**Fields to extract from DrugBank.ca**

Using the two example entries Dave sent me (ocrelizumab and interferon beta-1b), I have identified the fields that I think should be extracted from the DrugBank.ca database. As discussed, these would be used to:

1. Populate the “drug” table(s) in the project database. This would include all “approved” drugs in the DrugBank.ca database, which can be identified using the <groups> field (highlighted below). This way, the tool would in principle be generalizable to all pharmaceuticals approved in the US, EU, and/or Canada.
2. Expand the aspect lexicon for ABSApp by adding all drugs approved for the specific conditions we are currently investigating (initially including MS, RA, and breast cancer) to the lexicon. We should be able to generate this list by searching the <description> and <indication> fields for the disease names, but it would be good to crosscheck the lists generated in this way against known drugs for those conditions to check how well this works.
   1. When using drug names as aspects, all content from the following fields should be used as aliases for that aspect: i) <name>, ii) <synonyms>, iii) <products><product><name>. The first is the generic drug name, while the product names are the brands under which it is sold.
3. If there is too much information to extract under <products>, I can generate a limited list of sub-fields to capture.

**OCRELIZUMAB**

<drug type="biotech" created="2016-10-20" updated="2019-07-02">

<drugbank-id primary="true">DB11988</drugbank-id>

<name>Ocrelizumab</name>

<description>Ocrelizumab is a CD20-directed cytolytic antibody indicated for the treatment of patients with relapsing or primary progressive forms of multiple sclerosis. It is a second-generation recombinant humanized monoclonal IgG1 antibody that selectively targets the B lymphocytes that express the CD20 antigen. As a humanized molecule, ocrelizumab is expected to be less immunogenic with repeated infusions which improves the benefit-to-risk profile for patients with relapsing or progressive forms of MS. &#13;

&#13;

Multiple sclerosis (MS) is a chronic, inflammatory, autoimmune disease of the central nervous system that leads to neurological disabilities and significantly reduced quality of life [L1199]. Most patients with MS experience episodes of relapses with worsening function, followed by recovery periods, or remissions. Primary progressive multiple sclerosis (PPMS) accounts for 10-15% of the overall population of patients with MS, and involves gradual worsening of neurologic disability from symptom onset, often without early relapses or remissions [A31741].&#13;

&#13;

Developed by Genentech/Roche, ocrelizumab was approved by the FDA in March 2017 under the market name Ocrevustm for intravenous injection. It was later approved by Health Canada (as Ocrevus) in August 2017, making the drug the first available treatment for PPMS in both U.S. and Canada. In clinical trials of patients with relapsing forms of MS, treatment with ocrelizumab resulted in reduced relapse rates and reduced worsening of disability compared to interferon beta-1a [L1199]. In phase 3 clinical trials of patients with PPMS, treatment with ocrelizumab demonstrated lower rates of clinical and MRI progression than placebo [A31741].</description>

<groups>

<group>approved</group>

<group>investigational</group>

</groups>

<indication>Indicated for the treatment of adult patients with relapsing or primary progressive forms of multiple sclerosis [FDA Label].</indication>

<synonyms>

<synonym language="english" coder="jan">Ocrelizumab (genetical recombination)</synonym>

</synonyms>

<products>

<product>

<name>Ocrevus</name>

<labeller>Genentech, Inc.</labeller>

<ndc-id/>

<ndc-product-code>50242-150</ndc-product-code>

<dpd-id/>

<ema-product-code/>

<ema-ma-number/>

<started-marketing-on>2017-03-28</started-marketing-on>

<ended-marketing-on/>

<dosage-form>Injection</dosage-form>

<strength>300 mg/10mL</strength>

<route>Intravenous</route>

<fda-application-number>BLA761053</fda-application-number>

<generic>false</generic>

<over-the-counter>false</over-the-counter>

<approved>true</approved>

<country>US</country>

<source>FDA NDC</source>

</product>

<product>

<name>Ocrevus</name>

<labeller>Hoffmann La Roche</labeller>

<ndc-id/>

<ndc-product-code/>

<dpd-id>02467224</dpd-id>

<ema-product-code/>

<ema-ma-number/>

<started-marketing-on>2017-09-21</started-marketing-on>

<ended-marketing-on/>

<dosage-form>Solution</dosage-form>

<strength>30 mg</strength>

<route>Intravenous</route>

<fda-application-number/>

<generic>false</generic>

<over-the-counter>false</over-the-counter>

<approved>true</approved>

<country>Canada</country>

<source>DPD</source>

</product>

</products>

<dosages>

<dosage>

<form>Injection</form>

<route>Intravenous</route>

<strength>300 mg/10mL</strength>

</dosage>

<dosage>

<form>Solution</form>

<route>Intravenous</route>

<strength>30 mg</strength>

</dosage>

</dosages>

**INTERFERON BETA-1B**

<drug type="biotech" created="2005-06-13" updated="2019-07-02">

<drugbank-id primary="true">DB00068</drugbank-id>

<drugbank-id>BTD00078</drugbank-id>

<drugbank-id>BIOD00078</drugbank-id>

<name>Interferon beta-1b</name>

<description>Human interferon beta (165 residues), cysteine 17 is substituted with serine. Produced in E. coli, no carbohydrates, MW=18.5kD</description>

<groups>

<group>approved</group>

</groups>

<indication>Interferon beta-1b is a drug used for the treatment of relapsing/remitting multiple sclerosis. It has been shown to slow the advance of the disease as well as to decrease the frequency of attacks.</indication>

<synonyms>

<synonym language="english" coder="">Interferon beta 1b (recombinant)</synonym>

<synonym language="english" coder="">Interferon beta-1b,recombinant</synonym>

<synonym language="english" coder="">Interferon-beta-1b</synonym>

<synonym language="english" coder="">Recombinant interferon beta-1b</synonym>

</synonyms>

<products>

<product>

<name>Betaferon</name>

<labeller>Bayer Ag</labeller>

<ndc-id/>

<ndc-product-code/>

<dpd-id/>

<ema-product-code>EMEA/H/C/000081</ema-product-code>

<ema-ma-number>EU/1/95/003/003</ema-ma-number>

<started-marketing-on>1995-11-30</started-marketing-on>

<ended-marketing-on/>

<dosage-form>Injection, powder, for solution</dosage-form>

<strength>0.25 mg/ml</strength>

<route>Subcutaneous</route>

<fda-application-number/>

<generic>false</generic>

<over-the-counter>false</over-the-counter>

<approved>true</approved>

<country>EU</country>

<source>EMA</source>

</product>

<product>

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<labeller>Bayer Ag</labeller>

<ndc-id/>

<ndc-product-code/>

<dpd-id/>

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<ended-marketing-on/>

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<approved>true</approved>

<country>EU</country>

<source>EMA</source>

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<product>

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<labeller>Bayer Ag</labeller>

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<dpd-id/>

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<ended-marketing-on/>

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<route>Subcutaneous</route>

<fda-application-number/>

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<over-the-counter>false</over-the-counter>

<approved>true</approved>

<country>EU</country>

<source>EMA</source>

</product>

<product>

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<labeller>Bayer Ag</labeller>

<ndc-id/>

<ndc-product-code/>

<dpd-id/>

<ema-product-code>EMEA/H/C/000081</ema-product-code>

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<ended-marketing-on/>

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<route>Subcutaneous</route>

<fda-application-number/>

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<over-the-counter>false</over-the-counter>

<approved>true</approved>

<country>EU</country>

<source>EMA</source>

</product>

<product>

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<labeller>Bayer Ag</labeller>

<ndc-id/>

<ndc-product-code/>

<dpd-id/>

<ema-product-code>EMEA/H/C/000081</ema-product-code>

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<ended-marketing-on/>

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<strength>0.25 mg/ml</strength>

<route>Subcutaneous</route>

<fda-application-number/>

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<over-the-counter>false</over-the-counter>

<approved>true</approved>

<country>EU</country>

<source>EMA</source>

</product>

<product>

<name>Betaferon</name>

<labeller>Bayer Ag</labeller>

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<ndc-product-code/>

<dpd-id/>

<ema-product-code>EMEA/H/C/000081</ema-product-code>

<ema-ma-number>EU/1/95/003/008</ema-ma-number>

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<ended-marketing-on/>

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<strength>0.25 mg/ml</strength>

<route>Subcutaneous</route>

<fda-application-number/>

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<over-the-counter>false</over-the-counter>

<approved>true</approved>

<country>EU</country>

<source>EMA</source>

</product>

<product>

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<labeller>Bayer Ag</labeller>

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<dpd-id/>

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<ended-marketing-on/>

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<route>Subcutaneous</route>

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<over-the-counter>false</over-the-counter>

<approved>true</approved>

<country>EU</country>

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<labeller>Bayer Ag</labeller>

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<ended-marketing-on/>

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<approved>true</approved>

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<labeller>Bayer Ag</labeller>

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<ended-marketing-on/>

<dosage-form>Injection, powder, for solution</dosage-form>

<strength>0.25 mg/ml</strength>

<route>Subcutaneous</route>

<fda-application-number/>

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<over-the-counter>false</over-the-counter>

<approved>true</approved>

<country>EU</country>

<source>EMA</source>

</product>

<product>

<name>Betaferon</name>

<labeller>Bayer Ag</labeller>

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<dpd-id/>

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<ended-marketing-on/>

<dosage-form>Injection, powder, for solution</dosage-form>

<strength>0.25 mg/ml</strength>

<route>Subcutaneous</route>

<fda-application-number/>

<generic>false</generic>

<over-the-counter>false</over-the-counter>

<approved>true</approved>

<country>EU</country>

<source>EMA</source>

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<name>Betaseron</name>

<labeller>Bayer HealthCare Pharmaceuticals Inc.</labeller>

<ndc-id/>

<ndc-product-code>50419-524</ndc-product-code>

<dpd-id/>

<ema-product-code/>

<ema-ma-number/>

<started-marketing-on>2009-07-09</started-marketing-on>

<ended-marketing-on/>

<dosage-form>Kit</dosage-form>

<strength>0.25 mg/1mL</strength>

<route/>

<fda-application-number>BLA103471</fda-application-number>

<generic>false</generic>

<over-the-counter>false</over-the-counter>

<approved>true</approved>

<country>US</country>

<source>FDA NDC</source>

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<name>Betaseron</name>

<labeller>Bayer</labeller>

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<ndc-product-code>50419-523</ndc-product-code>

<dpd-id/>

<ema-product-code/>

<ema-ma-number/>

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<ended-marketing-on>2017-11-10</ended-marketing-on>

<dosage-form>Kit</dosage-form>

<strength>0.25 mg/1mL</strength>

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<over-the-counter>false</over-the-counter>

<approved>true</approved>

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<source>FDA NDC</source>

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<labeller>Bayer</labeller>

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<ndc-product-code/>

<dpd-id>02169649</dpd-id>

<ema-product-code/>

<ema-ma-number/>

<started-marketing-on>1995-12-31</started-marketing-on>

<ended-marketing-on/>

<dosage-form>Powder, for solution</dosage-form>

<strength>0.3 mg</strength>

<route>Subcutaneous</route>

<fda-application-number/>

<generic>false</generic>

<over-the-counter>false</over-the-counter>

<approved>true</approved>

<country>Canada</country>

<source>DPD</source>

</product>

<product>

<name>Extavia</name>

<labeller>Novartis Europharm Limited</labeller>

<ndc-id/>

<ndc-product-code/>

<dpd-id/>

<ema-product-code>EMEA/H/C/000933</ema-product-code>

<ema-ma-number>EU/1/08/454/008</ema-ma-number>

<started-marketing-on>2008-05-20</started-marketing-on>

<ended-marketing-on/>

<dosage-form>Injection, powder, for solution</dosage-form>

<strength>250 μg/ml</strength>

<route>Subcutaneous</route>

<fda-application-number/>

<generic>false</generic>

<over-the-counter>false</over-the-counter>

<approved>true</approved>

<country>EU</country>

<source>EMA</source>

</product>

<product>

<name>Extavia</name>

<labeller>Novartis Europharm Limited</labeller>

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<ndc-product-code/>

<dpd-id/>

<ema-product-code>EMEA/H/C/000933</ema-product-code>

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<started-marketing-on>2008-05-20</started-marketing-on>

<ended-marketing-on/>

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<strength>250 μg/ml</strength>

<route>Subcutaneous</route>

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<approved>true</approved>

<country>EU</country>

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<labeller>Novartis Europharm Limited</labeller>

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<country>EU</country>

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<labeller>Novartis Europharm Limited</labeller>

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<dpd-id/>

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<dpd-id/>

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<ended-marketing-on/>

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<strength>250 μg/ml</strength>

<route>Subcutaneous</route>

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<approved>true</approved>

<country>EU</country>

<source>EMA</source>

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<product>

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<labeller>Novartis Europharm Limited</labeller>

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<dpd-id/>

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<ema-ma-number>EU/1/08/454/013</ema-ma-number>

<started-marketing-on>2008-05-20</started-marketing-on>

<ended-marketing-on/>

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<strength>250 μg/ml</strength>

<route>Subcutaneous</route>

<fda-application-number/>

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<approved>true</approved>

<country>EU</country>

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<dpd-id/>

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<strength>250 μg/ml</strength>

<route>Subcutaneous</route>

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<approved>true</approved>

<country>EU</country>

<source>EMA</source>

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<labeller>Novartis Pharmaceuticals Corporation</labeller>

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<dpd-id/>

<ema-product-code/>

<ema-ma-number/>

<started-marketing-on>2009-08-14</started-marketing-on>

<ended-marketing-on/>

<dosage-form>Kit</dosage-form>

<strength>0.25 mg/1.0mL</strength>

<route/>

<fda-application-number>BLA125290</fda-application-number>

<generic>false</generic>

<over-the-counter>false</over-the-counter>

<approved>true</approved>

<country>US</country>

<source>FDA NDC</source>

</product>

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<labeller>Novartis</labeller>

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<dpd-id>02337819</dpd-id>

<ema-product-code/>

<ema-ma-number/>

<started-marketing-on>2010-05-05</started-marketing-on>

<ended-marketing-on/>

<dosage-form>Powder, for solution</dosage-form>

<strength>0.3 mg</strength>

<route>Subcutaneous</route>

<fda-application-number/>

<generic>false</generic>

<over-the-counter>false</over-the-counter>

<approved>true</approved>

<country>Canada</country>

<source>DPD</source>

</product>

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<dosage>

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<route>Subcutaneous</route>

<strength>250 μg/ml</strength>

</dosage>

<dosage>

<form>Kit</form>

<route/>

<strength>0.25 mg/1.0mL</strength>

</dosage>

</dosages>