




7th Asia Telemedicine Symposium  
December 27-29, 2013, Bangkok, Thailand


CAREN 

**Development of telemedicine in  
Central Asia**



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  The Central Asian Research  
and Education Network

Outline


CAREN 

- Current status of Central Asian Research and Education Network
- Priority for telemedicine development in Central Asian
- Distance learning for medical doctors and students
- Telemedicine Pilot Project in Turkmenistan
- Problem of liver alveococcosis in Kyrgyz Republic
- First regional CAREN Regional Networking Conference 2014
- Summary


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## Current status of CAREN

*From ancient Silk Road to high-speed data highway*

**CAREN** 


- EC-funded project to establish high-capacity R&E network in Central Asia
- The CAREN network connects the national research and education network of four Central Asian countries: Kazakhstan (KazRENA), Kyrgyzstan (KRENA), Tajikistan (TARENA) and Turkmenistan (TURENA)
- Terrestrial fibre connections (155 Mbps connection to GEANT for Kazakhstan and Kyrgyzstan, 34 Mbps connections for Tajikistan and Turkmenistan)
- From 2014 KazRENA and KRENA will have 622 Mbps connectivity to GEANT
- TARENA and TURENA will have 155 Mbps connectivity to GEANT
- Serve 1 million users at over 200 universities and research institutes in the region
- With direct link to GEANT and TEIN, CAREN provides Central Asia with a gateway to global collaborations in R&E
- The second phase of CAREN Project has started from October 1, 2013 and it focus on applications development

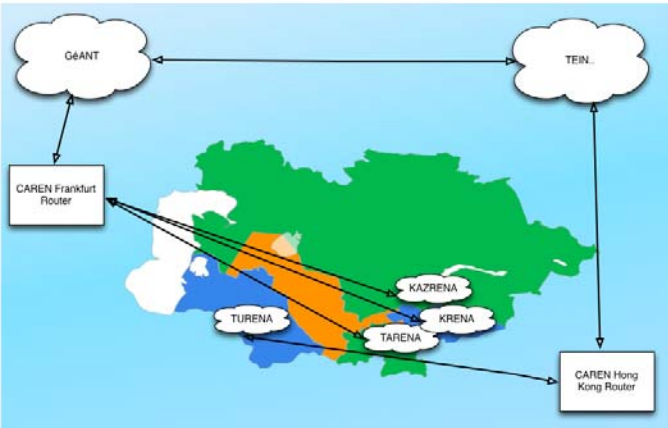




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## CAREN connectivity to GEANT (Europe) or TEIN (Asia)


**CAREN** 




 

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## World Connectivity The Global Virtual Research Village CAREN




- The GÉANT network has high speed links to networks in other world regions, connecting researchers across the globe:
  - Asia-Pacific
  - South Caucasus
  - Central Asia
  - Latin America
  - North America
  - Southern and Eastern Africa
  - Southern Mediterranean




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## Applications development for CAREN



Focusing on applications developments :

- Telemedicine
- Open and Distance learning
- Central Asia real-time monitoring of natural processes and phenomena, disaster prevention
- Regional collaboration in sustainable water resources management
- GRID computing
- IPv6 implementation
- EduRoam




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### Distance learning on telemedicine using high definition video and high quality CAREN network

CAREN

CAREN use two systems for videoconferencing : H323 and Vidyo



Videoconference with Prof. Shimizu on April 30, 2013






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### Distance learning for medical doctors and students. Remote participation in APAN telemedicine session in Korea(August 19-21, 2013).

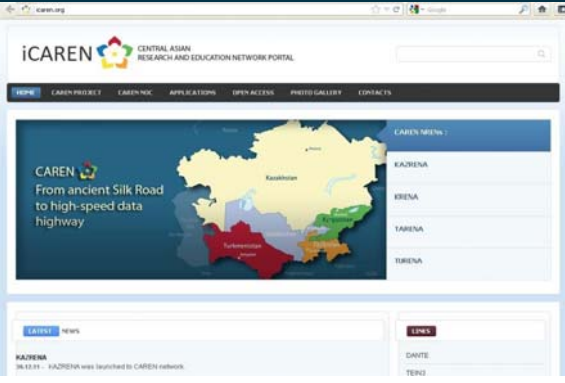
CAREN

- Use of high resolution Vidyo system
- CAREN VC with CA NRENs (April 30, 2013) on telemedicine with Professor Shimizu, Telemedicine Development Centre at Kyushu Hospital in Japan, and several of his partners . Discussion with NREN technical managers use for telemedicine different system: DVTS, H323 , Vidyo.




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**iCAREN Scientific Portal**  
[www.icaren.org](http://www.icaren.org)



A scientific portal called iCAREN ([www.icaren.org](http://www.icaren.org)) is being developed to provide tools for scientists which help them in their researches and access to Open Source resources. There is link to UN-APCICT Virtual Academy for CAREN users.



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**First CAREN Regional Networking Conference ,  
28-29 May 2014, Almaty, Kazakhstan**



 **1<sup>st</sup> CAREN Regional  
Networking Conference**

Innovative Internet for Researchers and Higher Education  
28-29 May 2014, Almaty, Kazakhstan

[Click here to find out more](#)

One session of the conference will be devoted to Open and Distance learning

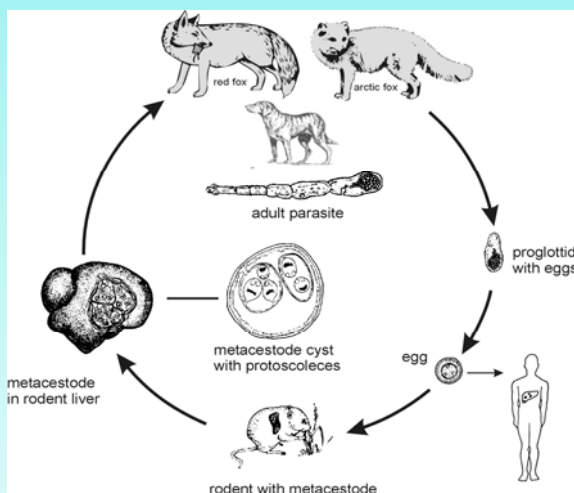



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## Problem of liver alveococcosis in Kyrgyz Republic

### Life cycle of Alveolar Echinococcosis





IN AHUNBAEV GENERAL  
SURGERY CLINIC OF NATIONAL  
HOSPITAL UNDER THE  
MINISTRY OF PUBLIC HEALTH

*From 8 April, 2009 at the  
Department of Surgical  
Gastroenterology and  
Endocrinology - 100 liver  
resections performed*

*And 74 operations performed for  
liver alveococcosis (most of  
patients from Alai region)...*

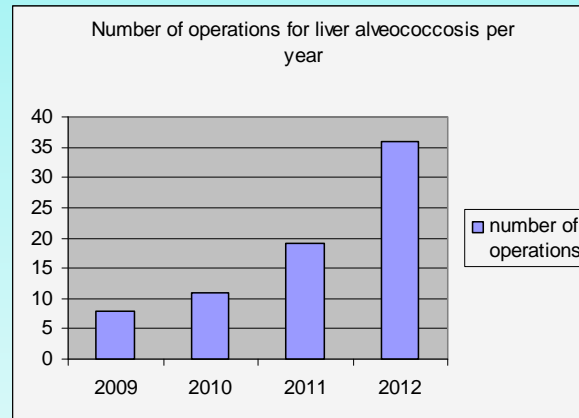
Therefore first expedition to Alai  
region was organized in 2011

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During the expedition 400 people were  
examined, 25 (6,25 %) of them had liver  
alveococcosis.



## Surgical treatment of liver alveococcosis in National Hospital



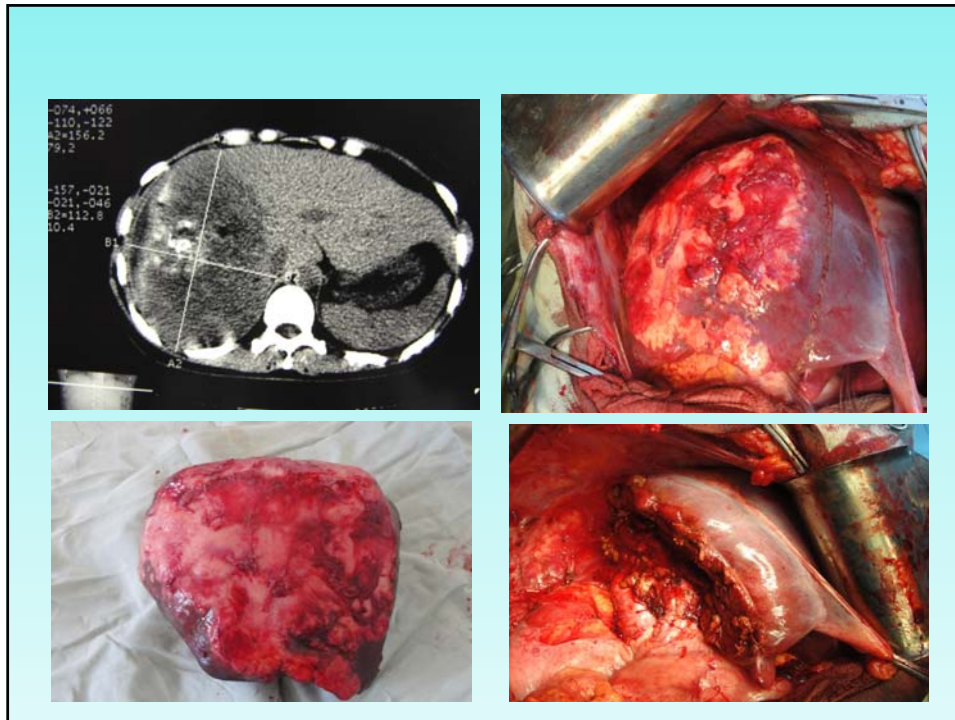
According official statistics the real incidence of liver alveococcosis is unknown, the number of patients underwent surgery for liver alveococcosis per year near 80.

*Practical application:*

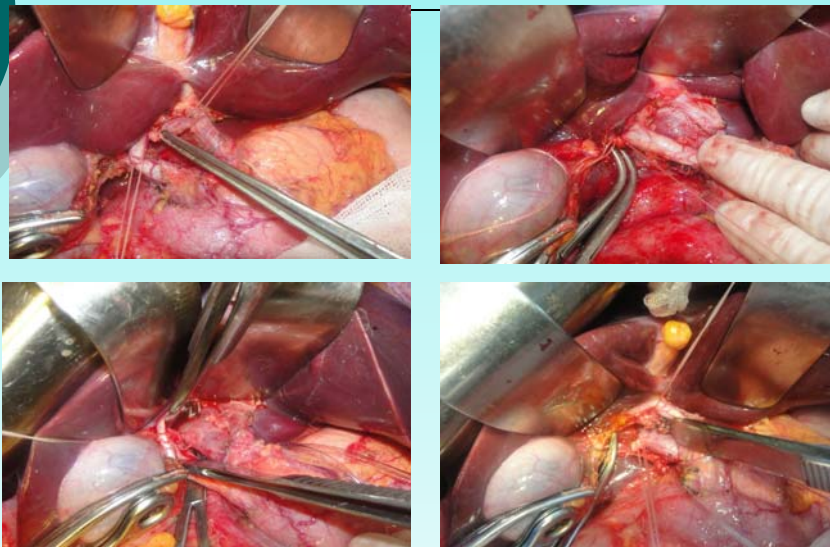
Unfavorable epidemic situation on alveococcosis leads to increase of number of patients with complicated forms of liver alveococcosis. Accordingly, at present moment clinical solution of this problem should be studied properly, especially capacity of surgical treatment. Nowadays we accumulate data on effectiveness of different clinical approaches to treatment of liver alveococcosis, which should be analyzed. Comprehensive study of liver alveococcosis will allow improve diagnosis and results of surgical treatment of the disease.

*Originality and novelty:*

The increase of number of patients with liver alveococcosis in Kyrgyz Republic observed last 10 years. It can be explained by unfavorable epidemic situation. Prolonged asymptomatic disease course leads to late diagnosis and impossibility of the successful treatment. During last 10 years only several studies dedicated to this problem were carried out in Kyrgyz Republic, therefore it stays studied not enough.



Extensive resections were performed using "hilar method", introduced 4 years ago



## Doctors - volunteers examining the population of Alai region



The examination of the population includes:

- collecting of blood samples for serological studies for antibodies to Echinococcus;
- ultrasound investigation of liver.

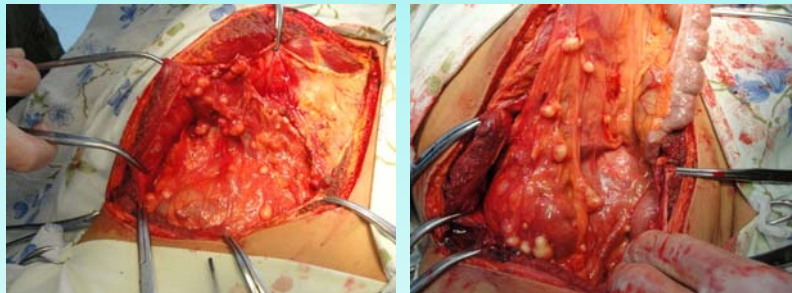
In this family from Alai region, all four children suffer from liver alveococcosis



Unfavorable epidemic situation on alveococcosis (sick dogs, marmots transporters of alveococcosis)



In this case, it's too late



# Telemedicine Pilot Project in Turkmenistan

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*Amansahedov Charyyar*

## 1. Country context

Turkmenistan is located in Central Asia, bordered by Afghanistan, Iran, Uzbekistan, Kazakhstan, and the Caspian Sea. Once a constituent republic of the Soviet Union, it is now one of the six independent Turkic states.

With most of the country covered by the Karakum (Black Sand) Desert, Turkmenistan relies heavily upon intensive agriculture in irrigated oases. The two largest crops are cotton, most of which is produced for export, and wheat, which is domestically consumed. Almost half of the nation's workforce is in agriculture, but it accounts for only 10% of GDP.<sup>1</sup> With an authoritarian government in place and a tribe-based social hierarchy, Turkmenistan has been slow to enact economic reform, mainly utilizing its gas and cotton export revenues to sustain its troubled economy.

Privatization goals are limited and modest in scope. From 1998-2005, Turkmenistan suffered from the continued lack of adequate export routes for natural gas and from obligations on extensive short-term external debt. Due to widespread internal poverty, endemic corruption, a poor educational system, and government misuse of oil and gas revenues as well as reluctance to adopt market-oriented reforms, near-future prospects are not optimistic.<sup>2</sup>

## 2. Case summary

The National scientific-educational network of Turkmenistan was established, within the framework of the project of the NATO Scientific Committee's "Virtual Silkroad". It opened the access to scientific-educational informational networks of Europe, Caucasus and Central Asia to academia, teachers and students of the country. At present, the network virtually connects 69 organizations including scientific research institutes, scientific clinical centers, higher educational institutions, secondary and special schools, and covers considerably large geographical area including the capital city, and cities of Mara, Turkmenabat, Dashoguz, Balkanabat and Turkmenbashi.

Now the project undergoes a new development. Since July, 2010, this project continued under the name of CAREN (Central Asia Research and Education Net) with support of the European Commission. The objective of this project is to connect the Central Asian scientific-educational networks to the European scientific-educational network GEANT.

At present, along with the expansion and upgrading infrastructure of the network, it is also planned to use it for video-connections among experts, distance learning, creation of

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<sup>1</sup> "Turkmenistan - Data & Statistics." The World Bank. Last modified December, 2011.  
<http://go.worldbank.org/L5J7EAF1U1>

<sup>2</sup> "The CIA World Factbook: Turkmenistan." Central Intelligence Agency. Last modified July 12, 2011.  
<https://www.cia.gov/library/publications/the-world-factbook/geos/tx.html#>

specialized database and telemedicine.

### **3. Period of project implementation**

The implementation of the demonstration project started in June 12, 2008.

### **4. Goals and objectives of the project**

The objective of having telemedicine services in Turkmenistan is to make qualified medical specialists of leading scientific clinical and diagnostic centers accessible for the citizens of remote regions.

### **5. Interests of stakeholders**

CISCO and Nvision are interested in demonstrating the potential of their equipment in developing and expanding infrastructure of the scientific-educational network.

The Supreme Council of Science and Technology by the President of Turkmenistan wants to gauge the potential of using established scientific-educational network for organizing telemedicine in Turkmenistan.

### **6. Project description**

The first demonstration of telemedicine, in the form of an eye-disease clinic, was organized on June 12, 2008. A videoconference connection was established between the Scientific Clinical Center of eye diseases and the Inter-sectoral scientific-technical Complex “Microsurgery of eye”.

The whole process was demonstrated for officials at the Ministry of Health and Medical Industry of Turkmenistan, and medical students at the State Medical Institute of Turkmenistan. Specialists had an opportunity to participate in the teleconsultations. An ophthalmology professor was commenting on the process of consultations and surgery without intervention in teleconsultations for medical students.

The following foreign consultants were invited:

- Professor Atikov Oleg Yurievich, Ph.D. in medical science, President of Association of Telemedicine of Russia
- Professor Tahchidi Hristo Periklovich, Ph.D. in medical science, General Director of State organization of Inter-sectoral scientific-technical complex “Microsurgery of eye”
- Dr. Claus Parhofer, General doctor of Medical Clinic II, Grosharden Classical University of Ludwig Maximilian, Munhen, Germany

The specialists of the Scientific Clinical center of eye diseases and the State Medical Institute of Turkmenistan participated in the video-conference as observers.

#### *Institutional arrangements and partnerships*

From Turkmenistan:

Academy of Science of Turkmenistan  
Ministry of Health of Turkmenistan  
Scientific clinical center of eye diseases of Karanov  
State Medical Institute of Turkmenistan (Ashgabat city)

From the Russian Federation:

Scientific-technical complex of eye microsurgery (Moscow)

From Germany:

Medical Clinic II, Grosharden Classical University of Ludwig Maximilian,  
Munhen, Germany

### Management dimensions

Academy of Science of Turkmenistan – TuRENA

### Technologies

The local scientific-educational network of TURENA and satellite network (IP connection, H323 protocol) were used.

Equipment used following additions:

- Equipment of information reflection: LCD panels, video-projectors, televisions, personal computers
- Audio-equipment: acoustic systems, microphones, amplifiers, mixers, etc.
- Equipment of information input: scanners, microscopes, cameras, plates of changing video signals, specialized medical systems and others.
- Demo-equipment comprised of 4 packages and was installed as follows:
  - The Academy of Science - central server of video-conference and package of video-conference connection for controlling
  - Ministry of Health (in case of installing fiber optic cable for setting up high-speed access to TuRENA network) – a package of video-conference connection with 2 LCD monitors for groups of medical specialists (to conduct 4 simultaneous sessions) and with projector for showing sessions on the big screen (to be viewed by large number of specialists)
  - Scientific Clinical center – a package of video-conference connection with cameras allowing to cover the area of surgery, computer scanners for showing X-ray pictures, or microscope with camera for inputting pictures into system of video-conference, or other specialized equipment with computer interface
  - Medical Institute – a package of video-conference connection with camera and monitor for teacher, and with projector for showing sessions on the big screen for viewing by students

### Technologies

Video-conferencing was possible with the technical support of “Cisco Systems.” “Invision Group” company, one of the largest Russian systems integrators closely working with the Russian Association of Telemedicine, supplied and installed the products. Software such as Tandberg Management Suite was used.

### Types of services to be provided through implementation of the project



- Organizing virtual telemedicine consultations
- Modeling of surgery with simultaneous telemedicine consultations with participation of one of the leading international scientific clinical centers
- Organizing session of distance learning for specialists of medical institutes.

#### Project budget

The project budget was USD 320,000.

#### Project acceptance and usage

Following were the implementation stages:

- Pre-surgery distance consultations: A surgeon performing a surgery informs foreign consultants and other specialists about the nature of disease of a patient, results of the analysis, diagnosis and chosen method of treatment, and accepts comments from consultants
- Demonstration of process of surgery: Comments of a professor in the auditorium for student are broadcasted for all specialists observing the process of a surgery in distance
- Post-surgery distance consultations: The process of surgery performed is discussed, advises on post-treatment treatment of a patient are given with participation of foreign consultants and other specialists

#### Challenges and opportunities

There is a potential lack of guaranteed flow of information between participants of tele/videoconference. Since the Internet is an open network, there is a chance of momentary technical difficulties when transferring patients' medical data. Two other challenges are accessibility and affordability.

#### Risk management

There are potential technical problems during surgery and consultations in online settings. However, there exists a good technical management in place for troubleshooting.

#### Monitoring and evaluation

The government of Turkmenistan and other participants evaluated the project positively.

#### Outcomes and impact

During the process of online surgery, there were simultaneous consultations with European and Russian specialists. Additionally, the surgery was observed by students of the State Medical Institute of Turkmenistan.

#### Replication and scalability

This project itself is expensive as the equipment of video-conference for managing telemedicine costs around USD 300,000. Therefore, the same setup can be used by other similar medical organizations. The system has been fully established and demonstrated on television.

#### Sustainability

The project is sustainable with the condition of further funding.

#### Current status of project

The project was of demonstrative nature. Thus, the equipment of telemedicine will be provided to interested medical organizations upon request.

### Key lessons learned

The telesurgery event was met with anticipation by scientists from all over the world. The most modern ophthalmologic technology was used, and Turkmen scientists received high evaluation from colleagues abroad.

Introduction of innovative technology is a priority in the national development of Turkmenistan. The participants of telemedicine conference were able to get acquainted with advanced technologies. Modern technical equipment allowed participants not only to observe the process of ophthalmological surgery performed online but also to listen to the opinions of leading foreign specialists who participated in the event.

### Objectives of organizers

Nvision Group supplied the equipment for 3-4 participants of the demonstration for a period of 6 months with a chance for the users to purchase the equipment and maintenance service.

Cisco also supplied equipment for testing and organizing demonstrative project for 6 months. Cisco also provided consultations with the clinical centers of Turkmenistan in cooperation with those in Germany through the usage of a protected VPN and Cisco systems equipment.

Supreme Council of Science and Technology, with the consent of the President of Turkmenistan, allowed Nvision Group and Cisco systems to temporarily import the equipment for demonstration and implementation of the project. The Council also ensured the return of the equipment upon completion without purchasing the equipment.

Ministry of Health and Medical Industry ensured connection of high-speed network of TuRENA in the administrative building of the Ministry through fiber optic cable. The Ministry also identified participants of the project.

In the capital city of Turkmenistan, monitors necessary for long-distance conference were installed in a number of points including in the conference hall of the Ministry of Health. The same equipment was also installed in the Academy of Science of Turkmenistan, the surgery and auditorium hall of the Scientific Clinical Center of Eye Diseases of S. Karanov, where staff of the Scientific clinical center, students and members of professors and teachers of the State Medical Institute of Turkmenistan were present. The surgery was performed on a 55 year old female patient. on implantation of soft intraocular lens whereas the blur crystal was crushed with ultrasound. Furthermore, a lens was implanted with the assistance of an injector.

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