



# New heights for lung transplant

## *Transplantul pulmonar la înălțime*

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Taking into account that lung transplant is a complicated and complex procedure, both from a medical and a financial point of view, for the Romanian patients, for more than 10 years, this procedure has been performed at the Allgemeines Krankenhaus (AKH) Hospital in Vienna. During this period, 49 Romanian patients with terminal lung diseases have been subject to transplants; these patients had no other chance to live than this medical procedure.

I would like to present to you a special medical expedition which took place on the Kilimanjaro Mountain in Africa, including a climb in Tanzania, up to the Uhuru Peak, located at an altitude of 5,895 metres. This expedition attended by persons who were subject to lung transplants along with medical staff was coordinated by Dr. Peter Jaksch, the physician responsible for the pneumology segment both prior and after the lung transplant in the department of thoracic surgery and lung transplant at AKH Vienna. The purpose of the expedition was to prove that the patients subjected to lung transplants may lead a normal life and, moreover, may reach an altitude of 5,895 metres. Several countries took part in this expedition: Austria, Hungary, Italy and Romania, all with a lung transplant program coordinated by the AKH centre in Vienna.

Romania was represented by Pavel Pascal, a patient who 5 years ago underwent a lung transplant for idiopathic pulmonary fibrosis and by me, Dr. Andrei Leșan, pneumology specialist and lung transplant coordinator for Transylvania region. During the specialisation program, in 2016 I participated at AKH Vienna at the patients monitoring prior and

after the lung transplant, I found out about this expedition and we were invited to represent Romania. I should mention that before the transplant Pavel had a permanent need for additional oxygen and could not leave his home, presenting a severe dyspnoea at the slightest effort. The selection of the patients subject to lung transplant was made based on the respiratory functional tests, the physical condition, the renal tests (immunosuppressants are strongly nephrotoxic) and of course, most importantly, the lack of any form of organ rejection, either acute or chronic. Based on this situation, a number of 10 patients subject to lung transplant were selected, 6 from Austria, 2 from Hungary, 1 from Italy and 1 from Romania. The medical team was made up of thoracic surgeons, pneumologists, lab physicians, intensive care physicians, kineo-therapists, nurses and psychologists, in a total number of 24, and thus a team of 34 persons resulted. The patients in the 4 countries are ordinary people without prior sports experience, but with a lot of determination and ambition.

The selected route for this expedition was the one called Lemosho and was selected because, although it is the longest, it is also the less tiresome regarding the inclination of the route and thus it allowed the best acclimatization among all the available routes on the mountain of Kilimanjaro. The team was accompanied by 120 main guides, secondary guides, cooks and carriers of heavy luggage, sleeping equipment and, of course, medical equipment. Taking into account the very high number of participants, the decision was made to split them up into four climbing groups, each group adapted from the speed and resistance point of view. The different groups can be viewed in the Table 1.

A	B	C	D
Dr. Gieszer Balasz	Prof. Klepetko Walter	Prof. Mühlbacher Ferdinand	Dr. Jaksch Peter
Dr. Ghimesy Aron	Maris Klepetko	Dr. Mühlbacher Jakob	Dr. Scheed Axel
Borka Peter	Rossmann Alois	Ing. Reich Thomas	Pascal Pavel
Dr. Lang György	Kovacevic Nijaz	Steigersdorfer Helmut	Dr. Leşan Andrei
Dr. Szilassy Laszlo Istvan	Gimpel Siegfried	Gappmayr Andreas	Ciurluini Samantha
Balogh Krisztian	Dr. Untersteiner Richard	Tischler Ulrike	Rothensteiner Julia
Garda Peter	Dr. Ebenbichler Gerold	Dr. Schwarz Stefan	Dr. Schiefer Judith
	Prof. Taghavi Shahrokh	Dr. Alexis Slama	Cheimoni Manos
	Dr. Reiter Birgit	Mag Gober Bettina	
		Dr. Ulrike Weber	

**Table 1.** The groups

Each morning started with the measurement of the oxygen saturation, the ventricular rate and the blood pressure, for the assessment of each of us prior to the climb in that particular day, and a Lake Louise score (LLS) for the assessment of mountain sickness (Acute Mountain Sickness; AMS). During the day, the plasma level of immunosuppressants was collected every two hours from three lung transplant patients selected randomly. It should be mentioned that these collections were performed on special storage pads and the lab analysis will be performed at AKH Vienna. The blood collection for the determination of the level of the immunosuppressants was performed at different altitudes in order to see if there are differences in the plasma level of such function of altitude. Upon the arrival at each base where we camped over night, blood was collected for the measurement of performance of blood gas, the serum electrolytes and the plasma level of creatinine, taking into account that we were all under prophylactic treatment for malaria, nephrotoxic medication, an important fact for the transplant patients, who had a pre-existing renal impairment due to immunosuppressants.

A series of eye and thoracic ultrasounds were performed every evening upon all the transplant patients for the purpose of early tracking of a high-altitude pulmonary oedema. Every evening would end with sleep monitoring of two transplant patients compared to the participating medical personnel. Sleep monitoring was performed by me, in the attempt to make as many entries of the lung transplant patients and of the other participants, including myself. The preliminary results from the arterial blood gas tests and the sleep records show that people suffering a lung transplant have higher values of partial pressure of oxygen and that the oxygen saturations, both daytime and night-time haemoglobin, are at least 4% better than the persons without a lung transplant. At the moment of completing all the analyses and following their statistic assessment, these will be published in specialised magazines.

The climb started at 2,100 m through the Lemosho gate, on June 11<sup>th</sup>, 2017, at 1.00 p.m., and lasted for 8 days; afterwards, on June 18<sup>th</sup>, 2017, the descent from the Kilimanjaro Mountain started. Two days after the climb started, the representative of the lung transplant patients in Romania, Pavel Pascal, could no longer cope with the constant effort and the hypoxemic conditions which could be felt at the altitude of 3,700 m. At this point, he had to interrupt the climb and made the descent to the base together with two guides. After another day, at the level of 4,000 m, the Austrian transplant patient Thomas Reich also had to make the descent; he also could not cope with the increasing effort

Day	Start	Altitude (m)	Altitude (m)	Finish	Altitude (m)	Altitude (m)	Time (hrs)	Distance (kilo)	Distance (miles)
1	Londorosi Gate	2,260	7,742	Mt Mkuwba	2,895	9,498	3-4	6	4
2	Mt Mkuwba	2,995	9,498	Shira 1 Camp	3,505	11,509	5-6	8	5
3	Shira 1 Camp	3,505	11,509	Shira 2 Camp	3,810	12,500	3-4	10	6
	Shira 2 Camp	3,810	12,500	Moir Hut	4,200	13,809	2-3	4	2
4	Moir Hut	4,200	13,809	Lava Tower	4,820	15,990	2-3	4	2
	Lava Tower	4,820	15,990	Barranco Camp	3,976	13,044	2-3	3	2
5	Barranco Camp	3,976	13,044	Karanga Camp	3,995	13,106	4-5	5	3
6	Karanga Camp	3,995	13,106	Barafu Camp	4,673	15,331	4-5	4	2
7	Barafu Camp	4,673	15,331	Uhuru Peak	5,895	19,341	7-8	5	3
	Uhuru Peak	5,895	19,341	Mweka Camp	3,068	10,065	4-6	12	7
8	Mweka Camp	3,068	10,065	Mweka Gate	1,640	5,380	3-4	10	6
				Total				70	42

**Table 2.** Lemosho - Kilimanjaro route

which the mountain of Kilimanjaro subjected us to. Following some significant efforts and some events which we managed to keep under control, all the remaining 32 participants have reached the Uhuru Peak, at the altitude of 5,895 m. The biggest problem occurring on the mounting, aside from the very frequent epistaxis, the headaches which were more and more powerful, the dizziness or the bowel movement disorders, was encountered by the transplant patient from Italy, Ciurluini Samantha, who had a significant increase in creatinine, getting to almost 4 from the basic level of 1.8. At that moment, the prophylaxis for malaria was stopped, the Tacrolimus dose was also decreased, the creatinine improved and this patient could continue the expedition. The route and the camps with the distances between them and the corresponding altitudes result from Table 2.

After extended efforts and pretty severe hypoxemia conditions (11% oxygen on the Uhuru peak), the 32 participants could conquer the highest peak in Africa on the mountain of Kilimanjaro. This is extraordinary taking into account that 8 of the 10 lung transplant patients have succeeded in reaching the altitude of 5,895 m without an additional supply of oxygen, on their own feet, after being bedridden or locked in their own home just a couple of years ago, without the hope of a normal life and with a permanent demand for additional oxygen. You have succeeded! You have succeeded in proving that lung transplant changes lives, saves lives and, more than that, offers the freedom of leading a more than normal life.

I would like to hereby thank Mr. Pascal who, even if he could not go through the entire route, contributed to a study which will support a better understanding of the capacity to react of the body of the transplant patients when this is exposed to an environment different from the usual one. Thus, he has succeeded in showing that the transplant of an organ should not stop you from continuing your life as it was before, or even from becoming involved in new and even bolder experiences.

We thank you, Mr. Pascal, for your courage and for all the efforts made for representing Romania in this medical study!

In the end, all I can say is that I am proud of everyone who participated in the expedition, especially, the lung transplant patients who started a new adventure with a lot of trust in us, an adventure that proved to be as hard as it was beautiful. On this occasion, a new international team of the lung transplant patients and of the persons who dedicated their career to helping the persons which need this medical procedure was created, and this team has succeeded for the first time in history to climb the mountain of Kilimanjaro and to prove that this is possible. ■