

COMPARING ADHESIVE TYPES FOR RADIOTRANSMITTER ATTACHEMENT ON EASTERN BAT SPECIES

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Fig. 1 Example of bottles for each adhesive

Abstract

Radio transmitters are a valuable tool used in bat studies around the world. There are varying methods for attaching the transmitters. A common method is to adhesive the transmitter between the scapulae with a surgical adhesive. However, within the last year the manufacturer of the most popular surgical adhesive (Skin-Bond) has changed its formulation. The new formula behaves significantly different and some researchers are unhappy with its performance. Our objective was to evaluate the currently available surgical adhesives to determine their performance for attaching radio transmitters to bats. The three adhesives tested included the original formula of Skin-Bond, the new formula of Skin-Bond and the Torbot brand adhesive (Fig. 1). In the field, we placed transmitters on three species of *Myotis* found in southern Indiana and northern Kentucky using the three different types of adhesive. We documented the length of time each transmitter stayed on the bats based on the number of days we could radio track them. Additionally, in the laboratory, we tested the application, drying characteristics, and holding strength of each adhesive. Data from the field portion of the study suggested that the old and new Skin-Bond were not different in transmitter retention times, and both were better than Torbot. Laboratory tests suggested that the new formula of Skin-Bond has the strongest holding ability, whereas the old Skin-Bond has the longest drying time and retains its stickiness for the greatest period of time.



Fig. 2 Adhesives reaching tacky stage

Introduction

Radio-transmitters have traditionally been attached to bats using rubber-based surgical adhesives. The adhesive is applied to both the bat and the transmitter. When the adhesive is tacky the transmitter is fixed to the bat. Recently a surgical adhesive company, Smith-Nephew, discontinued its older well known formula of Skin-Bond and replaced it with a new formula. The new formula (New Skin-Bond) is considered less suitable. The original formula of Skin-Bond (Old Skin-Bond) was the most popular and widely used adhesive (Brigham 2008), but since its discontinuation a need has arisen to find an alternative adhesive that is equal if not better in performance. Some researchers are recommending Torbot Bonding Cement (Torbot) which is a latex based surgical adhesive as a replacement. We tested the characteristics of each adhesive to evaluate the performance of New Skin-Bond and Torbot compared to Old Skin-Bond.

Materials and Methods

Three types of surgical adhesive adhesives were tested in the field and in a controlled laboratory environment; Old Skin-Bond, New Skin-Bond, and Torbot.

In the field, we placed radio-transmitters on three species of *Myotis* found in southern Indiana and northern Kentucky and tracked each bat using telemetry. We documented how many days each transmitter remained attached to the animal.

In the laboratory, each adhesive underwent two tests. First, each adhesive was applied to a clean glass slide in the same manner that it is applied to a bat. The time it took for the adhesive to reach the tacky stage was recorded (Fig. 2).

In the second test, each adhesive was applied to both a transmitter and to a clean glass-slide – as would be done with a bat. Both the slide and transmitter were left apart until the adhesive became tacky, then the flat side of the transmitter was applied to the adhesive on the glass-slide (Fig. 3). Adhesive was allowed to cure for one hour. After one hour, the transmitter was pulled from the glass-slide by the antenna to determine the force required to break the adhesive bond (Fig. 4). Force was measured with a 500 gram Pesola spring-scale.

Transmitters were re-applied to the adhesives and the same test was repeated after a 17-hour cure time. After the transmitters became detached, they were immediately re-applied to the same slide and immediately retested to determine the long term bonding ability of each adhesive. Each test was conducted twice for each adhesive.

The difference between the performance of each adhesive was tested using one-way ANOVA analysis. Field data were collected from 17 May - 15 August 2007.

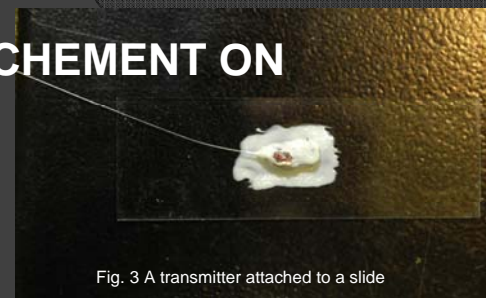


Fig. 3 A transmitter attached to a slide

Results

In the Field:

New Skin-Bond was applied to 5 bats, Old Skin-Bond to 30 bats, and Torbot to 17 bats. There was a significant difference in the length of time a transmitter was retained ($F = 5.57$, $df = 2$, $P = 0.007$). Mean number of days of attachment for New Skin-Bond (17.6 days) was not significantly different from that of Old Skin-Bond (16.9 days). Both varieties of Skin-Bond held significantly longer than Torbot (10.9 days).

In the Laboratory:

Old Skin-Bond had a drying time of 5-10 minutes to reach tacky state. After curing for 1 hour, Old Skin-Bond required 150 gr. of force to pull the transmitter free from the slide. When set for 17 hours it required 250 gr. of force to pull the transmitter free from the slide. With immediate reapplication and testing it required 200 gr. of force. After curing for 24 hours the adhesive was still tacky.

New Skin-Bond has a very fast dry time of less than 5 minutes. After curing for 1 hour, New Skin-Bond required 375 gr. and 300 gr. of force to pull the transmitter free from the glass slide. With letting it cure for 17 hours, greater than 500 gr. of force was needed to remove the transmitter from the slide. When the transmitter was reapplied and retested, 200 gr. of force was required. After curing for 24 hours the adhesive is still slightly tacky.

Torbot dries to a tacky state in 2-2.5 minutes. After curing for 1 hour, 50 gr. and 200 gr. of force were required to separate the transmitter from the slide. After curing for 17 hours 250 gr. and 200 gr. of force were required to separate the transmitter from the slide. After reapplication both attempts required 250 gr. of force to separate. After 24 hrs of curing, the adhesive was not tacky.

Discussion

The time required for Old Skin-Bond to become tacky is much longer than the other two adhesives. While it takes some getting used to the shorter working times of New Skin-Bond and Torbot. This allows for faster processing of animals and reduced hold times. We suggest New Skin-Bond as a replacement for Old Skin-Bond for transmitter attachment. Torbot is acceptable for applications where maximum transmitter retention is not needed.

Literature Cited

Brigham, R. M. 2008. Transmitter Attachment for Small Insectivorous Bats (<30 g). Holohil Systems Ltd. <http://www.holohil.com/bd2att.htm>.



Fig. 4. Example of a transmitter attached to a slide and a scale used to measure the force needed to remove