ASSESSMENT OF BURN WOUND TISSUE IN SITU BY MULTIPHOTON MICROSCOPY EMPLOYING FLUORESCENCE AND SECOND HARMONIC GENERATION CONTRASTS IN LIVE ANIMALS

J. P. Silva1, S. Dhall2, M. Martins-Green2, J. G. Lyubovitskyy
1University Of California Riverside, Riverside, CA USA;
2University Of California Riverside, Riverside, CA USA;
3University Of Minho, Braga, BRAGA Portugal

Current assessment of burn wound depth and progression of healing for proper choice of treatment is based on time-consuming and invasive techniques that may interfere with the healing process. One way to overcome these problems is to use noninvasive techniques. We use multiphoton microscopy (MPM) that employs fluorescence and second harmonic generation (SHG) contrasts to noninvasively follow the burn healing process in situ as healing progresses in live animals. Healing progression was followed in a partial thickness burn wound made on the dorsum of anesthetized Sprague-Dawley rats with a 2.8 cm diameter brass cylinder heated at 80°C for 60 seconds and pressed against the shaved rat skin for 6 seconds. During the first five days, burn healing was characterized by changes in the organization of collagen into a compact, mat-like assembly, suggesting progressive degradation of collagen fibers. From day 21 on, a network of capillaries with blood flow was observed. The epidermal cell layer and the blood vessel network became progressively more organized. At day 29, fibrillar collagen had SHG signal levels and morphology of the nearly preburn state. These findings were corroborated by histology/histochemistry. In conclusion, MPM technology that employs fluorescence and SHG contrasts is instrumental in following the healing process, in particular during the early stages of healing. The degree and rate with which these events occur early after burning could help clinicians make treatment decisions. The outcomes of healing at later times would be indicative of the effectiveness of the treatment applied.

DISTINCT MICROBIAL SPECIES IN ACUTE AND CHRONIC WOUNDS IN ACTIVE INJECTION DRUG USERS AND POTENTIAL IMPLICATIONS FOR PREVENTION AND TREATMENT

M. E. Smith1, N. Robinowizt2, C. Serio-Chapman2, P. Chaulk2, K. E. Johnson1
1Johns Hopkins University School Of Medicine, Baltimore, MD USA;
2Baltimore City Health Department, Baltimore, MD USA

This study aimed to characterize the microbial population of acute and chronic wounds in injection drug users (IDUs). IDUs frequenting a mobile Needle Exchange Program (NEP). Awareness of relationships between socio-behavioral risk factors and wound type and may have racial and gender associations. Wound type, race and gender may be associated with unmeasured factors that influence the local wound microbiome. Broad empiric antibiotics for wounds and abscesses in IDUs may be unnecessary in certain subpopulations.

SELF-CARE AND RISK REDUCTION HABITS IN OLDER INJECTION DRUG USERS WITH CHRONIC WOUNDS

M. E. Smith1, N. Robinowitz2, C. Serio-Chapman2, P. Chaulk2, K. E. Johnson1
1Johns Hopkins University School Of Medicine, Baltimore, MD USA;
2Baltimore City Health Department, Baltimore, MD USA

Injection-related wounds are a major cause of morbidity among injection drug users (IDUs). Studies suggest that long-term drug use accelerates aging. To investigate self-care factors associated with chronic wounds, we surveyed a population of active IDUs frequenting a mobile needle exchange program (NEP). In a cross-sectional study, NEP clients ≥18 years old, completed a 103-point survey regarding chronic wounds (duration ≥28 weeks), injection and hygiene practices. Factors associated with the presence of wounds were analyzed using univariate logistic regression. P values ≤0.05 were considered statistically significant. Of the 152 participants, 30 (19.7%) had a chronic wound. Of those with chronic wounds, 18 (60.0%) were ≥45 years old. Among participants ≥45 years old (n=79, 62.9%), those with a chronic wound were more likely to be in a drug treatment program (OR 3.4, 95% CI 1.0–10.8, p = 0.043) and less likely to use cigarette filters when drawing up prepared drug (OR 0.15, 95% CI 0.03–0.7, p = 0.018) compared to the same age group without chronic wounds. Compared to individuals <45 years old without chronic wounds, individuals ≥45 with a wound were more likely to report cleaning reused needles with bleach (OR 10.7, 95% CI 1.2–93.9, p = 0.003), and to use the clinic as a primary source of medical care instead of an emergency room (OR 3.4, 95% CI 1.1–10.4, p = 0.035). Chronic wounds are particularly prevalent in the older IDU population. Older IDUs with chronic wounds have different, and perhaps less risky, injection and hygiene practices than their peers and younger IDUs. These behaviors may be the result of living with a wound or long-term exposure to harm reduction services. These findings suggest that older IDUs with wounds are a different demographic and may be more receptive to local healthcare and substance abuse treatment messages.

THE CHARACTERISTICS OF ADSC YIELDING, PROLIFERATION AND DIFFERENTIATION FROM IRRADIATED PORCINE SUBCUTANEOUS FAT

D. Son1, Y. Yang1
1Keimyung University School Of Medicine, Daegu, DAEGU South Korea

From irradiated porcine subcutaneous fat, adipose derived stem cell (ADSC) was separated. The back of a pig was irradiated with 18 Gy and ADSC was separated in week 2, 4, and 6. The characteristics of ADSC yielding, proliferation and differentiation were evaluated. Irradiated group after six weeks had relative slower cell growth from day 15, which was twice as much slower. It also had quick stationary phase compared with control group and other irradiated groups. When CCK–8 was checked, there were no significant differences up to 72 hours after the incubation in all groups. But from 5 days (120 hours) and afterwards; cell survival rate increased only in the control group (normal ADSC). Cell aging (SA-β-gal activity staining) was checked using same cell numbers (p<0.01). In the irradiated group after 6 weeks, we can assume that cell aging activity increased due to damage accumulation. After irradiation, 2-week group and 4-week group had similar proliferation ability whereas 6-week group had significantly decreased colony formation, which decreased more than twice. In the sixth week after irradiation, no fat proliferation was observed. Irradiation facilitates chondrogenesis up to 4 weeks and represses from 6 weeks. In osteogenesis, the results were similar to that of chondrogenesis. In comparison with the control group, postirradiation 2-week and 4-week group showed notable differences and in the 6-week group, similar AP activity was observed. In regards to osteogenesis, time elapse after irradiation was not relevant. This result showed that 6-weeks after irradiation, ADSC’s yielding, proliferation and differentiation significantly decreased. When radiation induced chronic wound model is made, it seems most suitable to create skin defect after 6-weeks.

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