Our center has been doing research on Breast Implant Associated Anaplastic Large Cell Lymphoma, abbreviated BIA-ALCL; in fact we’ve devoted around 5 years to studying it. It is a very rare lymphoma that, if left undiagnosed, can cause death. Currently there are many theories as to the cause, but the literature suggests an association between breast implant surface type and this lymphoma.

However, data analysis is hindered by the fact that breast implant data does not have a classification system for textured or smooth surface types. The system currently classifies the filling of a breast implant only, between saline-filled and silicone gel-filled. Moreover, breast implant data is spread out across several sources.

Our goal for this project was to create a complete, comprehensive source of data that included all relevant or important information about breast implants. For our medium of data, we chose to create an ontology, and this was primarily because its structure allows for automatic classification. We would use this feature to classify our textured and smooth breast implants.

So, an ontology is a formal representation of properties, categories, and *relationships* between entities in a single domain. This is an advantage over the current structure of databases, which indicate properties for an entity but lack the relationships. An ontology uses a hierarchical structure to represent data, so you can think of it kind of like a taxonomy.

If you look at Figure 2, our initial ontology design, you can see our main class, **breast implant device**, where we list all the individual breast implants, its relationships and properties.

And after we input everything into the ontology, all the information, it classified 906 textured breast implants and 836 smooth breast implants out of the 1738 devices approved by the FDA.

So for a first version, we consider it to be quite successful. It combines data from several sources, extends it, in some cases, and importantly, allows us to automatically classify breast implants. And like I said before, in the context of the BIA-ALCL project, this makes the ontology very useful in supporting data analysis, such as text mining on MDR datasets. We now have an idea of what the textured and smooth breast implants are. The Breast Implant Ontology will also be released as an open resource to other researchers, industries, and organizations.

***What about future versions? What else is needed to make this a complete source of data?***

*To make this a complete source of data, we do need to add individual dimension measurements, and that is something none of these data sources provide. We are actually in the process of doing this; we’re extracting these properties (e.g. width, height, volume) from product catalogs and mapping them to a corresponding catalog number.*

*Also, an ontology is supposed to be a complete source of data on at least a single domain. We have so far included only data on FDA approved breast implants on the market. We’re hoping to expand the ontology to include off-market historical implants as well as implants in other countries.*