

Short Communication

# Failure of Rabies Post-exposure Prophylaxis Despite Achieving Adequate Antibody Titers in a Goat at Veterinary Hospital Rehan, District Kangra, Himachal Pradesh, India

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## I N F O

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## A B S T R A C T

Post-Exposure Prophylaxis (PEP) failures in cattle/ animals have been reported from all parts of the globe. Here, we report a failure of PEP in a goat despite achieving high titres after PEP. This PEP failure may be attributable to the fact that we may have missed some abrasions that were not infiltrated with Rabies equine Immunoglobulins (eRIG) or there may have been direct binding of rabies viruses to the nerve endings. Also, a delay in initiating PEP may be the reason as the goat was presented for PEP after 12-14 hours of bite by a rabid dog. Still, we need to search for the answers as all animals having antibody titers more than the arbitrary protection limit of 0.5 IU/ml survived except the goat despite having very high RVNA titers of 7.5 IU/ml at day 14.

**Keywords:** Rabies, Post-exposure Prophylaxis Failure, Intramuscular Vaccination, Intradermal

On Jun 14, 2016, the information of a clinically rabid dog having bitten seven cattle and one four-year-old goat in village Minta in Nurpur Block of Kangra district of Himachal Pradesh was received by the doctor in charge of Rehan Veterinary Hospital. A team was rushed to the village site and Post-Exposure Prophylaxis (PEP) was administered by

the veterinary doctor in charge to all the cattle/ bovine and the goat (Figure 1). Five doses of rabies vaccine Rabivac Vet, a Cell Culture Rabies Vaccine, available as 1 ml per vial were used "off label" for intra-dermal administration as part of an ongoing study on bovine in the area.<sup>1</sup> Each animal was given 0.2 ml intra-dermal rabies vaccine in the

neck of the cattle and in the dorsal surface of the pinna of the goat as practised for small animals like dogs in some experiments<sup>2</sup> on day 0, 3, 7, 14, and 28. Varying volumes of equine Rabies Immunoglobulins (eRIG), depending on the size and depth of the wound, were also administered in and around the wound(s) without IM eRIG administration<sup>3</sup> based on human experiences. All the animals were bitten on the face or head region and a detailed table of eRIG given to bovine is published in a paper on IDRV in bovine in Table 2, Phase II page 15 dated Jun 14, 2016 Sr. no. 10-16.<sup>1</sup> One previously vaccinated animal was given only single 0.2 ml ID booster vaccination without eRIG infiltration. The goat had eight wounds in and around the neck and was given a total of 3 ml eRIG in and around the wounds to cover the surface of all wounds till their depth to neutralize the virus at the site of the wounds itself. The rabid dog was killed by the villagers and presented for postmortem examination at the Rehan Veterinary Hospital where the brain was extracted and sent for Fluorescent Antibody Test (FAT) examination to Central Research Institute (CRI) Kasauli, Himachal Pradesh. The brain of the dog was found to be rabies-positive as per FAT. Serum samples were obtained on day 14 from all seven cattle and the goat and sent for RFFIT examination to the National Institute of Mental Health and Neurosciences (NIMHANS), Bangalore, India. All eight serum samples were having titers above considered protective (i.e. 0.5 IU/ml). The titers value for goat serum was 7.5 IU/ml at day 14 which is 15 times higher than required. Despite high serum titer values, the goat died on day 15 due to rabies as diagnosed clinically being hyperactive, excited, repeated head pressing, and bleating. A one-year-old bull and 8 years old buffalo bitten by the same rabid dog but not presented for PEP also died due to clinically diagnosed rabies (as these cattle were taken to some faith healer by the owner).



**Figure 1.** Goat that Died being given ID PEP in Dorsal Surface of the Pinna by Dr Uppinder Sharma

For the ongoing intradermal study in bovine, the Institutional Ethics Committee for CPCSEA of Dr GC Negi College of Veterinary and Animal Sciences, CSK, HPKVV, Palampur granted the ethical approval in the meeting conducted on Feb 5, 2016, and another meeting that was conducted on Nov 9, 2016 (Sr. no. 5/2016 wide letter no - 781/2016). Since the goat was also presented with bovine for PEP bitten by a suspected rabid dog, it was not refused PEP on ethical considerations.

## Discussion

PEP failures in cattle/ animals have been reported from all parts of the globe.<sup>4</sup> In this case of the goat, it might be due to the fact that we may have missed some abrasions<sup>5</sup> that were not infiltrated with eRIG or there may have been direct binding of rabies viruses to nerve endings<sup>6,7</sup> after the rabid dog bite. Also, a delay in PEP could be the reason as the goat was presented for PEP after 12-14 hours of the bite by the rabid dog as the owner found the wounds later hidden in the fur of the goat. Still, we need to search for the answers as all animals having antibody titers more than the arbitrary limit of 0.5 IU/ml survived except the goat. Although some studies contend that this value (i.e. 0.5 IU/ml) is the minimum required for protection in cattle, thereby saying that maybe higher titers are required in cattle as 100% of them are susceptible to rabies with anti-body titers below the level considered protective (i.e. 0.5 IU/ml) after single IM injection at day 30 or protective effect of rabies vaccination not only depends on adequate antibody response but also on defence mechanisms mediated by cell-mediated immunity.<sup>8,9</sup>

More such PEP failures studied may open some new ideas of failure of PEP not only in animals but in humans as well and all such failures need to be documented for more meaningful debate to arrive at a consensus statement on correlates of rabies antibody protection (i.e. 0.5 IU/ml).

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**Conflict of Interest:** None

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