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EDITORIAL

The future of lung transplantation[☆]



The first lung transplantation was performed 50 years ago, in 1963, in Jackson, Mississippi¹ and the first long-term survivals were achieved 25 years ago². Currently, lung transplantation has been established as an effective therapy for a group of selected patients with advanced-stage lung diseases, when other therapeutic options are no longer useful and there is no other alternative therapy.

Present status of lung transplantation is clearly favorable, with an increasing number of transplantation procedures being performed both globally and at a national level, along with a gradually improving short- and long-term survival.

Various factors will have a significant impact on the development of lung transplantation in next years

Regarding receptors selection, absolute contraindications (hepatitis C, HIV, renal or liver failure) will mostly become relative contraindications in selected cases in the latest revision of ISHLT that is about to be issued. This is particularly true for hepatitis C and HIV; in such patients an appropriate selection of suitable cases and the use of novel antiviral therapies have shown favorable mid-term results³. Furthermore, combined transplantation allows an acceptable survival to be achieved in selected patients with renal and liver failure^{4,5}.

Age of receptor is now considered in a more flexible way⁶ and will possibly be no longer a contraindication. Therefore, ethically appropriate decisions will be taken based on comorbidities or measurable factors such as quality of life, physical exercise tolerance or brain functioning tests.

Regarding main diseases to be treated by transplantation, other alternative therapies aim at reducing the amount of candidates to transplantation, because this must always be the last therapeutic option. Recent results from studies of pirfenidone⁷ in pulmonary fibrosis have shown a potential reduction of the number of patients eligible for transplantation or a prolonged time to transplantation. Several surgical or bronchoscopic procedures for lung volume reduction could also postpone transplantation for emphysema⁸. Even more interestingly, recent investigations on cystic fibrosis

therapy⁹ could result in a change of the disease course, as has already happened in patients with PPH¹⁰.

A better use of available donors is one of the most important factors helping lung transplantation to cover currently existing needs¹¹. Thus, an improved care of donors is providing more and better donors and has allowed using some suboptimal donors; nevertheless, the decision to accept a suboptimal donor should always ensure a survival similar to the usual one¹². Donation in asystole has shown similar survival results, and is now a reality that should increase in the future after asystole method is established in most medium-size towns.

The most important development in the near future could probably be *ex vivo* preservation allowing an appropriate assessment of donor organs to be carried out and prolonging ischemia time to 12 or more hours, while donor lungs are treated for neurogenic edema, mild contusions, and even some types of pulmonary infections¹³. The use of various *ex vivo* systems being currently tested, along with the creation of specific donor lung therapy units, will probably transform the future of lung donation.

In the long-term, one of the most attractive proposals could be the development of engineered bio-synthetic lungs, by means of growing epithelial and endothelial cells on a decellularized lung skeleton, thus allowing an appropriate ventilation, perfusion, and gas exchange¹⁴.

In conclusion, lung transplantation is having a consistent development with current lines for research being mainly focused on improving the use of potential donors and treating chronic rejection, still the main problems for lung transplantation development.

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