

# Natural Rubber Latex

## The First Choice in Protection

### Origin

Rubber gloves were originally introduced to protect the surgeons and nurses from powerful antiseptics more than 100 years ago (1880s). However, since the introduction of the CDC's Universal Precautions (Centres for Disease Control and Prevention) and the OSHA's Bloodborne Pathogen Standard (Occupational Safety & Health Administration) in response to the increase in infectious diseases, such as HIV and Hepatitis B virus (HBV), wearing latex gloves has become a routine practice by healthcare professionals all around the world.

### Composition

Natural rubber latex (NRL) is a particular kind of rubber derived from the milky sap of the *Hevea brasiliensis* tree, that is refined and treated to form the raw liquid latex used to make gloves. It is also used to manufacture a number of products as diverse as tyres, clothing, medical products and toys.

### Role

The principal function of gloves is to provide an excellent two-way barrier protection against infections to both healthcare professionals and patients, with the barrier effectiveness being not only dependant on the glove material but also, among other factors, on the glove quality.<sup>1</sup> It has been reported that in terms of leakage properties no alternative material has been found to be superior to NRL.<sup>2</sup> Apart from this primary function, medical gloves should also exhibit other important qualities such as strength, eased donning, good tactile properties, comfort, dexterity, puncture resistance, adequate wet and dry grip as well as chemical resistance.

### Characteristics

NRL is a cross-linked polymeric material, offering excellent strength and the ability to stretch to many times its original length without creating holes or breaches. On the contrary, materials that are poorly cross-linked (i.e. PVC or vinyl), tend to develop holes and breaches, both visible and at the molecular level upon stretching.<sup>2</sup> NRL memory is very high, allowing the material to always return to its original shape and along with its elasticity makes it superior to other glove materials in terms of comfort and fit.

Latex is very resistant to punctures and has the tendency to seal itself if a small hole occurs even though it can be pierced by very sharp objects.<sup>3,4</sup> NRL gloves provide a good protection from most caustic chemicals and detergents, being recommended by the OSHA for use with cytotoxic drugs.<sup>5</sup>

NRL is also a natural, biodegradable product, containing no petroleum by-products or dioxins,<sup>6</sup> enabling disposal by either land fill or incineration without environmental damage.

### Protection

In recent years, latex allergies have been a cause of concern among healthcare workers, with estimated percentages ranging from 0.6 to 10 per cent<sup>7,8</sup> (1 per cent prevalence in the general population), with the incidence currently decreasing. This decrease has been due to latex allergy education, a steady improvement in manufacturing technologies (thus reducing both the overall allergen level in the gloves to as low as 50ug/dm<sup>2</sup> or less as well as the chemical content blamed for the allergic contact dermatitis reactions), and finally to the intense research carried out to develop substitution materials.<sup>6</sup> Of these new materials, nitrile, polychloroprene, styrene copolymers, plasticised PVC and polyurethane are the most commonly used.

Unfortunately, non-latex gloves have certain drawbacks. Vinyl gloves may compromise barrier protection<sup>6</sup> while other non-latex alternatives (i.e. nitrile, polychloroprene polyisoprene or polyurethane) are more expensive than latex. In addition, **the overall qualities of the NRL in relation to all aspects of its use are superior to the properties associated with any alternative materials, 'none of which currently exist to match all the characteristics of NRL, including safety with respect to resistance to the transmission of pathogens such as HIV or TSEs (Transmissible Spongiform Encephalopathy)'.**<sup>2</sup> This is extremely important when Australian data is taken into consideration. There are 25 exposures to bloodborne

pathogens per 100 daily occupied medical beds and there is a 2-10 per cent HCV (Hepatitis C virus) transmission risk to HCW after a single needlestick exposure.

Each of these exposures are responsible for an estimated direct treatment cost of \$3,500 per HCW.<sup>9</sup> Australia also represents 5 per cent of worldwide HCW HIV infections cases caused by a specific occupational exposure to blood or body fluids.<sup>10</sup>

All the above properties of NRL, together with its relatively low cost, result in latex gloves being recommended (except for wearers allergic to latex proteins) as the first choice for barrier protection in the healthcare environment.

## Glove materials comparison table

Properties	Latex	Neoprene	Nitrile	Polyisoprene	Vinyl
Barrier protection	Excellent	Very Good	Excellent	Excellent	Fair
NRL	Varies	Excellent	Excellent	Excellent	Excellent
Strength/durability	Excellent	Very Good	Excellent	Excellent	Fair
Elasticity	Excellent	Very Good	Very Good	Excellent	Fair to Poor
Puncture resistance	Very Good	Good	Excellent	Very Good	Fair to Poor
Fit, feel, comfort	Excellent	Very Good	Very Good	Excellent	Fair
Chemical resistance	Good	Very Good	Excellent	Good	Poor

## Levels of risk associated with latex medical gloves

Transmissible agent	Intact product	Contact with chemicals	Manufacturing quality	Product tearing
TSE	No risk <sup>1</sup>	No risk <sup>1</sup>	No risk <sup>1</sup>	Very small
Viruses	No risk <sup>1</sup>	Small	Moderate	High

1. Infinitesimally low risk.

Source: Opinion of the Scientific Committee on Medical Products and Medical Devices on 'The protection offered by natural rubber latex devices (medical gloves and condoms) against transmissible diseases'. European Commission.

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