



Silver dressings and systemic toxicity: what's the evidence?

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Background

- Silver has been used extensively in burns care since its use as silver nitrate by Moyer and silver sulfadiazine by Fox in the 1960's
- More recently nanocrystalline silver dressings have been used (e.g. Acticoat™) using nanotechnology to deliver more active silver to the wound in a slow release mechanism
- Silver exerts its bacteriocidal effects by binding to proteins causing damage to cell membranes and denaturing bacterial DNA and RNA
- The amount and effect of systemic absorption of silver from this type of dressing is unknown

Method

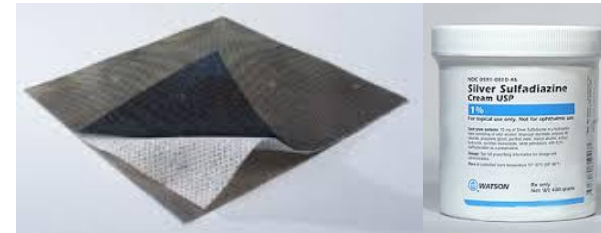
- We conducted a literature search of Cochrane, PubMed, Medline and Google Scholar databases from the year 1950 to 2017, searching for the terms: 'silver dressings' AND 'toxicity' AND 'burns'
- Abstracts were then hand-searched by a single author to assess relevance to silver levels, toxicity or complications
- Articles were excluded if they were not available in English

Results

- 12 relevant articles were found in the literature
- 2 cases reported deaths attributable to silver toxicity in which both patients suffered acute kidney injury (AKI)
- 2 cases of argyria (blue/grey discoloration of skin) were reported
- 6 studies reported increased serum silver levels in asymptomatic patients
- Post mortem results in 3 studies showed deposition of silver in multiple organs including liver, kidneys, lungs and brain

Discussion

- It is likely that cases of silver toxicity are underreported as most cases appear to be asymptomatic
- More frequent silver dressings and larger surface areas dressed (in terms of %TBSA) are risk factors
- No studies have shown long term adverse effects but isolated cases of argyria, AKI and death have been reported and attributed to silver
- As no standard definition or criteria for silver toxicity exists, nor any recognised treatment, the value in laboratory testing for serum silver levels is unclear



Author	Year	Type	# Patients	Findings
Gamelli	1993	RCT	20	Early Transient Self limiting bone marrow toxicity
Bigoli	2013	RCT	45	Increased LFT with of Ag
Pfurtscheller	2014	RCT- Animal	44	Acticoat>Silver Foam for absorption Ag can cross BBB
Wan	2009	Cohort/Animal RCT	46	Levels correlate with %TBSA, Nil toxicit Levels do not correlate with deposition
Boosalis	1987	Cohort	23	Levels correlate with %TBSA Nil Toxicity
Wang	1991	Cohort	36	Marked increase in Ag levels over a short period
Coombs	1992	Cohort	22	Early hepatic dysfunction, correlated with %TBSA Nil correlation with LFT and Ag levels
Vlachou	2007	Cohort	30	Mag Ag levels increased with increased Ag usage with dressing size
Moimenn	2010	Cohort	6	Ag levels increased sharply with use of Ag dressings Nil adverse effects
Iwasaki	1997	Case Report	1	Fluctuating consciousness associated with silver Extensive Ag deposition in Brain
Trop	2006	Case Report	1	Argyria, elevated serum and urine levels
McCague	2016	Case Report	1	Argyria, AKI and Multi organ failure

Santhanam	2008	RCT	25	Early wound-healing limiting bone marrow toxicity
Bigoli	2013	RCT	45	Increased LFT with of Ag
Pfurtscheller	2014	RCT- Animal	44	Acticoat>Silver Foam for absorption Ag can cross BBB
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