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Autoimmune comorbidities of psoriasis in US adults and children

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Background: Psoriasis is a chronic inflammatory skin disease affecting >7 million persons in the US. Few comprehensive large-scale and controlled studies examined the spectrum of autoimmune diseases occurring in psoriasis.

Objective: To determine the autoimmune disorders associated with psoriasis in US adults and children, and the excess payer costs related to care for these autoimmune comorbidities.

Methods: Data from the 2002-2012 National Inpatient Sample were analyzed, including a representative 20% sample of all US hospitalizations.

Results: In adults, psoriasis was associated with ≥1 autoimmune disease (adjusted odds ratio [95% confidence interval]: 1.90 [1.86-1.94]), including 28 of 35 autoimmune disorders examined. Autoimmune disorders with the largest effect-size included including alopecia areata (8.61 [4.95-14.98]), vitiligo (5.88 [4.91-7.03]), erythema nodosum (3.59 [2.43-5.29]), ankylosing spondylitis (3.31 [2.86-3.83]), primary biliary cirrhosis (2.68 [2.21-3.25]), nonalcoholic steatohepatitis (2.71 [2.57-2.86]), and autoimmune hepatitis (2.88 [2.22-3.73]). In children, psoriasis was associated with increased odds of type 1 diabetes (1.68 [1.14-2.49]), rheumatoid arthritis (6.45 [2.65-15.69]), systemic lupus erythematosus (2.66 [1.18-5.99]), alopecia areata (49.11 [7.05-341.94]), vitiligo (23.11 [7.46-71.66]), autoimmune hemolytic anemia (7.23 [2.35-22.21]), and unspecified autoimmune disease [29.08 [8.23-102.83]). There were significant differences of geometric-mean cost of care among adult ($8168 [$8017-$8322] vs $7888 [$7780-$7997], $P < .0001$) and pediatric ($6842 [5808-8060] vs $5761 [5375-6176]), $P = .0392$) inpatients with psoriasis, with $76,120 and $49,991,534 in excess annual costs of inpatient care attributed to autoimmune disorders, respectively.

Conclusions: Psoriasis was associated with hospitalization for multiple cutaneous and extracutaneous autoimmune disorders in adults and children, which contributed to substantial excess costs.

Commercial disclosure: None identified.

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Anal squamous cell carcinoma clinical outcome and receipt of chemoradiation with socioeconomic status

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Introduction: Squamous cell carcinoma (SCC) of the anus is relatively rare, but has a good prognosis with combination chemoradiation therapy. Unfortunately, disparities in receipt of treatment by socioeconomic status (SES) have been noted to exist with other cancer types. We explored how insurance status, income, and level of education impact treatment and survival for squamous cell carcinoma.

Methods: Patients with anal cancer from 2004-2016 in the Surveillance, Epidemiology, and End Results Program (SEER) database were included. Insurance status was defined as "Insured," "Medicaid," and "uninsured," and median household income (MHI), high school education, and unemployment rates were divided in quartiles. Cox regression, log rank, and multivariate regression were used to compare cancer-specific survival (CSS) and receipt of chemoradiation.

Results: Poorer CSS for anal SCC was noted for Medicaid (HR 1.52, 95% CI 1.34-1.74) and uninsured (HR 1.68, 95% CI 1.35-2.10) patients, as well as for those from communities with the lowest level of high school education (HR 1.17, 95% CI 1.02-1.38), lowest MHI (HR 1.29, 95% CI 1.08-1.54), and highest unemployment rate (HR 1.21, 95% CI 1.03-1.40). Patients were less likely to receive treatment if they were African American (OR 0.72, 95% CI 0.62-0.85), had Medicaid insurance (OR 0.71, 95% CI 0.52-0.96), or lowest level of education (OR 0.79, 95% CI 0.66-0.93). MHI did not impact receipt of chemoradiation.

Conclusions: Notable disparities exist for receipt of treatment and survival for anal SCC, and these differences are impacted by socioeconomic factors such as race, income, education, and insurance status.

Commercial disclosure: None identified.

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Telomerase and progerin modulation in cultured human normal fibroblasts submitted to UV stress

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Methods: A) Cultured human dermal fibroblasts (HDF) were treated or not with 0.2% phycobiliprotein (PBP) then exposed to UVA 4 J/cm^2 + UVB 0.075 J/cm^2 + blue light (465 nm) 20 J/cm^2 (UV+BL). The percent of shortened telomeres was assessed by Telomere Analysis Technology (TAT). Telomerase activity assessed by Telomeric Repeat Amplification Protocol (Q-TRAP). B) HDF were put in contact or not with PBP at 0.02%, 0.2% or 2%. Cells were irradiated or not by UVA 4 J/cm^2—UVB 75 mJ/cm^2 then incubated in absence (control) or presence of PBP. Progerin was extracted by sonication and quantified (ELISA).

Results: A. UV + BL irradiation induced a reduction of the mean length of telomeres ($P < .01$) and increased the percent of short telomeres ($P < .01$). PBP at 0.2% decreased significantly the percent of short telomeres in PBP-treated and UV+BL exposed cells compared with irradiated-untreated cells ($P < .05$). A significant decrease of telomerase activity was seen in PBP-treated and irradiated cells compared with untreated-irradiated cells. B. Progerin was significantly increased in UV-irradiated HDF compared with unexposed cells. PBP at 0.2% and at 2% induced dose-dependently a significant decrease of intracellular progerin in cells under UV (compared with untreated UV-exposed cells): inhibitions by −78% ($P < .001$) and respectively by −89% ($P < .001$).

Conclusions: UV and blue light irradiation increased the percent of short telomeres and telomerase expression in cultured fibroblasts ($P < .01$), UVs increased progerin expression. Phycobiliprotein at 0.2% decreased the percent of short telomeres ($P < .05$) and significantly down-regulated progerin expression in UV-exposed cells.

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Development of natural bacteriophages for skin care

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Background: The importance of a balanced skin microbiome for skin appearance is widely recognized. Acne vulgaris is known to arise from increased sebum and hyperkeratinization which are thought to stimulate *Propionibacteria acnes* proliferation leading to inflammation. Bacteriophages, bacteria-specific viruses, are natural components of the skin microbiome. *P. acnes* bacteriophages are more abundant on healthy skin than on acne skin1. BX001, a topical gel containing natural bacteriophages specifically targeting *P. acnes*, is being developed for human use.

Methods: The efficacy of BX001 was tested against clinical *P. acnes* strains isolated from healthy volunteers and acne patients, including strains identified as resistant to commonly used antibiotics. Phage activity on biofilm embedded bacteria was quantitated by bacterial extraction. Validated reconstituted human skin models were used to assess irritation potential of phages and human skin was employed to examine phage penetration. The efficacy of BX001 on *P. acnes* colonized skin was tested using an ex vivo model.

Results: In vitro, over 96% of the *P. acnes* clinical strains tested were sensitive to BX001, including multiple antibiotic resistant strains. Unlike erythromycin, bacteriophage reduced the number of biofilm embedded, viable bacteria by 100,000-fold within 24 hours and to undetectable levels after 48 hours. No BX001 associated irritation or appreciable penetration through epidermis was observed in ex-vivo models. BX001 was effective in eliminating *P. acnes* on colonized skin following two applications.

Conclusions: BX001 was effective in eradicating *P. acnes* and shown to be safe for topical administration in pre-clinical studies.

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