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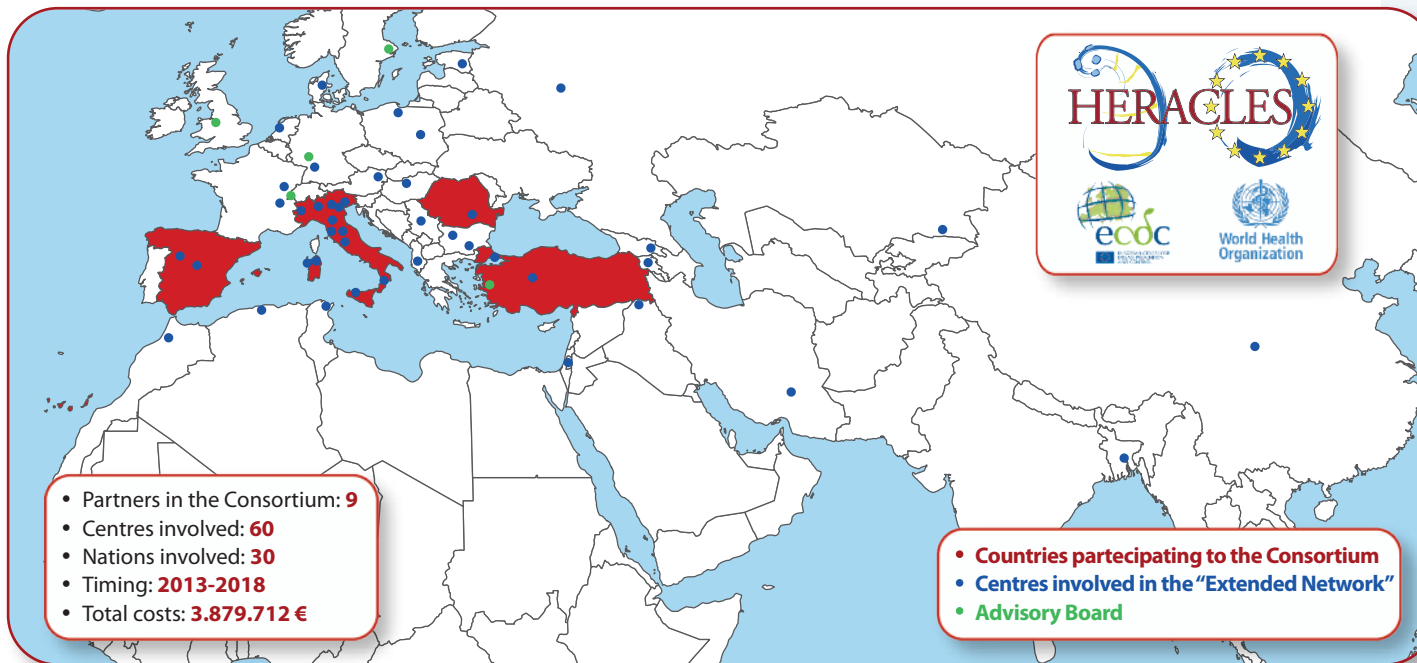


EU contribution: 2.861.500 €  
Total costs: 3.879.712 €



Human cystic  
Echinococcosis  
Research in  
Central and  
Eastern  
Societies





## Heracles - ALLIANCE

**HERACLES Consortium** is made up of nine partners, of which seven are academic institutions, one is a small-medium enterprise and one is a service provider company. Five countries are represented: Bulgaria, Italy, Romania, Spain, and Turkey. All academic partners are internationally recognised groups with important scientific background in the field of cystic echinococcosis (CE).

The Consortium is supported by the **HERACLES extended network** which enlarges the capacity of the core partners of the project. The HERACLES extended Network is represented by 60 centres from 30 European and Asian countries. The aim of this network is to support core activities within HERACLES, such as registering patients in the European Register of CE (ERCE), providing parasitic and human samples to the Echino-Biobank, and cooperating in research studies on serology and molecular epidemiology of CE. The ultimate goal is to promote **health equity** on CE providing common background, tools and access to biological and medical knowledge for the centres involved in the HERACLES extended Network.

## Heracles - International IMPACT

Current **core achievements** of HERACLES project during the period 2013-2018 were:

### WP1 - BURDEN OF DISEASE

- **The biggest research-based abdominal US screenings**

(2014-15) were conducted on **24,693 people** in 50 villages and 15 provinces/districts of Bulgaria, Romania, and Turkey. Adjusted prevalence of abdominal CE was: 0.41% in Bulgaria, 0.41% in Romania, and 0.59% in Turkey. The estimated number of individuals who may be infected with CE in rural areas is around 7,872 in Bulgaria, 37,229 in Romania, and 106,237 in Turkey. This is the first "original research" ever published by *The Lancet Infectious Diseases* (2018, Jul;18(7):769-778) on echinococcosis ([www.heracles-fp7.eu/heracles\\_survey.html](http://www.heracles-fp7.eu/heracles_survey.html)).

- The prospective, observational, **European Register of Cystic Echinococcosis (ERCE)** was created as a case series for CE clinical management and public awareness with **around 2,000 patients** from **30 centres** enrolled so far ([www.heracles-fp7.eu/erce.html](http://www.heracles-fp7.eu/erce.html)).

### WP2 - NEW MOLECULAR-BASED TOOLS

- Creation of the **Echino-BioBank** as a registered repository of parasitic and human blood samples to standardize research on CE and sustain experimental and clinical studies in this field with around 4,500 biological samples.
- Production, testing and validation of **recombinant antigens** (B1t, B2t, 2B2t, Ag5t, MDH, CaBP, AFFP and DiPol) in ELISA and VirClia© for human serology. These antigens showed better performance than hydatid fluid when tested for the follow-up of patients with CE after treatment and show potential to be included in a Point of Care-Lab on a Chip (PoC-LoC) device.

### WP3 - HOST-PARASITE INTERPLAY

- Biggest study on genotyping of *Echinococcus granulosus* strains in humans based on a **worldwide collection of parasitic cysts** represented by 742 samples collected from 26 countries.
- First time demonstration of the presence of **parasite and host derived exosomes in hydatid fluid from fertile cysts** by proteomic analysis (*Vet Parasitol.* 2017;236:22-33).
- Development of an efficient method to isolate different extracellular vesicles in human plasma and to distinguish proteins enriched in **exosomes**. Quantitative proteomic analysis identified **potential biomarker candidates** in plasma samples from patients with CE.

### WP4 - BIOAVAILABILITY OF DRUGS

- International patent on anti-parasitic soluble drugs: **"Salts of compounds having benzimidazolic structure, uses and process for the preparation thereof"**. (<https://patentscope.wipo.int/search/en/detail.jsf?docId=WO2017021992>).

### WP5 - TRAINING AND DISSEMINATION

- Creation of the **HERACLES' Extended Network** on cystic and alveolar echinococcosis in animals and humans with 60 centres involved from 30 countries ([http://www.heracles-fp7.eu/interactive\\_map.html](http://www.heracles-fp7.eu/interactive_map.html)).
- **Health education** on CE was provided to local rural communities (citizens, experts, public health authorities, policy makers) through meetings, local TVs, newspaper interviews, advertisements, and informative material during the ultrasound (US) survey sessions.
- **Training** to general practitioners and specialist physicians on CE were provided to experts working in endemic areas, as they are crucial to fight this disease.
- **Peer-reviewed scientific papers** published so far: >50 (<http://www.heracles-fp7.eu/publications.html>)

The tools developed within HERACLES will support governments, the European Commission and international agencies (ECDC, EFSA, WHO) to **harmonize data collection, monitoring and reporting of CE**. Results of HERACLES US screenings should be of use to **support public health stakeholders to plan interventions**, including preliminary cost-benefit analyses, in the perspective of complying with the WHO roadmap for CE control. In addition, laboratory-based results will open new opportunities for the diagnosis and understanding of *E. granulosus* biology and epidemiology. We see this as **breakthrough in the current scenario** of CE.

With the aim of improving surveillance of CE, we encourage governments and international agencies to **lobby the European Commission to champion new health policies** for the notification of human and animal CE.