

CHAGAS

GIVING A FACE TO THE DISEASE
A JOURNEY TO ARGENTINA



A DOCUMENTARY BY MATIAS BOEM • BOEMEDIA

DR. JAIME ALTCHEH
Head of Parasitology and Chagas disease
Ricardo Gutiérrez Hospital, Buenos Aires



– ANYONE CAN CHANGE EVERYTHING –

WE BELIEVE CHAGAS IS A CHILDREN'S DISEASE

“We believe Chagas is a children’s disease”, Dr Jaime Altcheg says, formulating an altogether radical theory about one of the greatest scourges to afflict Latin America. The paediatric doctor and head of the department for parasitology and Chagas disease is sitting in his office in the paediatric hospital Ricardo Gutierrez in Buenos Aires. In fact the room is no larger than a tiny glass-walled cubicle, crammed with patients’ records, specialist literature and, of course, a computer, above which is hanging a slogan: Anyone can change everything.

Dr Altcheg, a man in his mid-fifties, would never utter such a revolutionary idea flippantly: after all, he has spent most of his professional life researching Chagas disease, which according to WHO estimates poses a lethal threat to some six to seven million infected people worldwide. But against this backdrop his rationale is precisely this: “An infected adult is a child that went untreated! Most infections are caused in childhood.”

Dr Ledesma Patiño, since 2005 director of the regional Chagas centre in Santiago del Estero, capital of the eponymous province, corroborates the views of his colleague Altcheg. The region in the far north of Argentina is one of the six provinces with the highest risk of infection by the disease.

“Children are the most threatened group in our population”, he declares, summing up his experience. “Our centre has so far compiled 27,000 patients’ files. 3,500 of them concern acute cases of Chagas, 83% of these younger than nine.”

In principle, Chagas is considered primarily a classic vector-transmitted disease. Vectors are living organisms that transfer the pathogen from one infected human or animal to another. In the case of Chagas disease, the parasite is passed on by nocturnal blood-sucking bugs exclusive to Latin America, which in Argentina are called vinchucas.

“People’s living conditions are a crucial factor because for the vinchuca it is easier to lodge in the primitive houses of the poor rural population”, Dr Altcheh explains. “In addition, the bugs also live in animal enclosures that are often located right next to people’s houses. In cities and towns where buildings are better and animals are not free to roam around the infection risk is much lower.”

CHAGAS IS CONSIDERED A CLASSIC VECTOR-TRANSMITTED DISEASE



DR. OSCAR LEDESMA-PATIÑO

Director of the control program
for vector-transmitted diseases
Regional Chagas center
Santiago del Estero

THE „VINCHUCA“

SANTIAGO DEL ESTERO
ONE OF THE SIX PROVINCES WITH THE
HIGHEST RISK OF INFECTION BY THE DISEASE

CHAGAS IS A MAJOR EPIDEMIOLOGICAL PROBLEM

52 PERCENT OF THE RANCHEROS
ARE INFESTED WITH VINCHUCAS

Here too, surrounded in his archive by thousands of patients' files in plain brown envelopes stacked on simple metal shelving, Dr Patiño can stump up suitable figures: "Clearly, housing has proved the common denominator among the infections we have studied, especially old farms – of which, according to our surveys, there are some 70,000 in Santiago del Estero. One study we undertook between 2005 and 2006 showed that 52 percent of these rancheros were infested with vinchucas."

Vinchucas bite humans, mammals, reptiles and birds. They do it usually unnoticed in areas of the body where the skin is thinner. The bugs then suck blood and defecate. This mechanism was first discovered in 1909 by the Brazilian physician and epidemiologist Carlos Chagas, after whom the disease was later named. He succeeded in describing the complete mechanism of the disease: causative pathogen, vector, host, clinical manifestation and epidemiology.

But he was wrong when he identified the bite itself as the main source of infection. It was instead the French parasitologist Emile Brumpt who rightly observed that the transmission occurs when the insect's feces contaminated with the pathogens *Trypanosoma cruzi* are rubbed into the wound or undamaged mucous membranes. Yet it wasn't until 1969 that the disease in its entirety was correctly described by the British parasitologist Ralph Lainson – and it was also only then that Chagas was finally recognized as a major epidemiological problem.



CARLOS CHAGAS



EMILE BRUMPT



RALPH LAINSON



DR. SERGIO SOSA-ESTANI
Head of Department of Vector Transmitted Diseases
Argentine Ministry of Health
Buenos Aires

ESTER CONTRERAS
Housewife and Chagas patient
Buenos Aires

“Historically speaking, the sections of the population most affected were concentrated in the first few decades in the rural communities where the vector occurred”, reports the epidemiologist Dr Sergio Sosa-Estani, head of the National Institute for Parasitology and director of the department for vector-borne diseases in the Argentinian Ministry of Health, speaking from his wood-paneled office. “It’s a very extensive area. It stretches from the southern US to the south of Argentina and Chile, right across all of Latin America. Over decades, migration towards the cities has resulted in many people moving to live in areas without risk of vectorial transmission, yet still in need of treatment for their previously acquired infection.”

The institute is hidden behind the unremarkable façades of an entire row of houses on the Avenida Paseo Colón in Buenos Aires. Although its corridors are clouded with dust from sacks of cement, its lifts mostly discharge building site workers and its foundations shake with the din of construction, nonetheless work carries on relentlessly. The building is teeming with research, training and diagnosis; medical networks are constantly being spawned and scientific materials created. And here, day after day, just as Sosa-Estani describes it, patients turn up for treatment who were already ill before they arrived in the city.

“I used to live in a rural area where I’d heard there were vinchucas”, Ester Contreras relates. “I knew all vinchucas were carriers of parasites. But I had no idea what a parasite was,” the 41-year-old housewife candidly admits. Then her voice changes tone. Briefly, almost imperceptibly, her face clouds with fear and fatalism as she continues speaking in a markedly casual manner: “After I learned that I had Chagas I started doing research on the internet. Then I began showing symptoms like tachycardia. Now I prefer not to know so much about it...”

THE POPULATION MOST AFFECTED
IS CONCENTRATED
IN THE RURAL COMMUNITIES

NOW I PREFER NOT TO
KNOW SO MUCH ABOUT IT

CHAGAS IS BY DEFINITION AN UNNOTICED DISEASE

Understandably so, considering the subsequent course of the disease.

After the vinchuca's bite there is usually inflammatory swelling on the skin surrounding the insect's wound.

About half of those freshly infected, predominantly children or people with low immune systems, experience an acute phase lasting one to eight weeks with fever, breathing difficulties, swellings, diarrhea, abdominal pain and enlarged lymph glands,

tion are infected with Chagas, describes the treacherous nature of this disease: "Since the people don't feel any symptoms they are not worried. They don't go to hospital to have their illness diagnosed because they are unaware that they are ill. Generally, Chagas is by definition an unnoticed disease."

Ester Contreras, patient at the National Institute for Parasitology, confirms this view with experience from her own personal environment. It shows how



symptoms that are often wrongly diagnosed as flu. After this phase the symptoms recede and patients think they are cured.

Dr Faustino Torrico, a specialist in tropical medicine and infectious diseases, and professor at Mayor de San Simón university in Cochabamba in Bolivia, where some ten per cent of the popula-

precisely for this reason the disease is simply disregarded:

"Most Chagas patients without symptoms I know take a very easygoing attitude to their infection. My cousin has Chagas, but without symptoms. I asked her, why don't you go for treatment? They could cure you. But no, she doesn't want to. As long as she feels OK she's not interested."

EXAMINATION OF BLOOD SAMPLES
IN THE LABORATORY

CHAGAS PATIENTS
IN THE HOSPITAL



But this calm is deceptive. After a period of latency sometimes lasting up to several decades, on reaching a chronic stage the malice of the disease is revealed in some 30% of the patients. Symptoms occur – such as cardiac enlargement accompanied by tachycardia, motor impairment and respiratory distress, dilated oesophagus with swallowing disorders, simultaneous swelling of liver and spleen, dilation of the digestive tract, rupture or obstruction of the bowels, progressive paralysis of the abdominal tract with loss of weight and chronic constipation, as well as anaemia and neurological disorders – that can ultimately result in death for around a third of all those carrying the disease.

Even more dramatically, besides direct contact with the vinchuca and relatively seldom cases arising from blood transfusions, organ transplants and the intake of infected foods, one particular mode of transmission has grown in significance over the years: the congenital transfer of the disease from mothers to their unborn babies.

“Anyone can get Chagas disease”, Dr Claudia Domínguez, specialist for prenatal infections, observes dispassionately. The vivacious, dedicated doctor works in a public clinic, the Luis Carlos Lagomaggiore Hospital in Mendoza at the foot of the snow-capped Andes. The same-named province in central western Argentina is, like Santiago del Estero, one of the six regions in the country worst affected by Chagas disease. “People living in the endemic areas run a much higher risk of infection from a vinchuca bite than elsewhere”, Dr Domínguez continues. “However”, she adds with urgency, “most children under fifteen have already contracted the disease from their mothers during pregnancy.”

Dr Adelina Riarte, a colleague of Dr Sosa-Estani’s at the National Institute for Parasitology in Buenos Aires and director of the institute’s department of clinical pathology and treatment, confirms this observation: “Transfer from mother to child has become the second most important mode of transmission of Chagas disease”, she says,

THE SYMPTOMS RESULT IN DEATH FOR AROUND A THIRD OF ALL THOSE CARRYING THE DISEASE

ANYONE CAN GET CHAGAS DISEASE



DR. CLAUDIA DOMÍNGUEZ
Specialist for prenatal infections
Hospital Luis Lagomaggiore
Mendoza

MENDOZA
ONE OF THE SIX PROVINCES
OF THE COUNTRY
MOST AFFECTED BY CHAGAS DISEASE

TRANSFER FROM MOTHER TO CHILD HAS BECOME THE SECOND MOST IMPORTANT MODE OF TRANSMISSION



NEWBORN WARD AND WAITING ROOM OF THE LAGOMAGGIORE HOSPITAL



then goes one step further: “It’s now assumed that this is precisely how Chagas will persist over the next fifty years.”

Lagomaggiore Hospital where Dr Domínguez works offers free treatment, as do all other public hospitals in Argentina – regardless not only of where you live but also of which country you come from. Consequently patients will often travel for days on end from the deepest countryside or even from neighboring countries to get there. Many of them spend the night in the throng of the overcrowded waiting rooms. Here, in Argentina’s second-largest maternity ward, some 6,000 to 6,500 babies are born each year. In keeping with the guidelines of Argentina’s national Chagas program currently being operated and further developed by Dr Sosa-Estani and his team, throughout the country all pregnant mothers, as indeed all blood donors too, are supposed to be examined prophylactically for Chagas. Effectively, the Lagomaggiore Hospital can boast a success rate of 90 to 95%. Some five per cent of the examined women test positive for Chagas and, together with their children, are advised and treated by Dr Domínguez.

On her way to a house call the doctor points out that her patient Sabrina Lojam lives in an urban area in the centre of Mendoza. Street after street are lined with colorfully painted houses and tiny gardens. All of them are fitted with strong security bars, padlocks and high fences against the constant threat of burglary. All over the country criminality is flourishing in the wake of Argentina’s ongoing poor economic situation.

Since vinchucas generally don’t occur in this area Sabrina was completely bowled over by her Chagas diagnosis, especially as she’d had no symptoms. In customary Argentinian manner she warmly greets Claudia Domínguez with a kiss on either cheek. She then ushers the doctor into the living room decorated with plush toys, china figurines and family photographs. While her mother is proudly showing her electric knitting machine and what she has made with it, Sabrina sits down with her son on a sturdy lathed chair in front of the lavishly decorative wall-to-wall cupboard. “I didn’t know how I got the infection”, the 29-year-old mother says, still in a state of shock. “With my first daughter I wasn’t aware I could infect her. I only learned about it when my son fell ill.

Doctor Domínguez phoned to tell me I had tested positive for Chagas. So we had to examine the baby too. That's when I first found out I can pass on the disease during pregnancy."

It's the same story with almost all the women with Chagas-infected children. No matter how much effort Argentina's national Chagas program puts into educational campaigns through posters, flyers, TV and radio spots, the population overwhelmingly ignores or turns a blind eye to the disease. The lethal transmission of the infection from mothers to their unborn children can be described as largely unknown.

Sabrina's son has been treated for Chagas since his birth. Sabrina too began taking the same medicine because – in spite of the high risk – she had been hoping to have, and now has had, a third child, which is healthy. Dr Altcheh suggests a possible reason. In his experience, he relates, "we were able to prove that mothers who are in treatment transmit the infection less often than those who are not. Which is why it has now become routine practice to treat children and their mothers at the same time."

There are basically two medicines available for this treatment. One is Benznidazole, originally developed in the early 1970s by Hoffmann-LaRoche and now produced by the Argentinian company ELEA.

THE POPULATION OVERWHELMINGLY IGNORES THE DISEASE

TODAY, MOTHER AND CHILD ARE TREATED AT THE SAME TIME



El Chagas se puede Curar

Si estás embarazada hacete el análisis

ARGENTINA
UN PAIS CON BUENA GENTE

Más información al: 0800-222-1002

Presidencia de la Nación



¿Dónde vive la vinchuca?

En grietas de paredes

En cajas de ropa

En pajas

En rales, gallineros precarios, madras

¿Cómo se transmite el Chagas?

Cuando una vinchuca infectada con los parásitos Chagas, pica a una persona para alimentarse de su sangre, defeca y deposita dichos parásitos en la picadura. Al rascarse la picadura, la persona los introduce en su cuerpo.

Otras formas de transmisión

Las mujeres con Chagas pueden transmitir la enfermedad a sus hijos durante el embarazo.

Existen otras vías de transmisión (las transfusiones de sangre y los trasplantes de órganos infectados con *Trypanosoma cruzi*) que son muy poco frecuentes en Argentina gracias a los controles que se implementan en los establecimientos de salud.

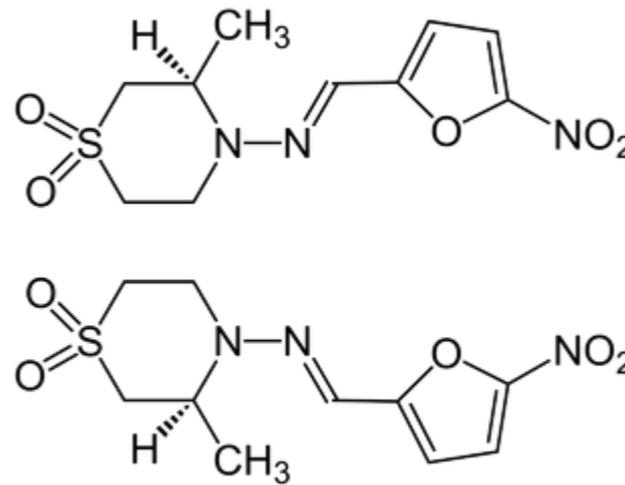
En todo lugar donde haya objetos amontonados.

BAYER DONATES ONE MILLION LAMPIT TABLETS TO THE WHO EVERY YEAR

The other is the substance nifurtimox made by Bayer, which had already once been granted a license for treating Chagas disease under the trade name Lampit in 1967. Production was halted in 1997 due to insufficient demand but resumed again in 2000 in consultation with the WHO.

Dr Maria-Luisa Rodriguez, global director of the development project for treating Chagas-infected children with nifurtimox, explains how this decision came about: "Pharmaceutical companies are frequently criticized for focusing solely on diseases that occur in developed countries. Yet over the last few years there has been a growing awareness that we should also involve ourselves in areas that don't necessarily constitute our core business." Thus since 2000 Bayer has been supporting the WHO with donated medicines, which since 2012 have amounted to one million Lampit tablets a year.

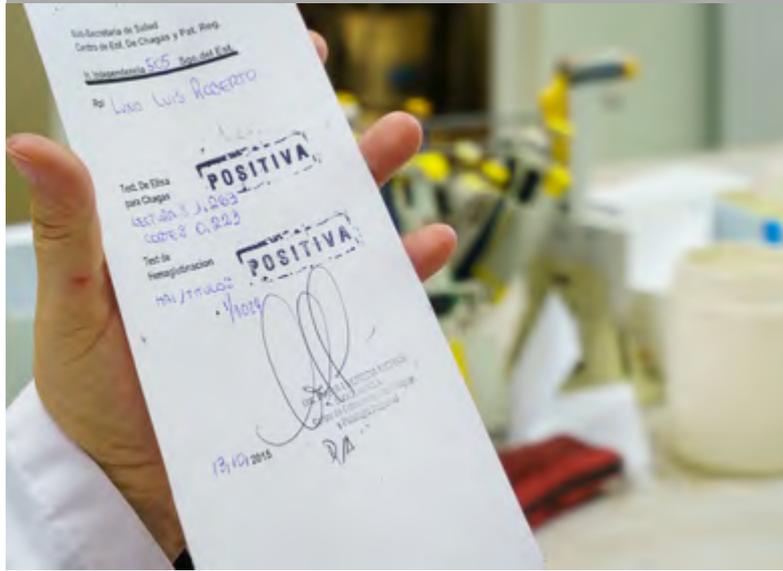
The physician Dr Carole Sampson-Landers, responsible in the nifurtimox project team for the planning, execution and completion of clinical studies, describes the normal course of treatment using this substance:



DR. Maria-Luisa Rodriguez
Head of development project Nifurtimox
Bayer



CHEMICAL FORMULA OF LAMPIT
PHARMACIST WITH LAMPIT



DR. Carol Sampson-Landers
Head of Planning and Conducting Clinical Studies
Nifurtimox project team
Bayer

POSITIVE CHAGAS SAMPLE

“A person goes to the clinic, is physically examined by the doctor, then a blood test is performed. If the result is positive the patient is given medicine straight away on their first visit. Typically the treatment lasts between 60 and 120 days, depending on the medicine. Normally the patient is asked to return for further check-ups at certain intervals during the treatment to keep tabs on side effects or other problems. When treatment has been completed the patient returns for a final visit and all the tests are repeated to ascertain whether the person has been fully cured.”

In theory this all sounds quite simple but in practice things often turn out to be more complicated. Many of the medical institutions that carry out the tests are situated in or near towns and cities. But the majority of those infected live far away in the country. They have to work and – ideally – their children go to school. They cannot just up sticks and set off on a journey to the city to be tested for a disease when maybe they don't even know they are infected with it.

For Dr Claudia Domínguez it is hard to understand why her patients often fail to show up for such essential tests. Only after making a house call on Alejandra, who is ill with Chagas, does the root of the problem become apparent. Alejandra's family offers a perfect example of how Chagas is transferred from mother to child during pregnancy. Here, the entire household is ill, from the great-grandmother down to the great-granddaughter. But it is only the youngest who turns up regularly at the hospital to see Dr Domínguez.

The eight-year-old girl with thick dark plaits and a broad gap-toothed grin lives with her family a long way from Mendoza in the country where Chagas is endemic. Practically the whole province is steppe. Artificial irrigation has turned it into the largest wine-growing region in Argentina. But for all the success Argentinian wines have enjoyed worldwide, in general the ordinary rural population remains bitterly poor – for which it feels great shame.

THE TREATMENT IS QUITE
DIFFICULT IN PRACTICE

THE ORDINARY RURAL POPULATION REMAINS
BITTERLY POOR – FOR WHICH IT FEELS GREAT
SHAME

THEY LIVE WITH THE NOTION THAT THEY ARE GOING TO DIE

MERCEDES, CHAGAS-SICK HOUSEWIFE,
WITH HER FAMILY

“To get an appointment”, Alejandra’s grandmother Mercedes explains, almost with a tinge of guilt, “I have to travel to the city. And to keep an appointment I again have to set off for the city on the evening before and spend the night in the hospital so I can be examined the next day. Since I’ve got diabetes and hypertonia I have to go into hospital several times a month. And when you are examined for one illness you can’t get yourself examined for another condition at the same time. That makes things very difficult.” ... and describes the time issues. But it is only after persistent questioning that the 45-year-old housewife discloses the real reason: “The journey alone, just for one person, costs us 60 pesos. If we have to get there the evening before we’ll also find something to drink and have supper. Then there’s breakfast the next morning. That will cost us up to 250 pesos. But at the moment my husband is unemployed and my monthly benefit is only 3,000 pesos, which has to do for four people...”

Mercedes won’t openly complain about her situation in front of strangers. Yet especially in the moments she feels unobserved her expression and body language reveal how despondent she feels. Dr Alejandro Palacios works in Tarija in Bolivia, where 40 percent of its approximately 250,000 inhabitants are infected with Chagas. He has encountered this understandable phenomenon on repeated occasions and adds a further, alarming dimension: “People suffering from Chagas disease have a tendency to depression. They live with the notion that they are going to die. So it is a disease that impairs not just the body but also the soul. Besides, Chagas patients feel stigmatized. Sometimes they are discriminated against by society and, for instance, can’t get work because of the illness.”



In Argentina this form of discrimination was for a long time even cemented in a law that indeed prevented people with Chagas from taking up employment simply on the basis of their diagnosis.

Together with Dr Lugones, founder of the Chagas centre in Santiago del Estero, and other colleagues, Dr Ledesma Patiño conducted a long but successful campaign against this legislation. As he points out, "Someone who is simply infected can perform any kind of activity without endangering the lives of others or his own."

Yet to get a good job you also need good training – something most people in the countryside are still lacking. The national Chagas program's efforts go beyond the conventional awareness campaigns previously mentioned, even trying to reach the rural population with animated films made for television: TV sets are turned on everywhere and all the time.

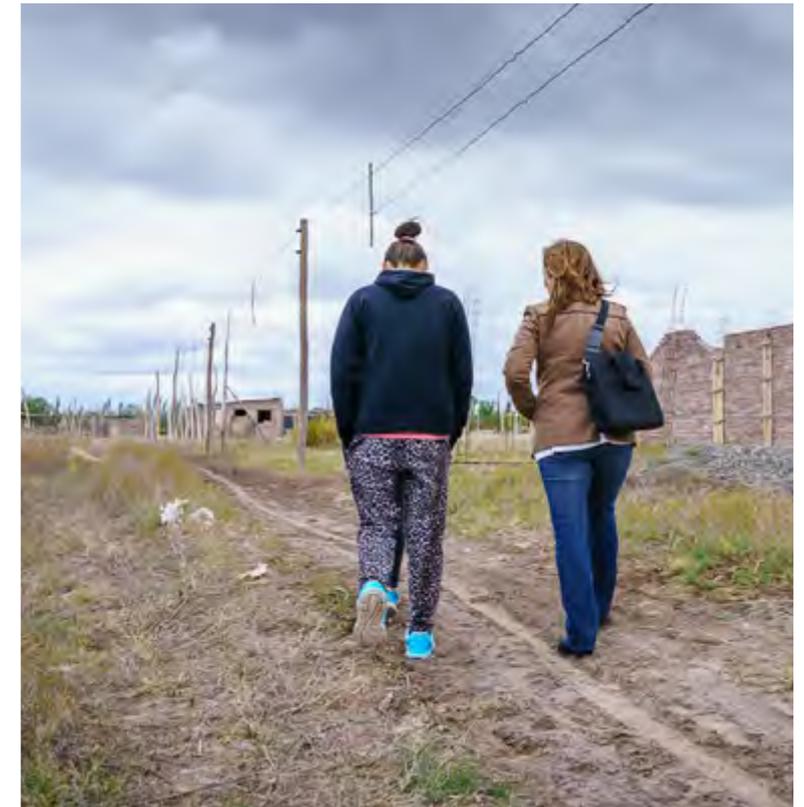
Nonetheless, Claudia Domínguez is constantly battling against her patients' lack of education: "So many people are still illiterate who can't even understand the point of the treatment. So we try to stay close to them and take care of them. Or we look for a member of the family or a neighbor who can explain to them when and how they should take their medicine."

Claudia is also concerned about the seventeen-year-old Daiana Ruiz. During her pregnancy the childlike, shy girl dropped out of school and has no plans to return.

The long, monotonous drive to visit Daiana takes the doctor down seemingly endless dirt roads. She repeatedly stops to ask directions, making sure she hasn't lost the way. Finally she spots Daiana with her little sister by the sluice of an irrigation ditch. A cold wind is sweeping grey clouds across the sky as Daiana takes Dr Domínguez along a long sandy track to the house of her parents-in-law.

In European eyes the flat building ringed by a fence cobbled together from irregular stakes rammed into the ground would look more like a run-down shack. In fact it is in far better condition than many of the much older straw-roofed adobe houses with open windows and cracks in the walls that offer vinchucas free access and perfect hiding-places. Its earthquake-proof walls have been fully plastered on the outside, its roof is at least partially lined with pan tiles and its windows are glazed.

On the inside too, furnishings couldn't be more simple, but the house is clean, tidy and lovingly decorated with crocheted doilies, photographs and effigies of the saints.



DR. DOMÍNGUEZ AND DAIANA ON THE WAY TO THE HOUSE OF HER MOTHER-IN-LAW



ILLITERATES OFTEN DO NOT UNDERSTAND THE GOAL OF THE TREATMENT

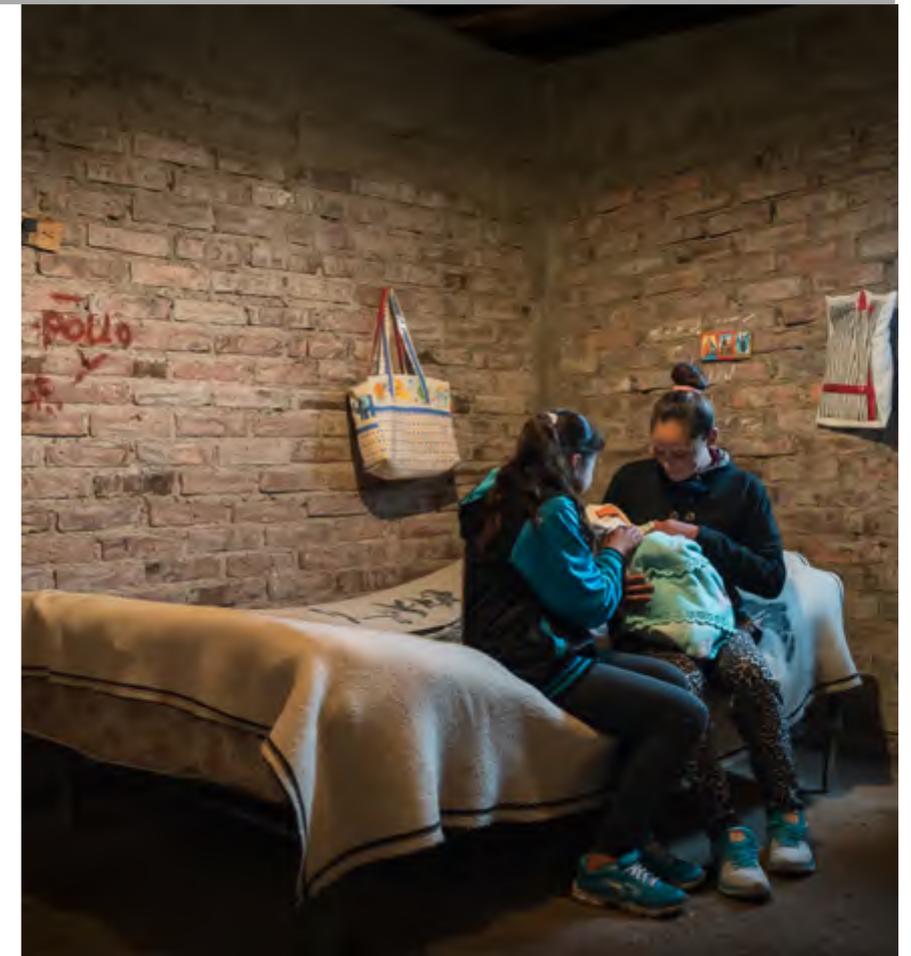
THE YOUNGER THE PATIENT, THE BETTER THEIR CHANCES OF RECOVERY

Here Daiana's family felt safe from vinchucas and thus from Chagas disease. She herself had no idea she was Chagas-positive or that her infection might represent a threat to her child.

"At first my family was very worried", she recalls, fighting back the tears as she gently rocks her daughter Paz in her lap, just two-weeks old and swaddled in a cloth. "But then I told them I'd be getting medicine for us both. Now they all feel reassured."

Claudia Domínguez, who takes touching care of Daiana, recounts with her particular brand of animated resolve, "It is very important to reach the right diagnosis. The younger the patient is, the better their chances of recovery and the better their tolerance of the medicine. That's why all children of Chagas-infected mothers should be examined immediately after their birth and given regular check-ups till their first birthday."

In the case of older patients infected a considerable time ago the parasite will already have found its way into organs like the stomach, the intestines or the liver. In this phase the infection can only be detected by means of an elaborate antibody test.



THE „VINCHUCA“

DIANA WITH HER MOTHER-IN-LAW,
HER SISTER AND HER BABY

In children, on the other hand, the diagnosis is relatively easy to ascertain. Directly after the initial infection the parasite is for some time still located in the bloodstream and can be detected without much difficulty under a microscope. Furthermore, immediate treatment will obtain excellent therapeutic results.

Claudia Domínguez then apologetically tempers this optimistic outlook, declaring that as yet there is no suitable paediatric formulation of nifurtimox for children. The reason why this is so important is explained by her colleague at Fernandez paediatric hospital in Buenos Aires, Dr María Serjan: “For children, from newborns to those weighing around 40 kilos, the dose of the medicine is calculated per kilogram of body weight. With a tablet for adults it is very difficult to properly adjust the dose to match the child’s weight. Especially when it comes to neonates who in general only weigh about three kilos.”

Hence Bayer has been working to develop a new formulation of nifurtimox specifically tailored to children. “For babies, the standard dose of 120 mg of the substance is too high”, Dr Carole Sampson-Landers confirms. “You can’t give them the whole tablet; you have to cut it in half or maybe even in quarters. But the tablet often breaks unevenly, so the doses are not accurate. But it is extremely important to administer the exact dosage since this reduces side effects and problems for the patient.”

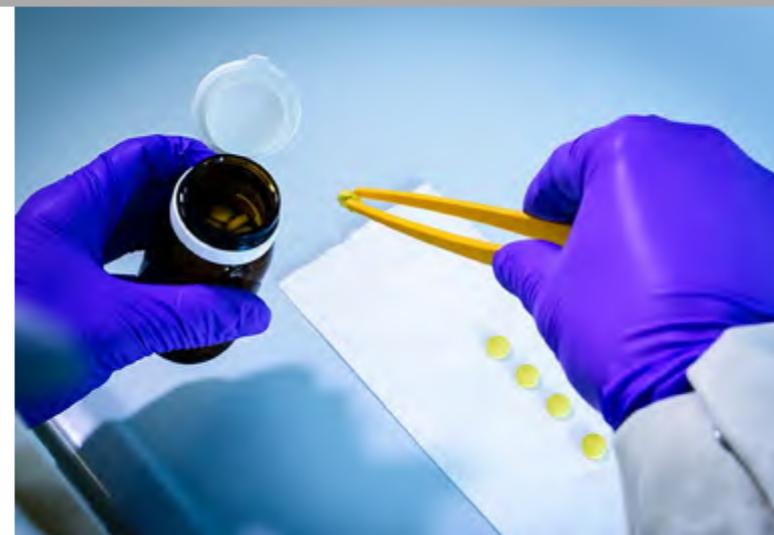
Indeed, the new paediatric formulation will contain just 30 mg of nifurtimox and will come as snap tablets, allowing it to be exactly halved. So, if required, the dose can be reduced to just 15 mg, the amount of the medicine that can be administered even to babies, especially neonates.

A NEW FORMULATION OF NIFURTIMOX SPECIFICALLY FOR CHILDREN

REDUCE SIDE EFFECTS AND PROBLEMS FOR THE PATIENT.



SIMULATION OF THE DIGESTION OF NIFURTIMOX



QUALITY CONTROL IN THE BAYER LABORATORIES



NIFURTIMOX INVESTIGATORS MEETING IN BUENOS AIRES, ARGENTINIEN



DR. JAIME ALTCHER WITH COLLEAGUES
AT THE RICARDO GUTIÉRREZ
CHILDREN'S HOSPITAL

BY TREATING THE CHILDREN
WE WILL STOP GETTING
ADULTS WITH AFTER-
EFFECTS

“The formulation we’ve developed is a tablet that dissolves quickly in water”, Dr Maria-Luisa Rodríguez adds. “Which means it can also be administered to small babies. Solid formulations can only be taken by children that are already able to swallow tablets.”

Inside the Nino Ricardo Gutierrez hospital in Buenos Aires is a wall covered with the colorful handprints of small children. Written underneath are the words “Por la esperanza de los chicos”, „For the hope of children“. All the specialists involved in the studies of the new children’s formulation of nifurtimox expect it to substantially boost these hopes. Dr Altchek, who is delighted to have just discharged a fully healed mother and her four Chagas-infected children, also sketches a highly optimistic view of the future: “By treating the children we will stop getting adults with after-effects!”

Indeed, this new formulation for children is now urgently awaited since in Argentina alone some 1,000 to 1,500 children are born with the disease each year. With the migration of the rural population, especially of already infected mothers, the congenital form of the disease has now become the major cause of Chagas infections in Argentina’s cities.

TO CONTROL THE CHAGAS VECTOR, WE NEED CONTINUITY AND CONTIGUITY

JORGE NASIR

Head of the Vector Control Program
Santiago del Estero



In the countryside, however, the campaign to defeat the vector, the vinchuca, continues with the same intensity as in the decades before. “In order to bring the Chagas vector under control we need continuity and contiguity!” recites Jorge Nasir, head of the Chagas program in the Argentinian province Santiago del Estero, his credo: the fight against the disease’s transmitter must be waged relentlessly and with combined energies.

Since vinchucas live directly inside the houses of those at risk and spread from house to house, it makes no sense to fumigate one home today, then another a hundred kilometers away, Nasir insists, seated in his blazing red office. “I have to take a linear approach! In every village I have to make sure in just the same way that not a single home has gone without treatment. All it takes is one untreated house and we have a grave health hazard!”

Argentina’s national Chagas program has been pursuing this idea with varying success since 1961. During the first two decades after its launch its ranks swelled to include over 2,000 technicians. Furnished with an overall budget of about 100 million dollars they battled with vinchucas in nineteen of the country’s provinces. In addition, in the early 1990s more than 15,000 health sector employees and city officials were trained to assist the technicians.

As a result, prior to 2000 insecticides were sprayed in a million homes. The infestation of houses by *Triatoma infestans*, the vinchuca’s scientific name, was indeed reduced from 6.1 percent in 1992 to 1.2 percent in 1999. In that year the number of clinically verifiable cases of acute Chagas disease amounted sensationally to no more than two.

Yet as the program’s official website concedes, budget cutbacks due to the financial crisis in 2001 and poor management quickly nullified this success. In contrast to the annual rate of 140,000 homes treated in 1994, for instance, in the period between 1998 and 2008 less than 65,000 houses were treated with insecticides. In the endemic areas only 40 per cent of households were subjected to consistent monitoring for an incidence of vinchucas. Consequently, since 2000 the number of people with infections has again been on the rise.

“Yet in 2009”, as Dr Adelina Riarte from the national institute for parasitology in Buenos Aires points out, “the political decision was taken to combat vinchucas so vigorously that in fact in about three or four years time all the country’s provinces will have brought transmission to a halt, confirming that this target has been met.”

In this respect Jorge Nasir's Chagas programme in Santiago del Estero seems like the blueprint for a sophisticated and systematically executed plan for controlling the disease's vector. He has three hundred staff at his disposal, thirty-six delivery vans, forty motorbikes and the necessary funds for their upkeep. A rare privilege, ascribable among other things to the fact that Dr Ledesma Patiño's power of persuasion has brought the governor of the province to grasp the importance of the issue and give sufficient support to the Chagas program.

Twenty-eight days each month Jorge's teams fan out from their headquarters in the provincial capital Santiago. Their white pickups creep through the congested streets of the "Madre de Ciudades", the mother of all cities, that was founded in 1553. Santiago is the oldest uninterruptedly inhabited settlement in all of Argentina. Driving first along properly asphalted highways, later down dusty dirt roads, the teams criss-cross Argentina's poor-house. The per-capita economic performance in Santiago del Estero is the lowest in the entire country and lies about 60% below the national average.

Sporadic solitary trees, head-high cacti and barbed thorn bushes line the unswervingly straight road that slices through the broad swathes of steppe. Following a designated plan the men comb the land. They drive from village to village, from farm to farm, identifying the precise position of each dwelling by GPS. They then feed the data into their mobile computers that are connected with a databank at headquarters maintained by the statistician Isabel Escosa.

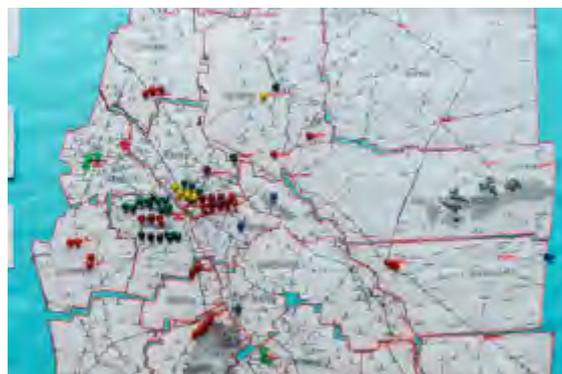
The databank contains all 52,000 farms and 18,000 precarious dwellings in the province, categorized according

THE GOVERNOR OF THE PROVINCE HAS GRASPED THE IMPORTANCE OF THE ISSUE

THE WIDE COUNTRYSIDE OF SANTIAGO DEL ESTERO



TRYPANOSOMA CRUZI, THE PARASITE THAT CAUSES CHAGAS DISEASE



CORRECT DATA IS THE KEY TO SUCCESS

SORTING, CLASSIFICATION AND ANALYSIS OF VINCHUCAS

to departamento and place. “Perhaps the most relevant information we get from this databank”, Isabel explains, “comes from the entomological situation reports on each house, in other words on the status of insect infestation.”

Sebastián Werner, responsible for referencing the data, visualizes the continuously up-dated status of all houses throughout the province on his computer-generated map: “I classify the buildings with colors. Green means there was no sign of vinchucas. Yellow means there are vinchucas in the vicinity of the house. In the orange houses we have discovered vinchucas inside the building. And the red symbols mean there is an incidence of vinchucas both in the vicinity of the house and inside the house itself.”

The mobile units deliver all the samples of vinchucas found in the inspected houses and immediate surroundings to the program’s entomological laboratory to be identified and examined. Sebastián’s colleague Carmen categorizes the samples according to Isabel’s lists. Consecutively numbered, these document all the houses, the forenames and names of their owners, personal data such as age and family background, whether there are resident minors and if so, how many. “Besides this, the teams also have to specify whether the samples were found inside or outside the house”, Carmen explains. “We are particularly interested in the indoor findings because if we have a case of Chagas these will be entomologically analyzed.”

The *Triatoma infestans* is the type of vinchuca mostly encountered in houses in Santiago del Estero. But the teams have also found representatives of other species such as *Triatoma guasayana*. The varieties differ in size and color, but also in terms of morphological characteristics. After their type has been identified the bugs are then examined for any incidence of the *Trypanosoma cruzi*, the pathogen of Chagas disease. To this end, each specimen is held down with tweezers while pressure is applied to its abdomen to squeeze out the feces. Under a microscope the pathogen in the specimen can be detected from its shape and quick movement. If the vinchucas are infected with the parasite Jorge can instantly tell from the recorded GPS coordinates which house the bug was found in and alert one of the mobile units. As he points out: “With each acute case of Chagas from a vinchuca bite we know there will be four or five hidden cases without overt symptoms of the illness. This is why we need to monitor the houses so closely in order to prevent further contagion.”

The old farmer Alejandro, for example, is completely overwhelmed by all the effort being expended over his health. To begin with, the members of the vector monitoring team inform the gaunt man dressed in baggy, threadbare clothes and sup-



OLD HOUSES LIKE ALEJANDRO'S ARE PARTICULARLY VULNERABLE

THE INSECTICIDE MIXTURE
CHECKING THE HOUSING ON VINCHUCAS

ported by a walking stick about their intended course of action. Then, equipped with protective suits, helmets, breathing masks and gloves, they comb the old man's ramshackle house looking for vinchucas. By the light of their torches they inspect the charred remains of wood and rubbish, brush aside impenetrably tangled flaps of dense, dust-encrusted cobwebs, rummage inside cupboards and chests of drawers. They finish by taking all the beds, tables, chairs and clothes outside.

Over and again, with bewilderment written all over his weather-beaten face, Alejandro exclaims, "All this, just for my sake!" and offers effusive thanks. In the courtyard a technician has been preparing the insecticide solution and now starts spraying indoors throughout the house, especially where the walls are cracked or show signs of mould, around loose floor tiles and under the straw roof pitted with holes.

"In Argentina we use chemical substances derived from pyrethroids", Jorge elaborates. Pyrethroids are synthetic insecticides similar to the key substances in the organic insecticide pyrethrum gained from the flower heads of the chrysanthemum. "They are not harmful to human health nor animals", Jorge continues. "Indoors

THESE SUBSTANCES ARE
HARMLESS TO HEALTH

they remain effective for approximately six months.”

The whole house is treated from the outside as well. All the adjoining stables and sheds are also emptied and the area surrounding all the buildings is sprayed. Outdoors, however, the insecticide’s effect is reduced to about seven days due to weather conditions like wind and rain.

Six months later the same procedure is repeated with equal thoroughness. This is necessary because while all the fully-grown insects and nymphs, in other words the young bugs, are killed in the first treatment, the vinchucas’ eggs are not. Within six months these will have hatched into insects but are still not ready to lay eggs during this period. Hence it is only after the team’s second visit that the vinchucas in the house can be properly brought under control.

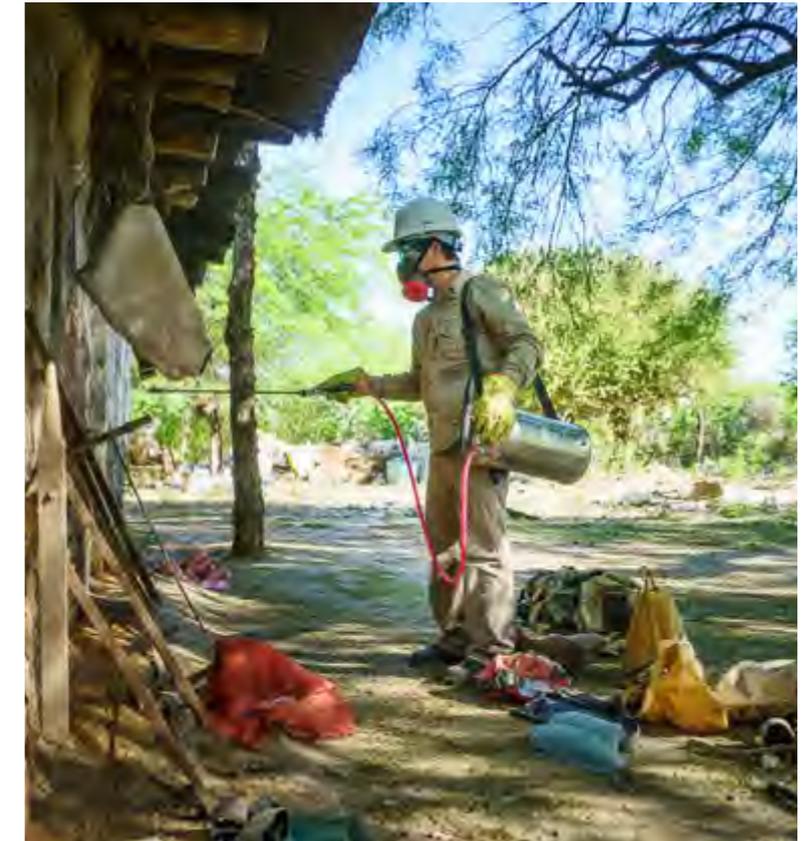
If the incidence of vinchucas is less than one percent inside the house and less than five outside, the treatment is considered to have produced optimal results. In this case the site can be declared vector-free. But as with all the other houses throughout the province, entomological assessments here will still be carried out twice a year. If vinchucas continue to be encountered inside a

building the team will again spray insecticides indoors as well as in a radius of 500 meters. “Why?” Jorge asks rhetorically, immediately volunteering the answer: “Because a vinchuca can cover up to 600 meters in one night. So we create a circle of health with a radius of 500 meters around the house to give it proper protection. If another house is located within this circle at a distance of less than 500 meters we will set up a 500-metre circle around this one too.”

But the mobile vector hunters of the Chagas program are not the only ones on the lookout for vinchucas. The population has also been enlisted to contribute. Wherever possible, every incidence of the bugs should be immediately reported.

With long lines of dust trailing in their wake, the mobile education teams in their pickups clatter through the bleak steppe. At regular intervals they visit roundabout 1,800 small rural schools, teaching schoolchildren about the infection, risks and consequences of Chagas disease.

The children attentively study the hand-painted charts that vividly depict the full cycle of the infection from the unknowing sleeping victim, to the biting bug, the pathogen in its feces and the red-dened, swollen areas of skin around the bite.



MOBILE TEAM IN THE INVESTIGATION AND TREATMENT OF A HOUSE



SIX MONTHS LATER THE SAME PROCEDURE IS REPEATED WITH EQUAL THOROUGHNESS



MEMBER OF THE MOBILE TEAMS
TEACHING A SCHOOL CLASS

Chanting in unison, they dutifully recite their newly acquired insights. The idea being that they then share these with their families at home.

Studies performed by the Chagas centre in Santiago indeed show that this hope is by no means unfounded: “In the pilot projects we conducted here in 1980 we observed that schoolchildren are the crucial factor for change”, recalls Dr Ledesma Patiño. “The children tell the adults what the disease means. This motivates them to come to us to be examined.”

A reassuring fact, since for the rural population everyday life harbors a number of risks. The subtropical climate and inordinately high temperatures in Santiago del Estero abet the proliferation of vinchucas. The old straw-roofed farmhouses built of rough mud bricks like Alejandro’s, with unglazed windows, open doorways and countless cracks in the walls, offer the bugs free access and perfect hiding-places. This is exacerbated by the people’s habit of letting animals like dogs, goats and chickens live in and around the houses. The animals’ feces and urine are nourishment to the bugs, hence an even greater attraction to invade.

“Our education teams explain to the people that they shouldn’t have animals indoors”, Jorge spells out, “that they must keep their homes tidy, that they shouldn’t hang pictures or calendars on the walls, that they need to plaster all the cracks and should take everything outdoors at least once a month so they can properly clean the house.”

THE CHILDREN ARE THE DETERMINING FACTOR FOR CHANGE

THERE IS NO SUCH THING AS A VINCHUCA-PROOF HOUSE, THERE ARE ONLY VINCHUCA-PROOF FAMILIES

JORGE NASIR
WITH POSTERS OF THE CHAGAS-PROGRAM



In addition, twice a year all residents of the province are called upon to scour their houses for vinchucas and report any findings immediately. “We work in conjunction with health centers, hospitals, schools, the police and churches”, says Jorge, describing this initiative. “Everyone has our phone number so they can either inform us or our liaison offices, which are dotted all over Santiago del Estero province. This is the surest way for all the departamentos to stay free of the parasite’s transmission through the vector.”

This procedure, organized so meticulously that it feels almost pedantic, is essential because it takes just a single house infested with vinchucas to re-infect an entire area within a brief period of time. Normally, a building harbors several hundred vinchucas whose female representatives will lay up to 200 eggs and thereby cause the vector population to proliferate continuously and at lightning speed.

For this reason Sebastián Werner’s databank also lists the greatest potential sources of risk: “I have classified which houses are farms, which of these are precarious and the materials they are built with. For the most part, vinchucas occur in old, primitive adobe buildings.”

Since the inhabitants of these houses, however often they are informed, frequently do not follow the advice given by the education teams – whether out of thoughtlessness or simply because they are too poor to improve their living conditions – the Argentinian government has come up with a very apposite solution. “We pass on all our data to the Ministry for Social Development in Santiago del Estero province”, Jorge says, describing the mechanism. “For some years now there has been a program for building homes designed to promote the clearance of these old farms. The government provides the population cost-free with simple but new homes, housing that is dignified and free of vinchucas.”

Admittedly, for the state this is an expensive strategy, but Dr Adelina Riarte proudly extols its great success: “In some provinces in our country the replacement of farmhouses with buildings made of materials less conducive to nesting by vinchucas has brought transmission almost entirely to a halt. In other words, one of the key weapons in the fight against Chagas disease are socio-economic improvements.”

Nonetheless, as Jorge admits, one of the Chagas program’s mottos remains: “There is no such thing as a vinchuca-proof house, there are only vinchuca-proof families! I can give you a house in excellent condition but if its inhabitants don’t keep it clean and tidy the vinchucas will always come back.”

But once a mobile vector eradication team has completed its work, or all the old farmhouses have been replaced by new buildings, a place is declared free of vinchucas.

Thereafter, a mobile medical team visits the local school and, with the parents' consent, takes samples of all the children's blood. Younger, pre-school children are visited for testing at home. The teams are tirelessly on the move, driving down the sandy tracks through the sun-scorched, shimmering steppe. Many of the small, widely scattered farms now already consist of new, fully plastered and tidily maintained buildings with animals deliberately kept apart from the house.

The visited families listen almost reverently to information that for them is often entirely new. After this, suspiciously observed by all those present, blood tests are performed on the children and, in case of doubt, on the adults too. Thus, to date in Santiago del Estero more than 80,000 schoolchildren and some 19,000 children below the age of five have been examined; all those who tested positive were immediately treated against Chagas disease.

THE INFORMATION IS OFTEN COMPLETELY NEW FOR THE FAMILIES



BLOOD SAMPLE FOR CHAGAS-TESTS



A FAMILY IS TAUGHT AND TESTED BY A MOBILE TEAM

DISTRIBUTION OF CHAGAS DISEASE
WORLDWIDE

A MEDICAL TREASURE:
PATIENT RECORDS IN
DR. LEDESMA-PATINO'S ARCHIVE



“In 1980 six per cent of children under five in the whole province were infected”, Dr Ledesma Patiño recalls. In spite of the 45 years he has spent combating the disease, during the interview he intermittently breaks into tears when he describes the living conditions and fortunes of those who are infected. “At present, on the other hand”, he adds on a more cheerful note, “six of the departamentos have been certified free of transmission. In other words, there are no longer any little children in this age group who are Chagas positive. Among schoolchildren up to the age of fourteen the incidence rate is now only around one to 1.2 per cent, while the number of new infections has dropped to under one per cent.”

However undeniably excellent these results are, Jorge Nasir advises caution: “We will never fully eliminate the vector!” Nevertheless he does allow himself to follow this with a more hopeful forecast: “But we can keep it under control at a certain level where it no longer poses a hazard to the health of the people in rural areas.”

If this exemplary campaign against vinchucas were adopted in all of Argentina’s provinces or even in all Latin American countries, it would doubtlessly signal a major victory against Chagas disease – but the war would still not have been won. Quite the contrary: through the large numbers of migrants the disease has now mushroomed into a global problem.

According to WHO estimates, in 2014 some 300,000 Latin American immigrants infected with Chagas were living in North America and 120,000 in Europe. A large proportion of them are women of childbearing age capable at any time of transmitting Chagas to their children and thereby contributing to the further spread of the disease.

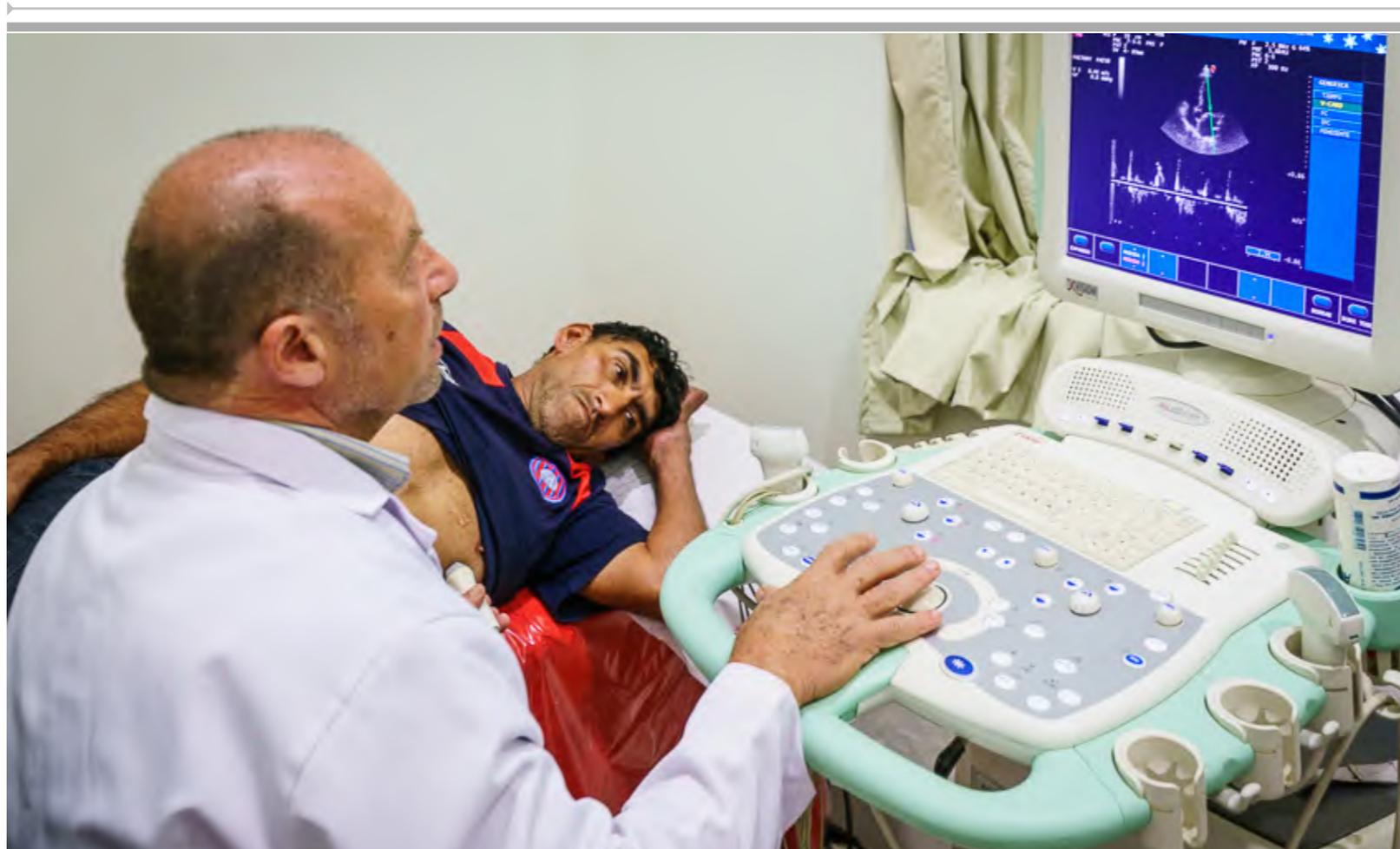
So what would it take to win this fight? Once again, a delightful allegory for the situation is given by the paediatric hospital Ricardo Gutierrez in Buenos Aires. Its premises fill an entire block in the famous Recoleta quarter

WE WILL NEVER FULLY
ELIMINATE THE VECTOR

and are enclosed within a long, high perimeter wall. The wall was painted all the way around with highly imaginative and exuberant motifs by artists, some of them famous. Now Superman and Snow White, Batman and Mary Poppins, Spiderman and Mogli, Yakari and Puss-in-Boots, together with many other heroes and heroines from the world of comics and fairytales have joined forces to allay children's anxieties about staying in hospital. It is precisely this kind of interdisciplinary as well as international coalition of experts, institutions, companies and governments that is needed to successfully face down Chagas disease.

Dr Claudia Domínguez is sitting in one of the small, bare consulting rooms in the Lagomaggiore Hospital in Mendoza. With the sleeves of her doctor's white coat rolled up as if about to launch into work, she spells out an agenda without missing a beat: "The key pillars in the fight to eradicate the disease are examining pregnant women and monitoring their children. And it has to be done 100 percent, irrespective of the different social classes or income groups. In addition, all blood examinations and blood donations should be tested for Chagas in order to adequately diagnose and treat the illness as well as to thoroughly monitor the patients.

PRECISELY THIS KIND OF
INTERDISCIPLINARY,
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ULTRASONIC EXAMINATION
IN A CHAGAS PATIENT



NEW FARMHOUSE IN
SANTIAGO DEL ESTERO

POLITICIANS HAVE TO GRASP
THAT ALL OF THIS MATTERS
IF PEOPLE'S LIVES ARE TO
IMPROVE

For, ultimately, it is we human beings who host the parasite. The vinchuca, which of course we must continue to combat in the endemic regions, simply transmits it. And after all, naturally everyone should have adequate housing, as indeed everyone in the world deserves to. That would help to sever the link between the parasite and human beings.”

Against a backdrop of plinging incoming e-mails and persistent phone calls received by colleagues with whom Dr Jaime Altcheh shares the smallest of spaces at the paediatric hospital Nino Ricardo Gutierrez in Buenos Aires, he nonetheless immediately comes up with a long list of necessary measures: “I believe still one of our greatest challenges is to educate doctors about Chagas disease. They don’t know that Chagas can be treated or cured, especially in children. But we also have to work intensively to educate the population in medical matters. It is essential that patients demand treatment if this is to have a serious effect on a global scale. In addition, people should live under better conditions so they don’t have to share their homes with the vector. We need an adequate formulation of the medicine for children, we have to improve our knowledge about the means of curing and...”, at which point he heaves an almost audible deep sigh, “...politicians have to grasp that all of this matters if people’s lives are to improve.”

CHAGAS

GIVING A FACE TO THE DISEASE
A JOURNEY TO ARGENTINA

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