

## Internet Appendix A55: Orthopaedic Medicine

### A55.1 Illustrative Pitch Template Example

This pitch is reverse engineered from the paper: Patton, D. and McIntosh, A., (2008), "Head and neck injury risks in heavy metal: head bangers stuck between rock and a hard bass", BMJ 2008; 337 doi: <http://dx.doi.org/10.1136/bmj.a2825> (Published 18 December 2008) Cite this as: BMJ 2008;337:a2825

Pitcher's name	Marita Smith	For category	Orthopaedic Medicine	Date completed	4/11/15
(A) Working Title	Head and neck injury risks: the link between head banging and heavy metal				
(B) Basic Research Question	Is there a measurable injury risk in head banging?				
(C) Key paper(s)	<p>Ferrario, V. F., Sforza, C., Serrao, G., Grassi, G. and Mossi, E. (2002). Active range of motion of the head and cervical spine: a three-dimensional investigation in healthy young adults. <i>Journal of Orthopaedic Research</i> <b>20</b>, 122-9.</p> <p>Kunin, M., Osaki, Y., Cohen, B. and Raphan, T. (2007). Rotation axes of the head during positioning, head shaking, and locomotion. <i>Journal of Neurophysiology</i> <b>98</b>, 3095-108</p>				
(D) Motivation/Puzzle	<p>Head banging is a violent dance form associated with hard rock and heavy metal music. Because it involves moving the head rapidly and rhythmically, head banging enthusiasts may be at risk of head and neck injury. Several musicians within the genre have experienced such injuries, e.g. Jason Newsted (Metallica) and Terry Balsamo (Evanescence). Head banging is frequently associated with severe headache symptoms, for which enthusiasts rarely seek treatment as they typically resolve naturally. However, it is possible that head banging may lead to serious, silent damage that goes unnoticed. There has been no prior examination of the risks of mild traumatic brain and neck injury from head banging activities in the literature. Considering the ubiquitous nature of this dance form and its popularization in the media, a comprehensive study is desirable.</p>				
THREE	Three core aspects of any empirical research project i.e. the "iDioTs" guide				
(E) Idea?	By examining the range of motion typically achieved in head banging, it should be possible to model the process and derive threshold levels to minimize injury risk.				
(F) Data?	<ul style="list-style-type: none"> <li>- Observational studies: identify popular head banging techniques by attending various heavy metal concerts.</li> <li>- Focus groups: work with heavy metal musicians to identify key head banging songs and their tempos.</li> <li>- Biomechanical analysis: Create a theoretical head banging model based on angular displacement of the head (sinusoidal motion) to</li> </ul>				

	enable the definition of parameters defining head and neck injury risk (Head Injury Criterion, HIC; Neck Injury Criterion, NIC).
(G) Tools?	Funding for concert tickets, participating heavy metal musicians for focus groups, modeling software
TWO	Two key questions
(H) What's New?	While case studies indicate that head banging might cause brain and neck injury, this will be the first study to explicitly examine this link via biomechanical methods.
(I) So What?	This study will identify exactly why heavy metal fans are often dazed, confused or incoherent at festivals and provide safe tolerance thresholds for head banging activities.
ONE	One bottom line
(J) Contribution	This study will provide safe head banging guidelines so as to minimize the risk of head and neck injury.
(K) Other considerations	<p>Is Collaboration needed/desirable?</p> <ul style="list-style-type: none"> <li>-Idea: no;</li> <li>-Data; yes –will need input from musicians in the genre</li> <li>-Tools; yes – funding for concert attendance and software</li> </ul> <p>Target journals – <i>Journal of Neurophysiology</i>, <i>Journal of Orthopaedic Research</i></p> <p>“Risk” assessment:</p> <ul style="list-style-type: none"> <li>-“no result” risk: low. The case study history of injuries suggests there will be a link between head banging and head/neck injury.</li> <li>-“competitor risk”(i.e. being beaten by a competitor): low. This is not a typically defined “hot topic” area.</li> <li>-risk of “obsolescence”: Low. The outcomes of this study will be extremely important for the general public, especially heavy metal enthusiasts who regularly engage in head banging.</li> </ul>