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First Safety and Performance Evaluation of T45K, a Self-Assembling Peptide Barrier Hemostatic Device, After Skin Lesion Excision

George Rahmani, MB, MCh, MSc,* Jayne Prats, PhD,† Terrence Norchi, MD,† Steven Kates, PhD,† Veronica McInerney, PhD,‡ Jack Woods, BA, MB, MCh, BAO,* and Jack Kelly, MB, MD, FRCS (Plast)§

BACKGROUND The self-assembling peptide barrier T45K (SAPB-T45K) is an oligopeptide that rapidly forms a biocompatible hemostatic barrier when applied to wounds.

OBJECTIVE Evaluate safety and performance of SAPB-T45K in cutaneous surgery.

MATERIALS AND METHODS In this single-blind study, after sequential shave excision of 2 lesions, wounds were randomized (intrapatient) to SAPB-T45K or control treatment. Safety was assessed at treatment, Day 7, and Day 30. Performance was evaluated using time to hemostasis (TTH) and ASEPSIS wound scores, with a subgroup analysis for patients with or without antiplatelet therapy.

RESULTS Each of 46 patients (10 [22%] with antiplatelet therapy) received randomized SAPB-T45K or control treatment for 2 wounds. Safety assessments were similar, and ASEPSIS scores reflected normal healing in both wound groups. SAPB-T45K demonstrated significantly faster median TTH (24.5 [range, 7–165] seconds) compared with control (44 [10–387] seconds), for a 41% median TTH reduction (18 [95% confidence interval, 7–35] seconds, $p < .001$). SAPB-T45K provided an identical median TTH of 24 seconds, regardless of antiplatelet therapy. Control median TTH was 90 and 40 seconds for patients taking or not taking antiplatelet therapy, respectively.

CONCLUSIONS SAPB-T45K provided significantly faster median TTH versus control, especially with antiplatelet therapy, and safety profiles were similar.

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Minor dermatologic surgical procedures are common—by some reports, an estimated 26 million are performed annually in the United States.[1] The most frequent complication of cutaneous surgery is minor bleeding.[2] Although not life-threatening, it can predispose the patient to hematoma formation, increased risk of infection, skin graft necrosis, and wound dehiscence.[3,4] Bleeding complications potentially interfere with the surgical outcome and may extend the duration of wound treatment.[2]

In addition, many patients who undergo cutaneous surgery take medications that increase the risk of

*Department of Plastic and Reconstructive Surgery, Galway University Hospitals, Galway, Republic of Ireland; †Arch Therapeutics, Inc., Framingham, MA; ‡HRB Clinical Research Facility, National University of Ireland, Galway, Republic of Ireland; §Galway University Hospital, Galway, Republic of Ireland

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bleeding. Approximately 46% of cutaneous surgery patients take anticoagulant and/or antiplatelet medications.[5] In the latter category, aspirin is commonly prescribed for cardiovascular disease and widely used over the counter for analgesia and inflammation. Aspirin irreversibly inhibits cyclooxygenase-1, preventing thromboxane A2 synthesis in platelets, which reduces platelet aggregation and platelet plug formation at an injury site. This effect lasts for the life of the platelet (7– 10 days).[6] Most patients undergoing surgery to remove skin cancer are older, and many have multiple comorbidities such as cardiovascular disease. With increasing use of coronary stents in this age group, dermatologic surgeons are now operating on patients who take various antithrombotic agents in addition to aspirin, such as warfarin, clopidogrel, prasugrel, or ticagrelor to prevent cardiovascular compromise. Dermatologic surgeons may operate on patients without stopping the medications perioperatively because the benefit of these therapeutic agents often outweighs the risk of bleeding complications.[3,5]

Various methods used in dermatologic surgery to promote hemostasis include surgical procedures such as anesthetic techniques, electrosurgery, manual pressure, and adjunctive topical agents.[4,7] Topical hemostatic agents are commonly classified as caustic (e.g., aluminum chloride, ferric sulfate, silver nitrate, and zinc chloride paste) or noncaustic.[4] Noncaustic agents, such as porcine gelatins, microporous polysaccharide spheres, hydrophilic polymers with potassium salts, oxidized regenerated cellulose, and microfibrillar collagens may work physically, or physiologically, for example, fibrin sealants, thrombin, and platelet gels.[4] Although effective in specific settings, many of these agents have limitations. Caustic agents can be painful and irritating. Noncaustic agents can swell and compress surrounding tissue. Efficacy of physiological hemostatic agents may be compromised in patients taking anticoagulant or antiplatelet medications. Additional limitations of other currently available hemostatic agents may include slow onset of action, foreign body reaction, adhesions, preparation difficulty, and the requirement for an intact coagulation system. Other concerns include animal/human sourcing, antibody formation, infection, and handling restrictions.[4,7,8] Some materials, such as silver, have been shown to be effective at eluting active agents to ameliorate the microenvironment and reduce the infection rate. However, the safety and tolerability of active agents remains in question.[9]

The self-assembling peptide barrier T45K (AC5 Topical Hemostatic Device; Arch Therapeutics, Framingham, MA) contains short oligopeptides with repetitive motifs (short sequences),[10] which self-assemble to form a clear, nonadhesive, nonvasoconstrictive biocompatible barrier that controls blood flow and achieves hemostasis at wound sites. The SAPB-T45K peptide and its constituent amino acids are synthetically produced from naturally occurring amino acids, reducing the potential for immunogenicity because they are not obtained from human or other animal sources. SAPB-T45K controls bleeding without relying on heat, pressure, platelet or coagulation activation, adhesion, vasoconstriction, or desiccation, and it is biodegradable.[11] In contrast to current hemostatic agents, SAPB-T45K rapidly achieves hemostasis regardless of the patient's coagulation status, is not derived from animal or human sources and does not elicit inflammatory or immunogenic responses, is biocompatible, easy to prepare, and does not require specific wound conditions. The AC5 Topical Hemostat device is investigational and has not yet been cleared or approved for use.

SAPB-T45K is applied as a liquid at the desired location. When SAPB-T45K contacts the charged wound surface, peptides assemble into nanofibers and establish an entangled wound-spanning network, resulting in

Figure 1. Appearance of gelled SAPB-T45K after contact with charged surface.

a contiguous gel barrier (Figure 1). The high water content and other properties of the self-assembled, stable, biomimetic nanofiber network (Figure 2) allow it to conform to irregular tissue surfaces.[12] SAPB-T45K allows a clear field for surgery and provides a microenvironment conducive to postoperative wound healing.

Given the prevalence of cutaneous surgery and potential increased morbidity from bleeding complications, a safe, easy to use, biocompatible, rapid-acting topical hemostat is desirable. Results from previous preclinical research suggest that treatment with SAPB-T45K reduces bleeding time regardless of the presence of anticoagulant or antiplatelet medications and has a favorable safety and biocompatibility profile. Therefore, this pilot clinical investigation was designed to assess SAPB-T45K safety and performance after skin lesion excision.

Materials and Methods

This was a single-center, randomized, single-blind prospective clinical investigation to evaluate the safety and performance of SAPB-T45K in dermatologic surgery. Figure 3 is a schematic of the study design.

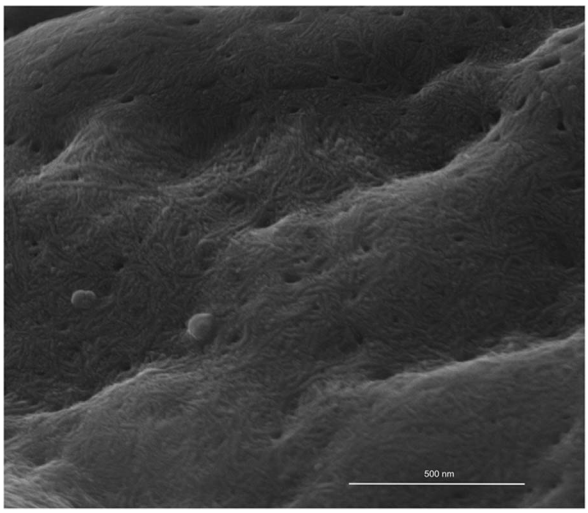

Figure 2. Cryo–scanning electron micrograph (SEM) of self-assembled nanofiber network. SAPB-T45K was freshly prepared with deionized water and thoroughly mixed to obtain a clear solution, which was further diluted 1:1 in phosphate buffered saline. The sample (30 μL) was kept at room temperature for 4 hours and then flash-frozen with liquid nitrogen before loading in the cryo-SEM sample holder. The cryo-SEM instrument was cooled to −190°C. Water was sublimed from the sample at −80°C for 2 hours, then the sample was platinum coated for 15 seconds before examination. Spherical objects are artifacts, not SAPB-T45K.

Patients

The study was conducted at Galway University Hospital, Galway, Ireland, between February and July 2016. Patients matching the inclusion criteria with no exclusion criteria (Table 1) were enrolled. Eligible patients underwent a baseline physical examination including laboratory blood testing.

Study Conduct and Procedures

This study complied with t ISO 14155 Good Clinical Practice principles, the Declaration of Helsinki, and applicable Irish regulatory requirements. The protocol and amendments were reviewed and approved by the Clinical Research Ethics Committee at Merlin Park University Hospital, Galway, Ireland. All patients gave written informed consent

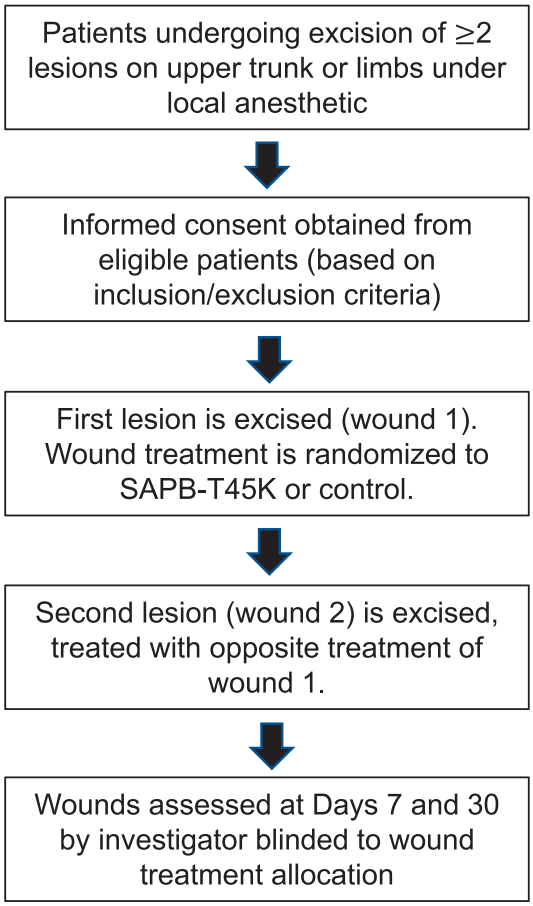

Figure 3. Study schematic.

TABLE 1. Key Inclusion and Exclusion Criteria

Inclusion	*Exclusion*
Males or nonpregnant females between 18–65 years	Active infection
Scheduled for shave excision under local anesthetic of at least 2 trunk or upper limb lesions in the same sitting	Known immunosuppression
Availability for follow-up at Day 7 and Day 30 after treatment	Suspected malignancy
Concomitant antiplatelet therapy allowed	Clinically significant active disease including cardiac disease or hypertension
	Wounds expected to expose bone or tendon, require antibiotics, or flap or graft procedures
	Known reactions to study treatments including procedural antiseptics
	Exposure to other investigational drugs <28 d of enrolment

before treatment. The patient remained blinded throughout the investigation. The investigator and nurse were unblinded during excision and treatment. Follow-up evaluation was performed by a blinded investigator.

Study Treatments

One vial containing SAPB-T45K as a lyophilized powder (AC5 Surgical Hemostat, Arch Therapeutics) was supplied in a kit with a syringe and blunt tip applicator. Before use, 1.5 mL of diluent (sterile water for injection) was added to the SAPB-T45K vial to form an aqueous, clear solution. One vial of SAPB-T45K was used for each patient. Saline was selected as the control wound treatment because it is isotonic, routinely used for wound cleaning at this institution, and thus, allowed a safety comparison of SAPB-T45K against best practice.

All lesions were basal cell papillomas (seborrheic keratoses) suitable for shave excision. Two similarly sized lesions located on the trunk or upper limbs in each patient were selected for inclusion in the study. Patients were in supine or prone position for excision of lesions to minimize any effects of gravity on bleeding, and excision was performed in 1 movement, taking approximately 2 seconds. In each patient, after excision, 1 wound was randomized to receive SAPB-T45K, with the second wound serving as control. The randomized sequence of wound treatment (SAPB-T45K first or control first) for each patient was generated through www.sealedenvelope.com and read by an unblinded treating physician before the first lesion excision. Either SAPB-T45K or saline was applied to the wound immediately after lesion excision, time to hemostasis (TTH) was determined for each wound, and an occlusive water-resistant dressing (Tegaderm, 3M Medical) was applied.

Safety and Monitoring

The primary objective was to evaluate the safety profile of SAPB-T45K using treatment-emergent events, such as wound healing, clinical laboratory parameters, adverse events, and blood tests. Blinded clinicians assessed local reactions (pain, edema, rash, cellulitis, and localized infectious processes); systemic reactions (fever, allergic reaction, anaphylaxis, or any untoward clinical event); and treatment-emergent adverse events (TEAEs) during initial treatment or at follow-up on Days 7 (±1 day) and 30 (±3 days). A physical examination and blood tests were repeated at Days 7 and 30 if abnormal at Day 7.

Efficacy Assessments

Time to hemostasis assessment commenced immediately after wound excision when the study treatment was completely applied and concluded when blood no longer appeared on the adjacent skin. Although treatment blinding was not possible because of obvious differences in viscosity between T45K and saline, the surgeon, the surgical nurse, and the clinical trials

nurse agreed on the TTH for each wound. Pressure was not applied to the wound. Efficacy was evaluated using TTH descriptive statistics (mean, median, and per cm^2 wound area) by wound treatment group and by paired (intrapatient) difference (control—SAPB-T45K), as well as ASEPSIS wound scores at Days 7 and 30. Analyses were performed for the overall population and for subgroups of patients with or without antiplatelet therapy at the time of treatment.

Statistical Methods

The sample size calculation was based on a projected reduction in ASEPSIS wound scores. A mean ASEPSIS score of 5.6 for controls was expected based on previous experience. With 2 lesions per patient (84 lesions, i.e., 42 matched pairs) required to demonstrate a 15% relative increase in mean ASEPSIS score improvement, assuming a SD of improvement of 1.6 (power 90%, alpha 0.05) and an expected dropout or loss to follow-up of 10%, a sample size of 46 participants was planned.

The intention-to-treat (ITT) population comprised all randomized patients who met the study entry criteria and signed the written informed consent. The treated-patient population (TP) comprised patients who received SAPB-T45K treatment. The per-protocol population comprised TP patients with no major protocol violations. There were no protocol violations and all patients received study treatment, therefore, all 3 populations were identical and a single ITT analysis was performed.

Descriptive and inferential statistical analysis was performed on all end points using R statistical software, version 3.2.0. Given the paired design used, with each patient receiving both SAPB-T45K and control treatments, the analysis also focused on within-patient wound comparisons. Time to hemostasis (overall, by wound area, and by subgroup) was analyzed with the 1-sample Wilcoxon signed-rank test. Confidence intervals (CIs) for the median TTH reduction (from control to treatment) were produced using bootstrap resampling with 10,000 resamples. Time to hemostasis (overall) was also analyzed with the paired t-test. A prespecified analysis was performed in patients with and without antiplatelet monotherapy and comparisons of paired wounds in each subgroup were performed as previously stated for the overall group. A post hoc comparison of median TTH reduction (from control to treatment) between the antiplatelet and non-antiplatelet groups was performed by the Mann–Whitney U test. The ASEPSIS score was dichotomized as 0 or greater than 0, and analyzed using McNemar test.

Results

All 46 enrolled patients underwent treatment of both lesions and completed follow-up to Day 30. Table 2 shows the patient demographic profile.

Most wound sizes were ≤ 2 cm^2 and 2 were >4.5 cm^2. With the exception of a patient who had a 12 cm^2 control-treated wound and a 6 cm^2 SAPB-T45K-treated wound, within-patient wound sizes were consistent, suggesting that any intrapatient difference in TTH resulted from the treatment applied and not wound size variation. At study enrolment, ten patients (22%) were using aspirin as antiplatelet therapy. Figure 4 shows a representative set of SAPB-T45K-treated and control-treated wounds (1 patient) at the time of treatment, Days 7, and 30; photographs were not used for formal wound measurements or follow-up assessments.

Safety

Table 3 provides a summary of local and systemic reactions. There were 2 (4.3%) local treatment-emergent reactions (TEAE) related to the clinical investigation for SAPB-T45K-treated wounds and 3 local or systemic TEAE (6.5%) for control wounds. The estimated difference in proportions of these events between groups (control–SAPB-T45K) was 2.2% with a 95% CI of (−9.3% to 14.1%). One TEAE occurred in the antiplatelet therapy subgroup in an SAPB-T45K-treated wound, whereas the remainder[4] occurred in the non-antiplatelet therapy subgroup (Table 3).

No AE led to discontinuation of the study or study treatment. There was no marked change in physical findings, laboratory blood tests, or other measured parameters during the study.

TABLE 2. Patient Demographics and Medical History

Parameter	*N = 46*
Age (yrs)	
Mean (SD)	57 (15.5)
Median (Min, Max)	58 (25, 84)
Sex	
Male	24 (52.2%)
Female	22 (47.8%)
Race	
Caucasian	45 (97.8%)
Black	1 (2.2%)
Antiplatelet therapy*	
No antiplatelet therapy	36 (78.3%)
Antiplatelet therapy	10 (21.7%)
Hypertension	10 (21.7%)
Hypercholesterolemia	6 (13%)
Hypothyroidism	3 (6.5%)
Diabetes mellitus	3 (6.5%)
Gastritis	2 (4.3%)
Cardiac murmur	2 (4.3%)
Osteoporosis	2 (4.3%)
Prostate cancer	2 (4.3%)
Previous surgery (any)	31 (67.4%)
Surgery within 1 yr of study	3 (6.5%)

*All patients received aspirin as antiplatelet monotherapy.

Efficacy

Median TTH was 24.5 and 44.0 seconds and mean TTH was 40.2 and 93.3 seconds for SAPB-T45K- and control-treated groups, respectively (Table 4). Mean and median TTH differences for paired (intrapatient) comparisons were significantly faster for SAPB-T45K-treated wounds, with a median reduction for SAPB-T45K treatment compared with control of 18 seconds, $p < .001$ (Table 4), and a mean TTH difference of 52.7 seconds, $p < .001$. Approximately 59% ($n = 27$) of SAPB-T45K wounds and 31% ($n = 14$) of control wounds had TTH of less than 30 seconds.

The median (min, max) TTH scaled by wound area was also lower for SAPB-T45K treatment: 42 (4.67, 1,100) seconds/cm^2 for SAPB-T45K-treated wounds and 104.2 (6.2, 797.2) seconds/cm^2 for control-treated wounds, for a paired interpatient difference of 50.6 (−1,088.9, 557.2) seconds/cm^2, bootstrap [95% CI: 9.8–68.3], $p = .019$.

The 10 patients taking antiplatelet therapy were older and more likely to be male than those not taking antiplatelet monotherapy. In this prespecified subgroup analysis, SAPB-T45K demonstrated a treatment effect similar to that observed in the overall population, with a reduction in median and mean TTH (Table 5) compared with control among patients taking or not taking aspirin.

As seen in Table 5, the median TTH for SAPB-T45K was consistently 24 seconds regardless of whether or not the patient took antiplatelet therapy. However, the median control TTHs were 90 and 40 seconds for patients with and without antiplatelet therapy, respectively. This represents a numerically greater median reduction of 35 seconds in TTH (control−SAPB-T45K) in participants taking antiplatelet therapy compared with the 16-second median reduction in those not taking antiplatelet therapy (non-antiplatelet group—antiplatelet group = median reduction 19 [95% CI: −10 to 194] seconds, $p = 0.08$).

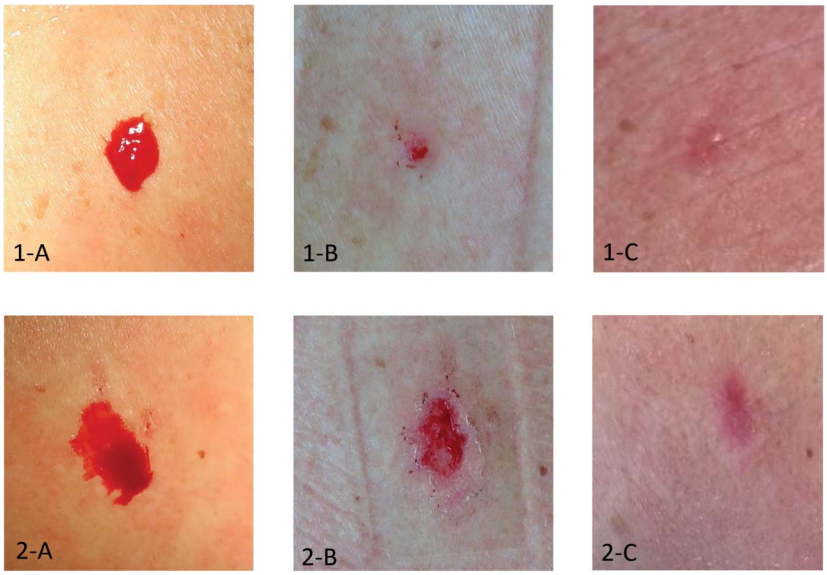

Figure 4. Representative SAPB-T45K- and control-treated wounds from 1 patient: (1) SAPB-T45K-treated (right mid-back, 1.5 cm^2) and (2) control-treated wounds (left lower back, 2.0 cm^2) at the time of treatment (A), Day 7 (B), and Day 30 (C).

No observed treatment effect on the wound ASEPSIS score was observed on Days 7 or 30, indicating that satisfactory wound healing was noted in both treatment groups with no complications or infections. However, the ability to detect a difference in wound characteristics is limited by the unexpectedly low ASEPSIS score variation in this study population. Forty patients (40/46; 86.9%) at Day 7, and 44/46 (95.7%) at Day 30 had an ASEPSIS score of 0 in each wound. McNemar test was used to assess the within-patient frequencies of ASEPSIS scores (dichotomized as 0, >0) between the control and SAPB-T45K-treated wounds at Days 7 and 30 (p = 1.00 at both time points). With no treatment effect on ASEPSIS scores in the overall population, statistical tests were not performed on ASEPSIS scores across subgroups.

Discussion

In this first human study of SAPB-T45K safety and performance, SAPB-T45K provided a rapid hemostatic barrier that significantly reduced TTH for cutaneous wounds compared with control treatment, both in overall wound treatment groups, and for the paired intrapatient wound treatment comparisons, with a similar safety and healing profile. Importantly, TTH was reached in under 30 seconds in all SAPB-T45K-treated wounds, regardless of antiplatelet therapy in these patients.

TABLE 3: Summary of Local and Systemic Reactions

Treatment	*Follow-Up Day*	*Local Reactions**	*Systemic Reactions*	*Antiplatelet Therapy*
SAPB-T45K	7	Localized infectious processes		No
SAPB-T45K	30	Rash		Yes
Control	7	Excessive pain, other: edema + ecchymosis		No
Control	7		Allergic reaction	No
Control	7	Localized infectious processes		No

*Medical dictionary for regulatory activities (MedDRA) preferred terms.

TABLE 4. Summary of Efficacy, Overall Population

TTH, s	*SAPB-T45K Group (n = 46)*	*Control Group (n = 45)*	*Paired Intrapatient Difference Control—SAPB-T45K (n = 45)*	
Median (min, max)	24.5 (7, 165)	44.0 (10, 387)	18 (−96, 267)	95% CI: 7–35, $p < .001$*†
Mean (SD)	40.2 (38.6)	93.3 (91.25)	52.7 (85.2)	95% CI: 27.1–78.3, $p < .001$‡

CI, confidence interval; TTH, time to hemostasis.
*Bootstrap 95% CI.
†Wilcoxon signed-rank test.
‡Paired *t*-test.

In addition, SAPB-T45K effectively reduced median TTH from 90 seconds to 24 seconds in patients taking aspirin and from 40 seconds to 24 seconds in patients not taking aspirin. These results demonstrate the consistent performance of SAPB-T45K in both groups, highlighting an important feature of SAPB-T45K—a mechanism of action independent of the patient's coagulation status, and suggesting the potential for significant reduction in blood loss if extended to larger wounds.

Complication rates were low and in line with those reported in the literature for similar surgery. Although a small number in each group developed minor complications (3 in the control group and 2 in the treatment group), the difference was not significant.

Cutaneous wound healing is an intricate process complicated by delayed healing and hemorrhage in a significant number of patients. Although the overall complication rate in dermatologic surgery is low, when multiplied by the overall frequency of cutaneous surgical procedures, bleeding complications remain a significant concern. For example, 1 prospective study found that 40% of the complications among over 1,300 such surgeries were related to bleeding.[2] Thus, there remains a significant medical need for agents that can reduce intrasurgical and postsurgical bleeding complications.

Surgeons have focused efforts on improving outcomes by using topical agents to reduce bleeding and minimize morbidity. Important considerations for such agents include the ability to effectively and rapidly stopping bleeding, time to achieve hemostasis, safety, and usability. Other available choices for topical agents include antibiotics and antiseptics, which may have a cytotoxic effect on keratinocytes and ultimately impair wound healing.[1] These agents are no longer endorsed by the American Academy of

TABLE 5. Summary of Efficacy in Patients With or Without Antiplatelet Therapy

Antiplatelet Therapy TTH, s	*SAPB-T45K Group (n = 10)*	*Control Group (n = 10)*	*Paired Intrapatient Difference Control—SAPB-T45K (n = 10)*	
Median (min, max)	24 (7, 120)	90 (23, 387)	35 (−9, 267)	95% CI: 12–208*, $p = 0.005$†
Mean (SD)	46 (42)	140 (125)	95 (104)	
No Antiplatelet Therapy TTH, s	*SAPB-T45K Group (n = 36)*	*Control Group (n = 36)*	*Paired Intrapatient Difference Control—SAPB-T45K (n = 36)*	
Median (min, max)	24 (8, 165)	40 (10, 244)	16 (−96, 215)	95% CI: 3–31*, $p = 0.004$†
Mean (SD)	39 (38)	80 (76)	41 (76)	

CI, confidence interval; TTH, time to hemostasis.
*Bootstrap 95% CI.
†Wilcoxon signed-rank test.

Dermatology in clean postsurgical wounds. In addition, there are multiple reports in the literature of natural agents that are used to promote wound healing. Many are poorly understood and their mode of action and safety profiles have not been evaluated.[9] Several topical agents contain human- or animal-derived products such as thrombin or fibrin, which carry the risk of potentially severe allergic or anaphylactic reactions, or blood-borne pathogen transmission. For this reason, some agents carry an FDA black-box warning.[13] Ease of preparation, mode of application, and efficacy that is independent of the application technique (e.g., thickness of the applied material layer) or patient factors, can also play a role in topical agent selection.[13]

SAPB-T45K is a novel material composed of a specifically designed peptide that self-assembles into a network of nanoscale fibers on exposure to charged surfaces. The easily applied SAPB-T45K liquid transforms rapidly into a gelled network that conforms to the irregular wound geometry without compression or other untoward effects on the surrounding tissue. This biocompatible physical barrier seals the wound and controls the movement of fluid, thus, reducing TTH and potentially blood loss. Histological examination of tissue in previous animal studies found that SAPB-T45K filled even the most minute tissue void in the wound, without any visible damage to the tissue or red blood cells in the area.[11] The formed barrier provides a microenvironment for subsequent wound healing.

Because SAPB-T45K is synthesized by defined chemical processes, manufacturing can produce reliably consistent material without risk of transmission of pathogens or biological contaminants. Although the peptide sequence is specifically designed, the individual amino acid components of the peptides are naturally occurring, contributing to biocompatibility and biodegradability. The favorable safety profile observed in this clinical study confirms and extends the observations of preclinical studies in which SAPB-T45K demonstrated biocompatibility with a lack of pyrogenicity or immunogenicity.[11]

Given the high likelihood that patients undergoing cutaneous surgery take anticoagulant or antiplatelet medications and the consensus recommendation is to continue these agents through the perisurgical period, despite an increased bleeding risk,[5] agents that do not depend on coagulation status to stop bleeding may be particularly important tools for surgeons. Csukas et al[11] reported on SAPB-T45K performance with or without heparin anticoagulation in a rat liver punch biopsy model. Notably, SAPB-T45K achieved equivalent, rapid hemostasis in both heparinized and non-heparinized animals—complementing the results in this study where SAPB-T45K similarly achieved similar median TTH in patients with or without antiplatelet therapy. In addition, in this same model, SAPB-T45K compared with currently available hemostatic agents, including fibrin and thrombin-containing agents, demonstrated more rapid hemostasis and a favorable adhesion prevention profile.[14] These characteristics may be further assessed in clinical studies of deeper wounds.

Wound healing with SAPB-T45K is comparable with that of control treatment. Sample size calculations were based on anticipated differences in ASEPSIS scores, but the ASEPSIS scores were very low and there was no observed treatment effect. Only 6 (13%) participants displayed an ASEPSIS wound score greater than 0 in either wound location. However, other clinically relevant secondary measures of efficacy showed a significant difference between SAPB-T45K and control treatment of wounds, suggesting that the sample size was appropriate for this setting. The study design of randomized paired wounds, allowing for each patient to serve as their own control, is also an important feature that provides confirmation of SAPB-T45K treatment effect.

As with all subgroup comparisons that are inherently not adequately powered, comparisons of differences in TTH reduction between patients with (n = 10) and without antiplatelet therapy are limited by sample size and should be interpreted cautiously. However, the observation of highly significant differences in TTH between SAPB-T45K and control, regardless of antiplatelet therapy, is remarkable considering the relatively low bleeding propensity of the wound locations and the small study size.

Conclusion

In this first human study to evaluate SAPB-T45K safety and performance in dermatologic surgery, SAPB-T45K treatment resulted in significantly faster mean, median TTH, and area-scaled TTH compared with controls, especially in the presence of antiplatelet therapy. SAPB-T45K was easy to apply during surgery and demonstrated similar safety profiles in both treatment and control groups. Based on the results of the current study, the authors believe that SAPB-T45K may reduce blood loss during cutaneous surgery and warrants further clinical evaluation in other topical uses and internal surgery applications.

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Address correspondence and reprint requests to: Jack Kelly, MB, MD, FRCS (Plast), Galway University Hospital, Newcastle Road, Galway, Ireland H91 YR71, or e-mail: jack.kelly@hse.ie