were also visiting schools to educate students as one presentation per class for rabies. However, the vaccination never reached about 70% of the dog population, although, the population is not known. There was also some awareness sessions using TV, radio by veterinary students. Most of the human cases are the results of lack of education such as washing the bite wound, visiting health centers to receive vaccination and rabies anti-sera from the ministry of health free of charge. In the other hand, some non governmental organization for animal rights oppose any process for dog killing. The objective of the Ministry to reach zero cases of rabies in 2030. In order to

reach this there are some challenges such as monitoring, people and capacity building and financing.

Dr. IMED TURKI and Dr.Habib Kharmachi, Tunisia, presented a paper about the different diagnostic test used to diagnose rabies. They also presented their national control program and data related to epidemiolsurveilance of rabies in Tunisia.

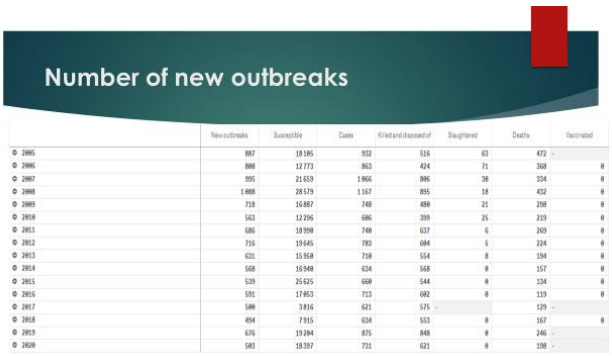
Comparative study of the effect on the reliability of rabies diagnostic tests ;FAT, RTCIT and RT-PCR depending on the quality of the reservation of samples.





Dr. Hemida Houari from Algeria talked about the Epidemiology of rabies in Algeria.

- He state that about 99% of human rabies cases are due to dog bites world wild.



	New outbreaks	Susceptible	Cases	Killed and disposed of	Slaughtered	Deaths	Vaccinated
2005	887	18 185	932	516	63	472	-
2006	888	12 773	863	414	71	368	0
2007	995	21 618	1 066	886	38	334	0
2008	1 888	28 579	1 167	835	18	432	0
2009	718	16 887	748	488	21	298	0
2010	563	12 296	686	399	25	219	0
2011	686	18 998	740	637	6	269	0
2012	716	19 645	783	604	5	224	0
2013	631	15 958	738	554	8	194	0
2014	568	16 948	634	568	0	157	0
2015	539	25 625	668	544	0	134	0
2016	591	17 953	713	692	0	119	0
2017	580	3 816	621	575	-	129	-
2018	494	7 915	634	553	0	167	0
2019	676	19 284	875	848	0	246	-
2020	583	18 397	731	621	0	198	-

- More than 95% of human cases occur in Asia and Africa. More than 80% of human cases occur in rural areas where little health education and awareness about the disease exist and post bite treatment. It is a reportable disease in Algeria since 1984. In 1985, it was identified as a priority disease by the National Zoonosis Control Committee, hence the establishment of a national program to fight against rabies. A national strategy is being developed. And a One Health working group / Rabies task-force has been formed. Human rabies deaths/year is 22 cases and dog vaccination coverage is about 23.70%. The cost of rabies/year is $19,747,157 and PEP treatments/year: 79,749 US$.

Number of new outbreaks

	New outbreaks	Susceptible	Cases	Killed and disposed of	Slaughtered	Deaths	Vaccinated
2005	887	18185	932	516	63	472	-
2006	888	12773	863	424	71	368	0
2007	995	21659	1966	886	38	334	0
2008	1888	28579	1167	895	18	432	0
2009	718	16887	748	488	21	298	0
2010	563	12296	686	399	25	219	0
2011	686	18998	748	637	6	269	0
2012	716	19645	783	684	5	224	0
2013	631	15958	718	554	8	194	0
2014	568	16948	634	568	0	157	0
2015	539	25625	668	544	0	134	0
2016	591	17863	713	682	0	119	0
2017	500	3816	621	575	-	129	-
2018	494	7915	634	553	0	167	0
2019	676	19284	875	848	0	246	-
2020	581	18397	731	621	0	198	-

Number of vaccinated

Year	Number of vaccinated (Species)			Vaccine type
	Cats	Cattle	Dogs	
2005	9249+11551	26539+353898	9249+11551	
2006	4238+3205	461350+68713	6357+4807	
2007	5009+3210	740034+566	11688+4816	
2008	7573+3637	13760+1790	11359+5455	
2009	12288+5277	744730+2641	8192+21108	
2010	8220+13559	8965+26717	12329+20338	
2011	8219+7262	170606+3934	12330+10892	
2012	922+24887	662823+170256	16114+37332	
2013	1004+12105	7260+796209	13046+39202	
2014	1236+1108	488104+265713	19009+10191	
2015	693+1168	417458+190258	544904+16924	
2016	1427	453997	87145	
2017	-	286708	29818	
2018	761+1885	120800+367547	19089+7902	
2019	1525	223557	19683	
2020	1462+9693	790663	151425	Inactivated Vaccine

Control Measures to control rabies in Algeria:

- improve health and welfare of owned and stray dog population;
- reduce numbers of stray dogs to an acceptable level
- promote responsible ownership
- assist in the creation and maintenance of a rabies immune or rabies free dog population
- reduce the risk of zoonotic diseases other than rabies
- manage other risks to human health (e.g. parasites)
- prevent harm to the environment and other animals
- prevent illegal trade and trafficking.

Surveillance measures in Algeria for rabies:

- Surveillance is the basis of any control program.
- forms the basis for data collection, which allows decision makers to know the true situation of the disease in the country and to respond appropriately for controlling it
- Even in the absence of sophisticated laboratory tools, databases useful for monitoring control actions, however basic they may be, are important (registration of animal rabies cases, census of the canine population, census of suspected rabies cases, number of people contaminated, number of people treated, number of vaccinated animals, etc.).

Stray dog management

- Culling of dogs without owners as the sole measure of rabies control should be avoided (except in the case of rabies outbreaks management); it has not been recommended for several years by all the competent international bodies.
- In some small, highly targeted areas, culling can accompany control or management measures, but not on a large scale because it is ineffective.

- It is also counterproductive for effective rabies control because, as it does not respect animal welfare, it generates reluctance among the population to have their dogs vaccinated.
- Initiatives of capture, sterilization and vaccination of ownerless dogs, often carried by NGOs and students, have been mentioned and should be followed to assess their effectiveness and to test their feasibility.

Mass par-enteral vaccination of dogs

- All accessible dogs should be vaccinated against rabies (OIE and WHO recommendation).
- Civil society should be sensitized and trained in the responsibility of empowering their dog(s) in order to identify and vaccinate them.
- Mass vaccination strategies could be standardized in the region, and efforts should be made to order vaccines (bulk orders for cheaper prices).

What we do

- Vaccination of canine and feline species, obligatory from the age of 12 weeks.
- Vaccination of domestic carnivores during monitoring of Rabies outbreaks.
- Annual vaccination of all cattle above 4 months′ age.
- Vaccination of cattle around Rabies outbreaks.
- Biological diagnosis of animal rabies cases
- Reporting of animal rabies cases
- Regional workshop on rabies epidemiological surveillance and rabies vaccination of dogs 16-17 February 2021
- The OIE is supporting its Members in the path towards a rabies-free future. Dog-mediated rabies is set for elimination by 2030. The OIE strives to coordinate intersectoral action at a global level and to accompany countries in the development and implementation of their national rabies strategies.
- An in-country SARE workshop was held from 12-18 October 2019 in Algiers, where representatives from all relevant ministries, civil society and the private sector worked together to, for the first time, assess the current situation of rabies in their country and develop a practical work plan using the SARE tool. This was the first in-country workshop held by GARC for a MERACON country.

GARC assisted "Billy Compassion for Animals Algeria" in hosting an offline GARC Education Platform workshop for members of the community. During the various educational workshops, 19 people became certified rabies educators.

Network / Workshop participation:
Attended the "MERACON: Returning to rabies elimination in 2021" webinar

GARC staff provided a virtual training session on the Rabies Vaccination Tracker (RVT) tool using the GARC App for professionals working for "Billy for compassion humanity and empathy (BCHE)"

The Stepwise Approach towards Rabies Elimination (SARE) is a

Practical planning, monitoring and evaluation tool to guide, develop and refine rabies control programme.

It provides measurable steps, designed as a logical flow of activities, to progress from Stage 0 to Stage 5, in efforts towards freedom from dog-transmitted rabies.

Latest SARE score: 2 (2019)

A SARE score of 2 out of 5 signifies a country where a national rabies control strategy has been drafted and is being implemented.

CONCLUSION:

1. Rabies, transmitted to humans or animals, causes certain death.
2. Algeria invests enormous resources to fight against this scourge but despite these efforts, rabies continues destroying around twenty lives each year.
3. It is clear that the strategy for the fight against rabies in our country must be reconsidered, reinforced, and consolidated by:

a. Make vaccines and IgAr intended for humans accessible;
b. Ensure that those bitten can receive treatment quickly
c. Implement, as a first step, canine mass vaccination in areas at risk.
d. It is important to promote cross-sector work with a collaborative approach of all relevant sectors for a One Health approach.
e. Information, education and communication are also very useful means of preventing the population against rabies before and after exposure to the risk of rabies.

Dr. Asadulla Pyarokhil from Afghanistan gave a presentation about control of rabies, a very important zoonotic disease in the region and in the world.

Dr. Asadulla described the stray dog control program in Kabul city; starting from capturing dogs, neutralization, vaccination and release. This project was supported by a British charity organization. This program was managed with the support from the local communities through cooperation and public awarrness sessions.

Mayhew International charity organization

1. Capture dogs 2. Vaccinate dogs 3. Spaying dogs 4. Public awareness

Vaccination and spaying

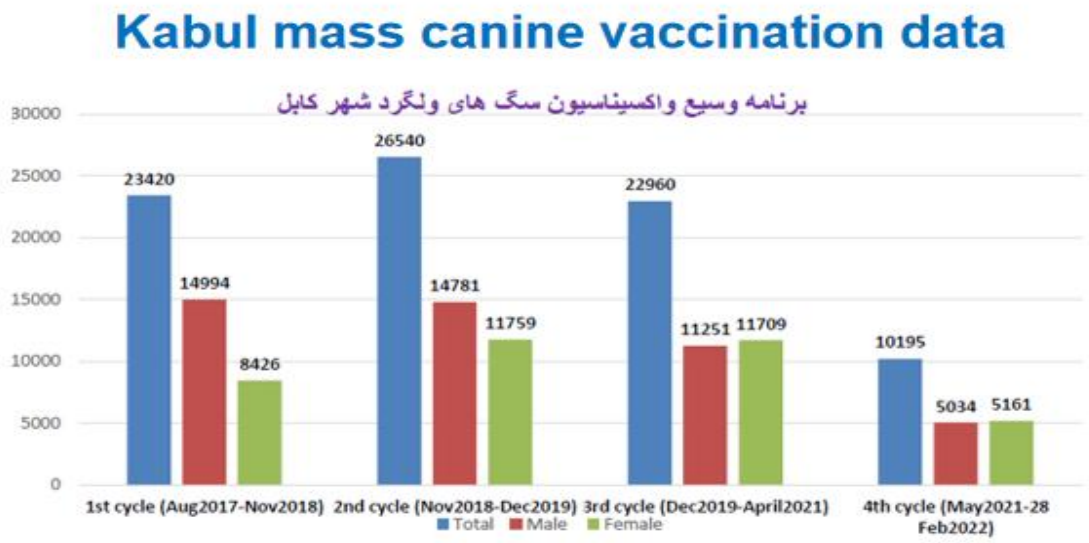
Animal hospital, faculty of Vet. Science, Kabul University

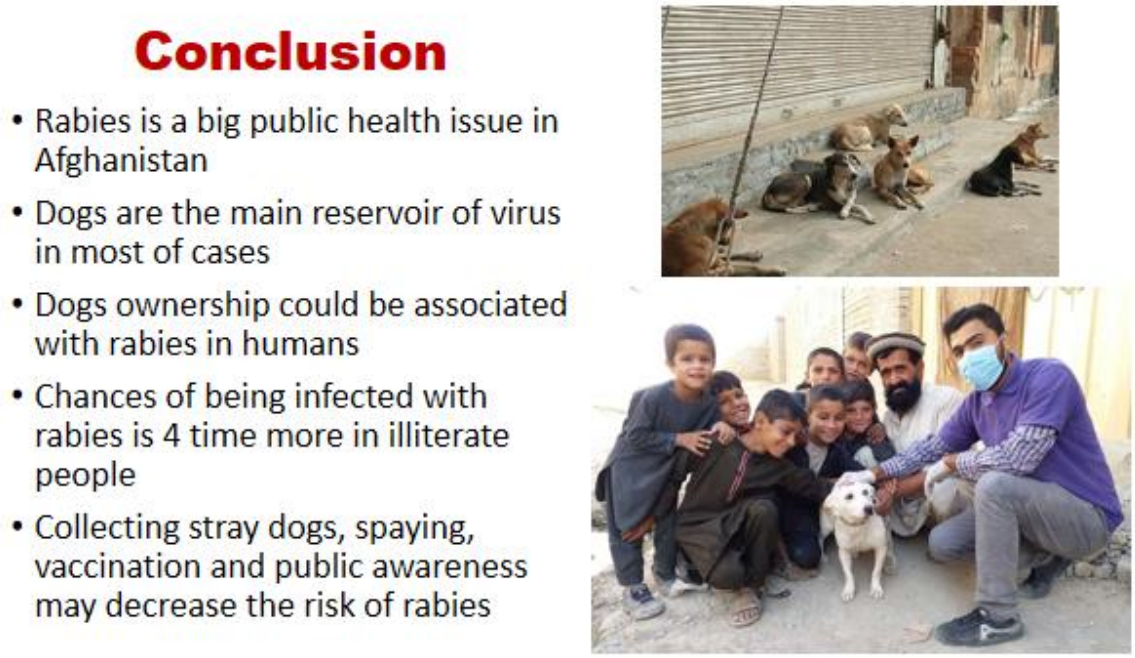
Community engagement

Working with the community

Community engagement and education program (since April 2019 till now)

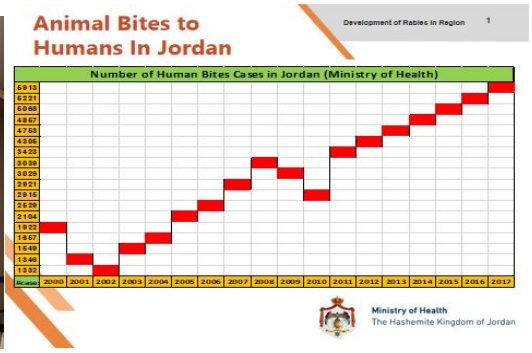
- 51 educational sessions or workshops
- A total of 3186 students
- A total of 198 teachers
- A total of 1351 community members and district leaders



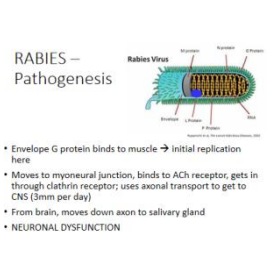


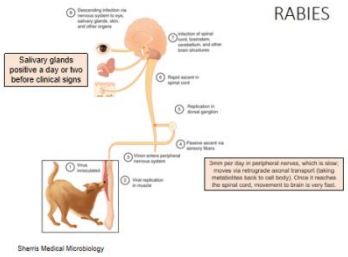
Dr. Sameh Abu-Tarboush, Dean of the faculty of veterinary Medicine also presented a paper about clinical examination of animals with emphasis on the examination of the nervous system. He showed pictures of animals with clinical signs of different animal diseases and he provided discussion platform how to differentiate between animal diseases with neurological signs with emphasis on rabies.

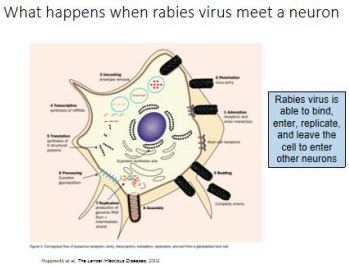
Dr. Qusay W. AlKhateeb, a graduate student in the pathology department working on rabies on Jordan gave a presentation about rabies development in Jordan.

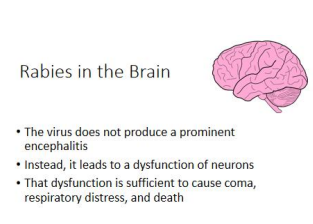


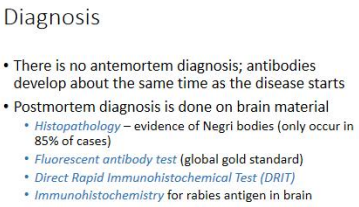
Professor Corrie Brown from The University of Georgia, College of Veterinary Medicine, Athens, USA gave a very nice presentation about the pathogenesis of Rabies. This presentation is used to teach veterinary students at our faculty and could be used in another faculties as well.

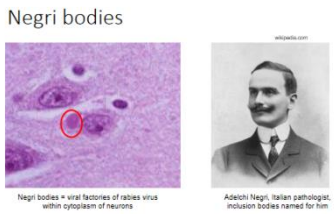


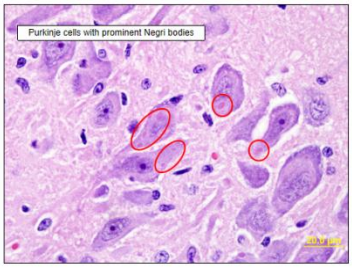


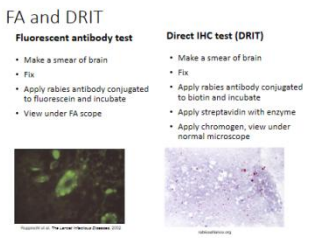


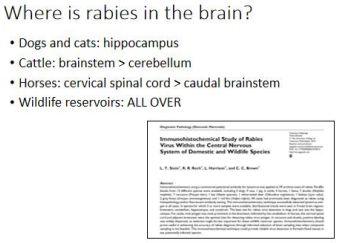


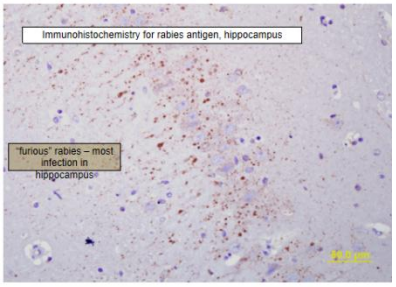


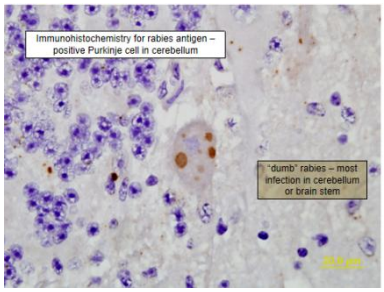






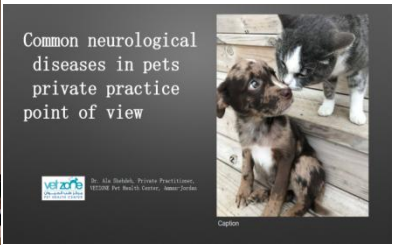


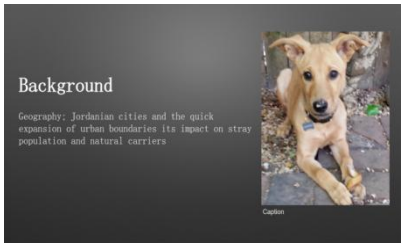


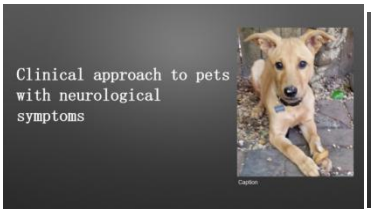


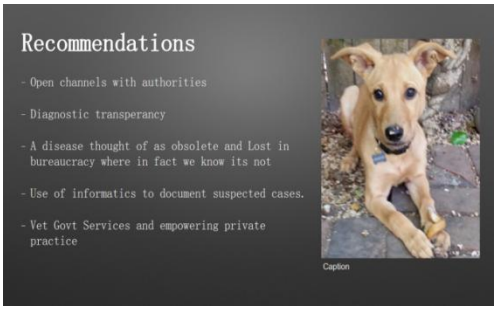
Dr.Alaa Shehadeh, Private sector, Jordan gave a presentation about Common neurological disease in the pets in Jordan from the point of view of the privet sector. He described the changes in the Jordanian culture where people started to raise dogs more

and more. He described three main cases which induces neurological signs; pesticides poisoning, canine distemper and tetanus beside rabies.









Dr. Shereen, a part time lecturer from Jordan University of Science and Technology also presented a lecture about a common animal disease, namely Listeriosis as part of the differential diagnosis

Listeriosis in animals

Dr.Shereen M.Al-Khlouf

Suspected animals and Route of entry

*Common in domestic animal especially adult ruminant are feed contaminated silage than human beings.

*Newly born , elder ages & pregnant.

Route of entry .

*1)Ingestion of contaminated feed or water ➢ or by fecal shedding of bacteria ((oral _fecal route))

Three different forms of Listeriosis are documented in animals

Septicaemic, Encephalitic and Abortion Form.

- Listeriosis causes encephalitis, abortion, mastitis, repeat breeding and endometriosis in animals .
- The encephalitic form is known as 'circling disease' due to movement of the animal in circles in one direction (OIE 2014).
- Septicemic disease occurs in horses and pigs.
- Outbreaks of Listeriosis are uncommon in birds and disease is observed occasionally in young chicks. The disease is sporadic/rare in poultry, usually seen as a septicemia or localized encephalitis.
- Besides causing disease in domestic animals and birds, L. monocytogenes also affects rodents and wild animal population (OIE 2014).

Clinical signs and lesions in mammals

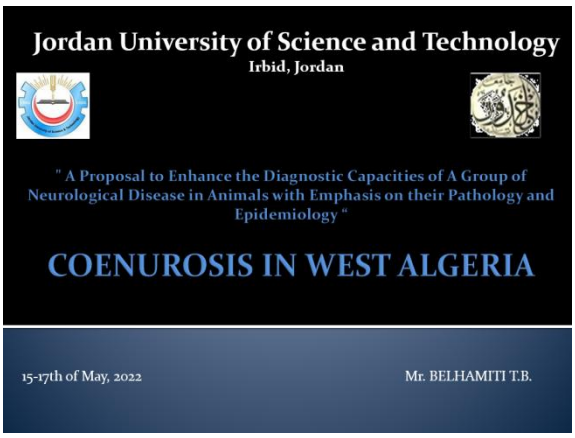
* Sheep can be severely affected by Listeriosis and the signs include encephalitis (i.e. circling disease) , abortion with placentitis in the last trimester (from 12 weeks on) and gastroenteritis with septicemia .
* Young lambs (under 5 weeks of age) might develop the septicemia form while the encephalitic form is noticed in older lambs (4-8 months).
* Incoordination, head deviation sometimes with tilting of head, walking in circles, propelling themselves forward till getting a solid object like wall or gate and unilateral facial paralysis (causing drooling of saliva, drooping of eyelid and ear) .
* Death occurs in 2-3 days due to respiratory failure.
* Goats and cattle similar signs like sheep .
* In cattle, the disease course is long and takes about 1-2 weeks.
* Buffaloes are also susceptible to Listeriosis where genital tract infections are common (Shakuntala et al. 2006). The cerebral form of Listeriosis also occurs in camels (Al-Swailem et al. 2010).

Conclusions and future perspectives

Listeriosis caused by *L. monocytogenes* is a fatal infectious disease

* It is a major problem in developing countries where there is scarcity of food as well as unhygienic conditions.
* As disease is under-rated in most countries and situations, extensive epidemiological investigations and data and adapt an effective disease control program at national and global level.
* Rapid diagnosis and effective treatment/prevention.
* Documented food-borne outbreaks of Listeriosis have highlighted the need for improvement in isolation as well as identification procedures of *Listeria*.
* Better understanding about its persistence outside mammalian hosts
* More studies from developing countries are required to take into account regional differences in clinical outcome of Listeriosis

Dr. Belhamiti from Algeria gave a presentation about Coenurosis in west Algeria. Some of his slides are presented below.

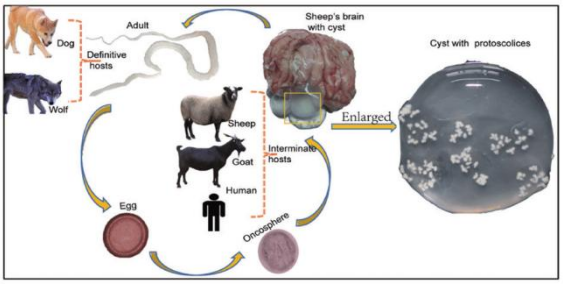


- Cœnurosis is a metacestode which develops in CNS of animals
- It is caused by ***Cœnurus cerebralis*** a larval stage of ***Tœnia multiceps***
- Cœnurosis develops mainly in the brain and the spinal cord, rarely in other organs (muscle, peritoneum, heart, lung)
- Variable motor and sensory neurological disorders.

- Lambs are most susceptible to disease
- Infestation is highest in the spring when lambs are out to pasture.
- Age-dependent resistance to the disease.
- Not all animals exposed to infesting elements develop cœnurosis

Etiology

- ***Coenurosis cerebralis***
- vesicular, monosomatic, polycephalic larva



Invasive phase
- 8 to 10d post-infection
- Active migration in CNS

Acute Cœnurosis
- 10 to 33d
- Final destination in CNS

Quiescent phase
- 40d: piriform vesicle (5 – 8mm)
- 2months: vesicle of 2cm

Chronic phase
- 3 months: maturation of the cyst with visible protoscolex
- 7 to 8 months: reaching the final size of cyst (5 to 6cm)

Diagnostic

- Age of animal
- Clinical signs
- Results of neurological, imaging and necropsy examination

The combination between :
- clinical signs
- localization of cysts by imaging (ultrasound, radiography, MRI and CT)

The best diagnostic method

- Listeriosis
- Estrosis
- Scrapie
- PEM
- Cerebral echinococcosis
- Brain abscess

Control of Cœnurosis

- Surgical treatment for animals of high genetic value (Cost !!!!)

Chimiotherapy is efficace when applied during the migration of the parasite :
- Praziquantel at 100mg/kg
- Praziquantel + Fenbendazole

- Prevention is the best practice to control this disease:

- Deworming dogs regularly with appropriate drugs
- Limit access of dogs to infected organs
- Burn and/or bury infected organs appropriately.

- The real prevalence of coenurosis is difficult to assess, because farmers and vets often diagnose the disease and send the animal for slaughter without confirmation or report.
- A large proportion of infected lambs may also be sold fat before clinical signs have developed

Paralysis

Prof. Ahmad Al-Shuhaidi, Professor of Virology at Sues Canal University, Faculty of Veterinary Medicine:Egypt.

Dr. Al-Shuhaidi discussed Enzonitic Viral diseases associated with Encephalitis with reference to Rabies.

He started his presentations about the relation ship between Vector, reservoir and dead end host; he talked about three viral diseases causeing encephalitis in horses. Then described another group of diseases: Akabane and California encephalitis. Then he described five more viral diaereses such as Japanese, West Nile and Zika viruses. He also discussed Louping ill disease and tick born encephalitis. He also described a group of viral zoonotic diseases such as Hendra, Nepah, Bovine Spongiform Encephalopathy, Scrapie, Feline Spongiform encephalopathy.Then he described in details the characteristic of the rabies virus with emphasis on the pathogenesis, diagnosis and rabies precaution, prophylaxis and vaccination of human and animals against rabies.

Dr. Rami Megbel; From Jordan University of Science and Technology, presented the epidemiology and mode of transmission of Taenia Multiceps and the role of dogs as a final host in the transmission of the disease to sheep and goats and probably in cattle.

He also showed the pathological findings and compared the occurrence of the disease in the Middle east with Europe. He raised the point that this disease can be transmitted to humans as there are 350 cases reported world wide and one case in the South of Palestine. In Jordan the prevalence was 3% and it was found mainly in the Spring and Autum, and in the age of 0.5 to 2.5 years old.

Eng. Shtoura Al-Eidwan (below picture on the left), The Director of Vector and Animal Welfare department, from The Great Amman Municipality.

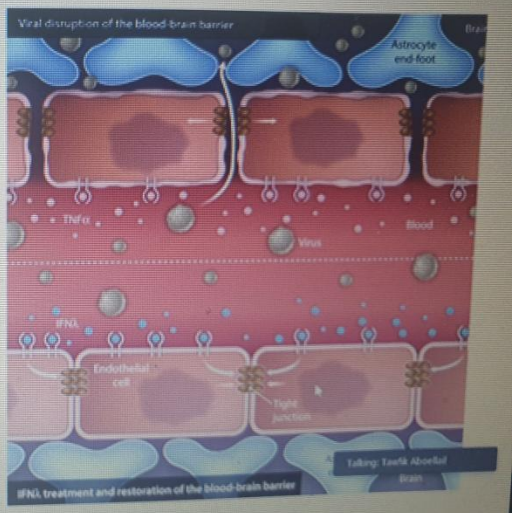
She talked about the control of Stray dogs using Animal Birth Control (ABC) program for the purpose of reducing the dog population in Amman. This required training of workers and provide infrastructure and cars. The main challenges were weak training for caching dogs, lack of data base of animal population and density in Amman. There is a need for cooperation with Jordanian institutions and international organization. She also talked about the threats such lack of awareness and laws and regulations, and the available waste in the city, behaviour of citizens and porous border of the city, and also discussed some opportunities for this ABC program. They have stopped poisoning and shooting of stray dogs and used the ABC program. Some of the recommendations were also presented.

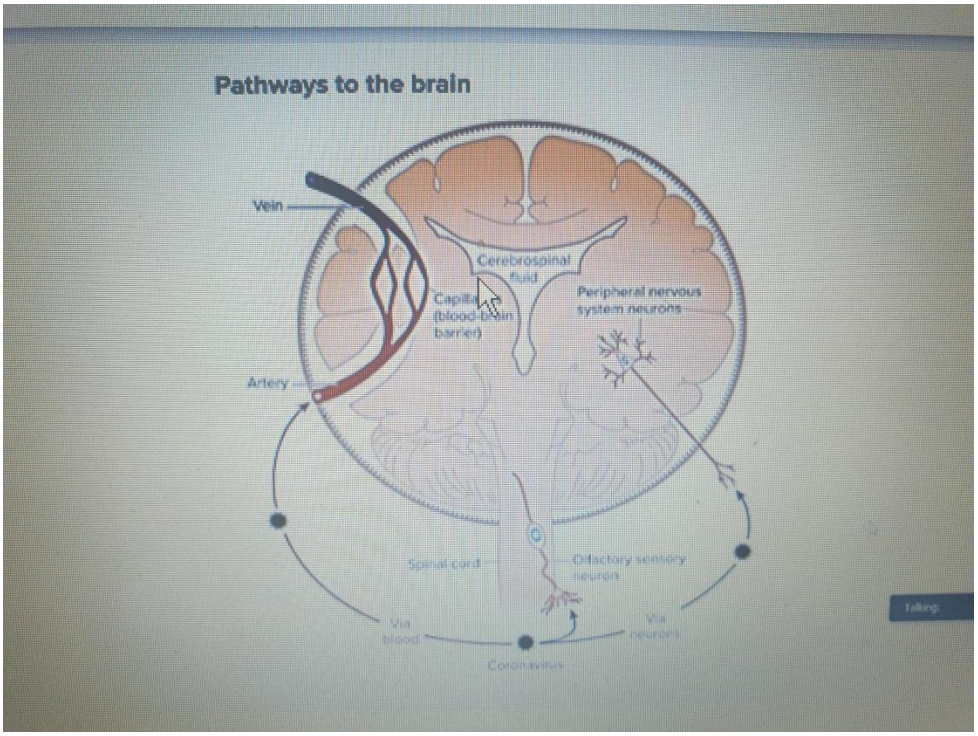
Dr. Mahmoud Al-shiab (below picture in the middle)**,** from Irbid monucability, heath division, presented the governarate plan to control stray dogs in order to reduce and limit dogs bites and rabies.

Prof. Tawfic Aboelleil, Professor of Pathology, from Colorado State University, USA, presented a research paper entitled Neuroinvasion and SARs-CoV2 Neuropathology with Emphasis on animal model in collaboration with vector born virus department and pathology department. He described three models how Covid and or Zika can enter the CNS and induced lesions

NEUROINVASION

- **Neuroinvasion** is the ability of the virus to enter the CNS
- **Neurotropism**, which is broadly defined as the ability to infect CNS cells, neurons and glia.
- **Neurovirulence** or the capacity of viruses to cause clinical disease within the CNS, involves both host- and virus-specific factors.





In the last day of the workshop, closing session was conducted to summarize the main points, key issues and recommendations from the project. One master student was working on rabies and he is near graduation. He will publish 2-3 papers from his thesis. We are also working to prepare two brochures; one on rabies and another one on Coenurosis. Also, certificates for participation and contributions in the workshop was handed at the closing ceremony.