# The association of a new immune disorder in cobalturic patients with cobalt-chromium orthopedic-implants. A prospective blinded study of 229 subjects.

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INTRODUCTION: Bioprosthetic materials can elicit both a periprosthetic and a systemic immune response.

METHODS:

This is a study of 229 consecutive patients with cobalt-chromium joint components presenting to one orthopedic surgeon over 4 years. A Cobaltism-Symptom-Inventory was administered and scored and an interval (since arthroplasty) medical history was taken.

The interval medical history included new or worsened autoimmune diagnoses, new medication or food allergies, and new rashes.

After the encounter a urine-cobalt determination was organized. Subjects with a urine-cobalt of ≥ 1 ppb were considered to be cobalturic.

RESULTS: 20 (16%) of the 128 cobalturic subjects reported a new or worsened autoimmune diagnosis, new food or medication allergies, or rashes. Comparatively, 4 (4%) of the not-cobalturic patients noted such pathology. This is a significant association (Fisher's exact two-tailed test, p =0.004). The odds ratio of cobalturic subject to experience new or worsened autoimmune diagnosis, new food or medication allergies, or rashes is 4.5.

DISCUSSION AND CONCLUSION: Cobalturia (urine-cobalt of ≥ 1 ppb) in patient with cobalt-chromium joint components is significantly associated with an increased incidence of new or worsened auto-immune diagnoses, new food or medication allergies, or new rashes with an odds-ratio of 4.5. These subjects may be experiencing Autoimmune Syndrome Induced by Adjuvants (ASIA).

Contingency

| Table Analyzed | UCo v Autoimmune Dx. | | |
|---|---|---|---|
| **P value and statistical significance** | | | |
| Test | Fisher's exact test | | |
| P value | 0.0043 | | |
| P value summary | ** | | |
| One- or two-sided | Two-sided | | |
| Statistically significant (P < 0.05)? | Yes | | |
| **Effect size** | **Value** | **95% CI** | |
| Relative Risk | 1.138 | 1.047 to 1.252 | |
| Reciprocal of relative risk | 0.8785 | 0.7986 to 0.9551 | |
| Odds ratio | 4.491 | 1.509 to 12.45 | |
| Reciprocal of odds ratio | 0.2227 | 0.08031 to 0.6625 | |
| Sensitivity | 0.4732 | 0.4059 to 0.5414 | |
| Specificity | 0.8333 | 0.6415 to 0.9332 | |
| Positive Predictive Value | 0.9804 | 0.9026 to 0.9845 | |
| Negative Predictive Value | 0.1563 | 0.1035 to 0.2290 | |
| Likelihood Ratio | 2.839 | | |
| **Methods used to compute CIs** | | | |
| Relative Risk | Koopman asymptotic scc | | |
| Odds ratio | Baptista-Pike | | |
| Sensitivity, specificity, etc. | Wilson-Brown | | |
| **Data analyzed** | **No new Autoimmune D** | **new Autoimmune Dx** | **Total** |
| Uco < 1 | 97 | 4 | 101 |
| Uco ≥ 1 | 108 | 20 | 128 |
| Total | 205 | 24 | 229 |
| **Percentage of row total** | **No new Autoimmune D** | **new Autoimmune Dx** | |
| Uco < 1 | 96.04% | 3.96% | |
| Uco ≥ 1 | 84.38% | 15.63% | |
| **Percentage of column total** | **No new Autoimmune D** | **new Autoimmune Dx** | |
| Uco < 1 | 47.32% | 16.67% | |
| Uco ≥ 1 | 52.68% | 83.33% | |
| **Percentage of grand total** | **No new Autoimmune D** | **new Autoimmune Dx** | |
| Uco < 1 | 42.36% | 1.75% | |
| Uco ≥ 1 | 47.16% | 8.73% | |