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Oleoresin Capsicum: Pepper Spray as a Force Alternative

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Introduction

Oleoresin capsicum (OC), or "pepper spray," is gaining acceptance and popularity among law enforcement officers and police agencies as a safe and effective method of incapacitating violent or threatening subjects. There is, however, a lack of objective data on OC, its risks, and its benefits.

The purpose of this bulletin is to:

- Explain what OC is.
- Describe its known effects, benefits, and limitations.
- Dispel myths and provide objective information to help make informed purchasing decisions.
- Provide names, addresses, and telephone numbers of OC manufacturers and other relevant sources of information.

OC properties and effects

Although OC, like CN (chloroacetophenone) and CS (orthochlorobenzal-malononitrile), can be produced synthetically, unlike the latter agents, OC is a naturally occurring substance. It is found in the oily resin of cayenne and other varieties of peppers—the same peppers used to "heat up" spicy foods. Contact with OC particles in a sprayed mist incapacitates subjects by inducing an almost immediate burning sensation of the skin, but more important, a burning, aching, and swelling of the eyes. When the agent is inhaled, the respiratory tract

is inflamed, resulting in a swelling of the mucous membranes lining the breathing passages and temporarily restricting breathing to short, shallow breaths.

The traditional tear gas agents CN and CS also cause painful tearing and respiratory discomfort, but do not have the same inflammation and swelling effects as OC. The distinction is important because subjects who are extremely agitated, mentally ill, or under the influence of drugs or alcohol may not feel the pain and, thus, may not be affected (or as affected) by the spray.

For example, if subjects who are either oblivious to pain or have a particularly high threshold of pain are sprayed in the eyes with CN or CS, they may be able to keep their eyes open and offer further resistance to police. This reaction is characteristic of people under the influence of drugs such as phencyclidine (PCP). If such subjects are sprayed with OC, however, they will probably have the same physiological reaction as anyone else—their eyes will swell shut involuntarily whether they can feel pain or not. Most people cannot keep their eyes open at all after being sprayed with OC unless they actually hold apart their eyelids with their

fingertips. Fear and disorientation often result from this temporary blindness. There have also been reports of subjects' loss of strength and coordination—perhaps due to shortness of breath. Consequently, this reaction gives an advantage to law enforcement officers.

Sgt. Hugh Mills, supervisor of physical training/defensive tactics for the Kansas City, Missouri, Police Department has observed both the advantages and limitations of OC in his experience with subjects under the influence of drugs, mostly cocaine and PCP. "We discovered that some subjects under PCP were not affected by the pain factor. Because the swelling of the mucous membranes and the closing of the eyes is a physiological reaction rather than a pain reaction, the worst case situation is that although the subjects don't feel pain, they can't see either. Police would rather deal with a person with impaired vision."

The Kansas City Police Department has averaged 800 applications of OC for the past 2 years. Based on this experience, Mills reported good to excellent results from its use on drug users. He explained that excellent results mean that the subject was immobilized. On the other hand,

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good results did not immobilize the subject but caused temporary blindness, which still allowed the officer to subdue the subject.

Another benefit of OC is that in most cases no special decontamination procedures are required. It is biodegradable and, unlike chemical irritants, OC has not been found to linger in clothing or affected areas. After a subject is sprayed and subdued by OC, law enforcement officers usually need only provide proper ventilation and access to water for flushing the eyes and skin.

Strength versus percentage

OC sprays are available in a variety of different concentrations, usually anywhere from 5 to 10 percent for aerosols manufactured for law enforcement. These percentages may be misleading, however, because it is the strength of the OC in the spray that determines its effectiveness, not its percent of volume. The strength of the OC depends on the grind of the pepper before the oil is extracted. Moreover, strength is usually measured in Scoville Heat Units (SHU's); the higher the SHU's, the greater the inflammatory capacity of the OC. For example, oil from a 1 million SHU pepper grind would not be as inflammatory as oil from a 1.5 million SHU grind.¹

Also, OC is an oil; to work, it must atomize into a fine spray. Because oily solutions do not break up as easily into a mist, solutions greater than 5 percent OC may not atomize as well.

Product selection

Once a law enforcement agency decides to adopt OC as a force alternative, it must

¹ Despite the scientific sounding name, Scoville Heat Units (SHU's) are not scientific measures. They are based originally on what are essentially taste tests.

make several product selection choices. A variety of vendors market different types of OC products. Aside from cost, some of these choices include the product's formulation, concentration level, range, type of trigger mechanism, spray pattern (mist, fog, or stream), and presence or absence of a safety device. Agencies should insist that, as part of any purchase contract, the manufacturer provide them with copies of any manual updates or product warnings for the life of the product.

One of the most important considerations agencies face when selecting a pepper spray product is whether to purchase one with an isopropyl alcohol-based carrier or one with a nonalcohol-based carrier. Of particular concern is the potential inflammability of pepper spray products that use isopropyl alcohol as a carrier. In one reported incident, police sprayed an armed, extremely agitated adolescent with OC and then shot him with an electrical stun gun; the charge from the stun gun apparently ignited the OC carrier liquid on his clothing and set him afire.

One manufacturer of pepper spray with an alcohol-based carrier said, "Isopropyl alcohol has been used in household aerosols for cosmetic and pharmaceutical products for more than 60 years," adding, however, that no OC product should be used near sparks or flames. Furthermore, some manufacturers and product users believe that alcohol-based products are more effective than nonalcohol-based products because they work better under all temperature conditions.

They also believe that alcohol-based products are better at atomizing the active ingredient, opening pores and dissolving skin oils. Advocates contend that the reaction of pores and skin oils may reduce the time it takes for the product to take effect. Nonflammable carrier systems use Freon, Dymel, methylene chloride, and other industrial chemicals. These chemicals, in sufficient quantities, may be ozone depleting, toxic, or carcinogenic. Regardless of the carrier, aerosol cans of any type can leak, rupture, or explode if left inside patrol cars in the sun with the windows rolled up in extremely warm weather.

Law enforcement administrators must determine which OC product is appropriate in different situations. For example, an OC aerosol in an isopropyl alcohol carrier may be appropriate for routine patrol situations requiring an officer or team of officers to subdue hostile arrestees where no flames or sparks are present. Conversely, crowd dispersal situations involving large-area saturation may require a nonflammable carrier. Obviously, the needs of a small police department in a rural setting will differ greatly from the needs of a large force in a highly populated urban area. Fire and rescue personnel, legal counsel, and insurance experts should also be consulted during this decision-making process.

Training

Thorough training in the use of OC is critical. Training enhances product effectiveness, protects both the officer and the

As part of NIJ's Less-Than-Lethal Technology Program, the International Association of Chiefs of Police (IACP) is collecting and analyzing field data on the use of oleoresin capsicum (OC) and other handheld aerosols by patrol officers. NIJ's goal is to conduct a scientifically based study on OC. The field evaluation is being conducted in the Baltimore

County (Maryland) Police Department. The IACP has also prepared an Executive Brief for NIJ that is designed to familiarize police executives with the product. Copies of the Executive Brief are available from the IACP by writing or calling: IACP, 515 North Washington Street, Alexandria, VA 22314, (703) 836-6767.

agency in the event of litigation, and ensures both officer and subject safety. Proper OC training should be comprehensive, going beyond the technical application to cover product derivation, the processes that cause physiological reactions, and decontamination protocols. Legal issues (for example, use of force guidelines) and tactical issues (for example, application techniques, verbal commands, and control strategies) should also be examined.

Rather than expecting the pepper spray to incapacitate the suspect by itself, many agencies suggest that OC spray should be used to distract the arrestee through discomfort, the sheer surprise of being sprayed in the face, and the accompanying reflex of shielding and closing the eyes.

To experience its effects firsthand, some police agencies actually spray officers with the pepper spray as part of the OC training. Advocates of this approach maintain that, because the product is reportedly safe, officers should fully understand it. Officers who have been sprayed by pepper spray acquire confidence in the effectiveness of the product and have compassion for anyone they may spray. Furthermore, exposure helps officers understand the danger of an accidental dose of OC from a gust of wind or a poorly aimed spray or an even worse danger—letting the OC canister fall into the hands of subjects during an arrest.

Mills cites the case of an Arizona State trooper as a good example of the wisdom of using the spray in training. The officer was sprayed with OC by a subject, but the officer said he survived the attack because his exposure to the spray in training taught him how to react. Moreover, Mills said that officers would be even better prepared if they trained with the 5-percent OC solution that is used on the street rather than the 1-percent OC solution that is now used in training.

Benefits of Pepper Sprays

- The physical effects of being sprayed with oleoresin capsicum (OC) may significantly reduce an individual's aggressive behavior. The effects range from tearing, involuntary closing of the eyes, and burning and redness of exposed skin; to coughing, gagging, and shortness of breath; to loss of motor skills or muscle coordination.
- Law enforcement agencies have reported that they have successfully used OC sprays on individuals who are extremely excited and agitated, under the influence of drugs and alcohol, and mentally impaired.
- OC sprays seem to leave few if any residual effects, allowing suspects to be transported without affecting transporting officers. Decontamination protocol normally requires only fresh air and soap and water.
- Chemists assigned to the FBI's Forensic Science Research and Training Center did not see any long-term health risks associated with the use of OC.
- Thirty-nine police agencies and three correctional institutions using OC aerosols did not report any medical problems encountered by subjects being subdued and arrested, and no medical problems were encountered by the officers administering the OC.
- Departments that have adopted OC sprays claim to have fewer allegations of police use of excessive force or police brutality charges, resulting in fewer lawsuits.
- Departments have reported a reduction in officer and arrestee injuries as a result of the introduction of OC sprays.
- Manufacturers offer several OC concentrations with differing size spray units and spray patterns for applications ranging from personal use to crowd control.

Limitations of Pepper Sprays

- The use of OC sprays with alcohol-based carriers should be avoided when flames or sparks are present, as the carrier is inflammable.
- Officers issued OC should carefully review all the manufacturer's information, including the product's material safety data sheet, because OC sprays often contain other chemicals that may pose fire or other health and safety hazards.
- OC sprays incorporating other chemical agents may leave more residual effects and require different decontamination protocols than OC sprays alone.
- The suspect must be within the effective range of the product for the OC spray to work. If the suspect is too close or too far from the officer, the spray may not be effective. Likewise, if the aerosol is sprayed in bursts that are either too short or too long, its effectiveness may be hampered. Because manufacturers use different mixtures of chemicals and spray patterns, it is always best to follow the manufacturer's instructions to ensure optimum performance.
- Eyeglasses, sunglasses, and other protective eyewear and clothing may greatly reduce the effectiveness of OC sprays. The spray's effectiveness may also be reduced by a suspect who throws up his hands in a defensive measure to block the spray.
- A lack of adequate training can lead to failures or improper use of OC sprays and, therefore, expensive litigation.
- OC sprays can be used against the officer.
- Exposure to high temperatures such as leaving the aerosol inside a hot patrol car in the summertime can cause the aerosol can to leak, rupture, and explode.
- OC sprays cause upper respiratory inflammation; therefore, they may have detrimental effects on people with preexisting respiratory problems.
- No chemical agent is 100-percent effective.

Several OC manufacturers offer training courses or can refer you to other affiliated training programs. However, no universally accepted organizations certify training in the use of OC products. Agencies should ask manufacturers who offer "certified" courses to make clear who certifies the training. For additional information on OC training, you may also wish to contact the Aerosol Subject Restraint Instructors Council, a loose confederation of manufacturers, instructors/trainers, and training institutions, at (212) 989-1174.

Application technique. Application technique is a critical point: It involves a fumble-free draw, use of a spray technique that dispenses an optimum amount of OC, and proper verbal directions. In addition, there must be proper movement to keep the tactical advantage over the subject, fumble-free reholstering, and appropriate control techniques that result in a properly handcuffed arrestee. The draw starts with proper choices of canister, holster, carry location, and draw technique. The canister must be designed to be quick and sure under stress, easy to point accurately, and safe from unintentional discharges (DuVernay 15).

Because arresting, handcuffing, and searching a person will almost always follow an application of OC, it is essential that the canister be reholstered smoothly and securely. Just as with a handgun, this reholstering should be practiced repeatedly and without looking to make sure it may be executed cleanly under stress.

Two schools of thought address carry positioning.² One advocates that the aerosol be carried on the strong side (the right side for a right-handed person, left side for a left-handed person) and be drawn with the strong hand. Advocates of this approach believe the strong hand is best

during times of stress, particularly when the task requires dexterity and fine motor movement, which is the case when drawing and applying OC. The other school of thought suggests that the canister be carried on the weak side and deployed with that hand. These proponents maintain that the strong hand should be kept free to engage in empty-hand defensive drills and control. It also allows the strong hand to remain free to draw the firearm (DuVernay 16).

Drawing the canister with the weak hand and the firearm with the strong hand simultaneously is not wise. Under high stress, the brain's message intended for one hand can go to both hands and result in an unintentionally discharged firearm, perhaps wounding or killing the subject or another officer. In addition, it is important that officers do not develop a tactical over-reliance on pepper spray: OC is not intended to replace the use of a firearm, a nightstick, or police backup (DuVernay 18).

Still, when confronting subjects under the influence of PCP, Mills said, "OC is the best option short of a lethal weapon. If we did not have pepper spray, we would have to use lethal force. Having OC is another tool to use at the lowest possible level versus impact weapons, which won't work anyway on subjects under the influence of PCP." Furthermore, Mills said, since the use of OC, officer and subject injuries have decreased as have complaints and litigations.

Verbal commands. Verbal commands—before, during, and after the confrontation—must also be practiced if the officer expects to actually deploy them under stress. Commands given before the actual use of force are essentially warnings that attempt to coax cooperation from the subject. They are also intended for the ears of witnesses. "Stay back, I don't want to hurt you" and "Stop resisting arrest, or I will have to spray you" establish both use of

the lower force level and reluctance to escalate the level of force.

Once the chemical has been applied and empty-hand techniques are being used, commands must be given to direct the now confused and distracted subject. "Lie down on the ground" and "Stop resisting arrest" tell the subject what is required and how to stop the pain of a compliance technique. These commands also communicate to witnesses the officer's desire to use minimum force (DuVernay 18).

After resistance has ceased, the subject must be reassured that nothing further will happen to him or her, and that de-contamination for the OC application is forthcoming. Without this reassurance, the subject may again become violent from frustration or in an effort to escape discomfort. Statements such as "No one is going to hurt you" and "Stay calm, and I will get the agent out of your eyes" provide incentive for cooperation and demonstrate the officer's reduction of force as resistance is reduced.

The subject should be monitored carefully, until symptoms disappear, to ensure medical treatment is provided should it be needed. Some indications that medical treatment should be obtained are if the subject displays physical symptoms other than a slight reddening of the skin, complains of an inordinate amount of pain, or shows symptoms for more than 30 minutes. However, any time the subject requests medical care, it should be provided.

Reporting and documentation. Thorough, accurate, and timely reporting of

TAPIC encourages law enforcement agencies to send us any information they may have regarding their own studies or experiences with OC, or any other less-than-lethal weapons, and other law enforcement equipment. Please write or call TAPIC, Box 6000, Rockville, MD 20850, (800) 248-2742.

²DuVernay, Bert. "When Compliance Is Needed: What Chemical Agent To Spray and How To Spray It." *Police*, February 1993: 15-18.

every incident involving the use of OC spray is crucial. This response is essential in the successful prosecution of the subject and the defense of any allegations of excessive force by a law enforcement officer. The reports should start with the officer's first knowledge of the incident and describe in sequence the actions of both the officer and the subject. A critical, but often overlooked, aspect of the report is to note how the officer reduced the force applied as the resistance of the subject declined.

Medical and legal issues

The Federal Bureau of Investigation Firearms Training Unit (FTU) conducted research to determine the most effective chemical agent product to be carried by their Special Agents. Based on that research and testing, along with information provided by the U.S. Army Chemical Research and Development Center, FTU favored the use of oleoresin capiscum. FBI chemists who were consulted during the study did not foresee any long-term health risks associated with the use of OC.

Furthermore, police agencies responding to an FTU questionnaire did not report any medical problems. Nevertheless, Occupational Health Services, Inc. (a private research facility in Kansas City, Missouri), reported that because OC caused the subject's breathing passages to swell and constrict, the use of OC on persons with pre-existing respiratory conditions such as asthma could, in rare instances, cause death.

Police departments that use OC aerosols report little, if any, litigation initiated by the use of pepper spray on combative arrestees. In fact, Mills said litigation has decreased since the use of the spray. Moreover, various courts have upheld the use of traditional chemical irritants when properly employed. Any OC-related litigation, therefore, may be similarly resolved.

Guidelines

Police usually rank OC just after physical pain compliance and immediately before the use of impact weapons on the use-of-force continuum. This is largely because there appears to be no verified long-term physical effects or health risks associated with the use of OC.

Specific, prescribed guidelines for the use of OC are usually required by most police agencies. Standard operating procedures generally mandate that OC is appropriate for use with actively combative individuals who have resisted or ignored verbal commands, when physical control techniques are necessary, or when there is a danger of officer injury. At a minimum, guidelines should consider issues related to the following:

- Appropriateness of agent use.
- Necessity of warnings prior to application.
- Decontamination procedures.
- Incident documentation.
- Possible sanctions for indiscriminate use.

Conclusion

According to John Granfield, program manager of the International Association of Chiefs of Police (IACP), "Most of the information on OC has come from officers who used it during training and on subjects. This information has been basically anecdotal. A number of manufacturers, in order to protect themselves from liability, did contract with private labs to do tests...However, no government or consumer agencies have done any tests."

Although much remains to be learned about the immediate and long-term effects of oleoresin capiscum, law enforcement agencies are increasingly turning to OC as a less-than-lethal force alternative for many law enforcement patrol situations. The Technology Assessment Pro-

gram Information Center (TAPIC) has not formally tested or evaluated OC. The following list of contacts is provided only as information for law enforcement personnel. TAPIC does not endorse any OC product, nor can we be certain this list represents every manufacturer of the product.

Associations

Aerosol Defense Spray Association

P.O. Box 540117
North Salt Lake, UT 84054
(801) 292-6316
Steve Beazer, President

Association of Defensive Spray Manufacturers

c/o David Birenbaum and Associates
818 Olive Street, Suite 918
St. Louis, MO 63101
(314) 241-1445
Mark S. Birenbaum, Ph.D.

OC Manufacturers

Aerko International

3410 Northeast Fifth Avenue
Fort Lauderdale, FL 33334
(305) 565-0475
Fax (305) 565-8499

Aero Tech Labs

728 Northwest Seventh Terrace
Fort Lauderdale, FL 33311
(305) 463-4584

Advanced Defense Technologies

1610 South Main Street, Suite B
Bountiful, UT 84010
(800) 543-5207
or

The National Institute of Justice (NIJ) Field Safety Program is collecting information on OC as part of its ongoing efforts to ensure the safety of law enforcement technologies. In addition, NIJ will provide periodic reports on other less-than-lethal technologies that are introduced to the field.

Suite 112 144 Perrish Lane Centerville, UT 84014 (800) 854-8401 Fax (801) 298-7942	Federal Laboratories P.O. Box 305 Saltsburg, PA 15681-0305 (800) 445-8327 Fax (412) 639-3888	MSI P.O. Box 679 Bennington, VT 05201 (800) 255-2634 (800) 639-4530 (law enforcement only) (802) 447-1503 Fax (802) 442-3823
B-Safe Industries P.O. Box 153-H Scarsdale, NY 10583-8653 (914) 723-2553 Fax (914) 725-2925	Guardian Protective Devices P.O. Box 133 West Berlin, NJ 08091 (800) 220-2010 (609) 753-7405 Fax (609) 753-7613	Omega Securities, Inc. P.O. Box 1 Marlow, NH 03456-0001 (603) 446-7595
Cap-Stun Weapon Systems 1111 Broad Street, Suite 2B Camden, SC 29020 (800) 882-7011 (803) 432-1875 Fax (803) 432-2859	Guardian Security Products 21639 North 14th Avenue Phoenix, AZ 85027 (800) 527-4434 (602) 582-1070 Fax (602) 582-2133	Pro-aer 2887 Miles Avenue Throggsneck, NY 10465 (203) 224-3352 Fax (718) 822-9273
Casco International, Inc. P.O. Box 166 Fitzwilliam, NH 03447 (800) 232-2726 (603) 585-9422 Fax (603) 585-9575	Knock Out Security Products 7061 Southwest 47th Street Miami, FL 33155 (800) 394-7233 Fax (305) 662-8511	Security Equipment Corporation 330 Sun Valley Circle Fenton, MO 63026 (800) 325-9568 (314) 343-0200
Counter Assault Box 4721 Missoula, MT 59806 (800) 695-3394 (406) 728-6241 Fax (406) 728-8800	<p>The Technology Assessment Program is supported by Cooperative Agreement #90-IJ-CX-K009 awarded by the U.S. Department of Justice, National Institute of Justice. Analyses of test results do not represent product approval or endorsement by the National Institute of Justice, U.S. Department of Justice; the National Institute of Standards and Technology, U.S. Department of Commerce; or Aspen Systems Corporation.</p> <p>The National Institute of Justice is a component of the Office of Justice Programs, which also includes the Bureau of Justice Assistance, Bureau of Justice Statistics, Office of Juvenile Justice and Delinquency Prevention, and the Office for Victims of Crime.</p>	
Defense Technology Corporation P.O. Box 240 Casper, WY 82602-0240 (800) 733-3832 (307) 235-6900 Fax (307) 473-2605		

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