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| The Whole Grain ConnectionNewsletter number 35April 2021 |

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| ***Why do we have this great difference in covid symptoms between people?***         I know someone who was diagnosed with covid-19 and recovered without hospitalization, even though at a vulnerable age. And who has evidently been paying attention, most of the time, to the need to eat whole grain foods and plenty of fruits and vegetables.                   Both he and his wife eventually tested positive to covid-19, after suffering from *bad colds, but no fever for a couple of weeks*. Their physician was sure initially that they were not suffering from a covid infection. In conversation I discovered that they eat store bought whole grain breads and cereals, but otherwise do most of their own cooking. Before covid they ate out with friends as a regular but infrequent pleasure. The important part of their lifestyle that saved them I think, is that his wife has taken an interest in healthy foods and cooking for decades. The suggestion is that with this healthy diet that included whole grains, they escaped the severe symptoms that might have meant hospitalization and possibly intensive care or death!           Over these many months I have been watching for a scientific discussion of how whole grains could save us from covid, or at least from a severe case of covid. The connection seemed evident from the beginning, because people suffering from obesity, diabetes and cardiovascular disease were the most likely to be severely infected. Whole grains are well known to reduce the symptoms of these diseases. However, exactly the reason why these metabolic diseases predispose people to the most dangerous covid symptoms, was not so very clear as it has by now become.           Apparently, a particular aspect of covid is that it attacks the interior lining of all the blood vessels, known as the *endothelium*. Thus, if the cardiovascular system has already been damaged by metabolic disease the covid attack is likely made much worse. Also, this covid damage to the interior lining of the blood vessels is being used to explain the fatigue felt by many people who have survived covid infection.           So, what is it in whole grains that could keep the blood vessels so healthy that they would resist attack by covid? It is the polyphenolics in the bran that came to mind, and previously to a number of researchers. Polyphenolics have long been known to strengthen blood vessels. The polyphenolic compound richly present in the bran of all the cereal grains including wheat, rice and corn, is *ferulic acid*. Although, *ferulic acid* is also present in various fruits and vegetables, we would take in the most by eating our basic grain foods in the whole grain form. It’s easy to imagine that people eating a refined grain, refined sugar based diet with relatively few fruits and vegetables would take in very little *ferulic acid*, or indeed very few polyphenolics in general.            Like most of the color and flavor polyphenolic compounds in grains, *ferulic acid* is held within the cell walls of bran, which are built with pentosan dietary fiber. Some of this pentosan dietary fiber is soluble and therefore consumed by the intestinal bacteria. *Ferulic acid* is thus released into the intestines ready for absorption and use in the body, to protect blood vessels.           The fermentation and enzyme activity during whole grain bread-making, will also release *ferulic acid*, directly into the dough. No need to wait for digestion in the microbiome. Pentosan degrading enzymes (pentosanases) in malt will dissolve pentosan fiber, simultaneously releasing *ferulic acid*. Sourdough-leavened, malt-enzyme treated whole grain breads will provide us with readily-absorbable free *ferulic acid*. Hopefully this will protect us from the worst that covid can do!           Here are links to some of the literature and news articles that brought me to this conclusion, or you can fact check for yourself directly at [www.pubmed.gov](http://r20.rs6.net/tn.jsp?f=001hEPj7QXbKa4jlX1T7Od5lc8lOKy3ge7Plpj1iELGlD5mbv-6qEQGpan3xeLmDKaCDnwYcOdzhMuXk5lCGIQtEz2uU0_WxnfjeF-dxJvqrA5PlSlzbXYvXrZQajEpPXYcHdr3-6ZJc8Q=&c=g71FNlOJa3Csafb9eCWDA9AC7ix2K0HRJ2KmQBqiDajJXR5WD1AQ5g==&ch=RGrkYiaMIqUp9h9egociCaQ5JehN4CxNxZqNcwqDbQohVLAEqbLevw==&jrc=1)[Recognition that covid-19 damages blood vessels (the endothelium)](http://r20.rs6.net/tn.jsp?f=001hEPj7QXbKa4jlX1T7Od5lc8lOKy3ge7Plpj1iELGlD5mbv-6qEQGpcACMU7cGLu7pAqdtrkiVY1fZFXWWD_in875FZ4lSLN3Mkk037qJn9KMaAxItMnwlSPYjcc7pflyn-8_YTNpAEgE2tSw18XTJ6o1k9WjRXd9vwcPHKMvsux6TkxyRq0iVzh81XD6Cr3vri2CdfOT8jRJPMZHS_g08AEaD0ZrgdvqiPGfAXeB2H5zekU1ujyFAyMo275eR1FivWLD_8S4STcjNY1BggrfRmH8Ug8lIsZDiNfPyUQ7xQPzo-9cslefRWX8kmHxLIuzmsi_rzcnugA62pGzZtyE0RRE2NU3gmJ8JZWkkAu_YYrpLBXMIscMEvYOJT_fCt9Dyrq3v-mS3SLMIfyxx7fwzeXI9wdq-0ZTIaBReSmN3-d9zEPlcxACFE2DymK4pa8HQKBiax9vVzIrNbSmNfnVkqBNvKtMoJ6skQEcRxy_nDkd-MzRmLhX_Q==&c=g71FNlOJa3Csafb9eCWDA9AC7ix2K0HRJ2KmQBqiDajJXR5WD1AQ5g==&ch=RGrkYiaMIqUp9h9egociCaQ5JehN4CxNxZqNcwqDbQohVLAEqbLevw==&jrc=1)[Dr Mary Fowkes - dies at 66. Discovered that the endothelium is involved in causing the massive breakdown of organs in severe covid cases](http://r20.rs6.net/tn.jsp?f=001hEPj7QXbKa4jlX1T7Od5lc8lOKy3ge7Plpj1iELGlD5mbv-6qEQGpcACMU7cGLu7mB1PdCgYxd-ILSi4xyVBSAi00hmO7WVG3D4zjQOaY6xbkmlE47PunQ_oSlUBEWHmUiKtWlSrnkUgxrTi9ozkMDM5cL520OOkGcc1eMsPDLshLPTnLIeRDSSBBR235JOOjNu8QDg8_5fxFIFISKSYfQV_UMMHY5v2xLDVgfwSo5rBlZxReMRbFQ==&c=g71FNlOJa3Csafb9eCWDA9AC7ix2K0HRJ2KmQBqiDajJXR5WD1AQ5g==&ch=RGrkYiaMIqUp9h9egociCaQ5JehN4CxNxZqNcwqDbQohVLAEqbLevw==&jrc=1)[Increased bioavailability of ferulic acid and enhanced vascular function](http://r20.rs6.net/tn.jsp?f=001hEPj7QXbKa4jlX1T7Od5lc8lOKy3ge7Plpj1iELGlD5mbv-6qEQGpcACMU7cGLu7wdPMDLrgXVm-XXz0ej4MW2D0E2Jhm8_kLhQOpxC9HjO0P6jSWcygnU9sYJbXpMNUuK4xD3LdLJSf3FelYLzkYpp32a1nknfJ4Yq5Bqp1280=&c=g71FNlOJa3Csafb9eCWDA9AC7ix2K0HRJ2KmQBqiDajJXR5WD1AQ5g==&ch=RGrkYiaMIqUp9h9egociCaQ5JehN4CxNxZqNcwqDbQohVLAEqbLevw==&jrc=1) |

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| ***What if?***           Surely it is out of shear habit rather than efficiency, that refined flour millers produce their whole grain flour by reconstituting the bran and germ with the endosperm. It is well known that the refined flour process requires the use of wetted grain initially. Thus, in order to make a shelf stable reconstituted whole grain flour, they need to heat and dry the bran and germ as well as grind it finely enough to satisfy the bakers. This is extraordinarily inefficient, and it does not even lead to a superior whole grain flour; except that it is remarkably shelf stable.            Notably, the first miller to address the problem of fast oxidation in wet wheat germ produced during refined flour milling, was Richard “Stoney” Smith, as early as 1886. Stoney Smith’s method was to heat the separated wet germ together with a sweetener, either sugar or saccharine or even both. The heat was to halt the germ turning rancid and the sweetener was to counteract the flavor change, due to the heating. Such flour was eventually produced under the “[Hovis”](http://r20.rs6.net/tn.jsp?f=001hEPj7QXbKa4jlX1T7Od5lc8lOKy3ge7Plpj1iELGlD5mbv-6qEQGpcACMU7cGLu7XjryipXn4qbdz3SR1ekb22t-vLdwmCw0JcMN8GtKS9Gv1YL-i7zhy12hY-SpVPpICSKOlKchN57muTFMa34P6OKv5PtxtpJH&c=g71FNlOJa3Csafb9eCWDA9AC7ix2K0HRJ2KmQBqiDajJXR5WD1AQ5g==&ch=RGrkYiaMIqUp9h9egociCaQ5JehN4CxNxZqNcwqDbQohVLAEqbLevw==&jrc=1" \t "_blank) brand name. Thus, the impossibility of directly storing reconstituted whole grain flour after wet roller milling was recognized immediately after the introduction of refined flour milling around 1880. In the UK from at least the 1940s “Vitbe” bread was also sold as an alternative to Stoney Smith’s “Hovis” loaf.            It seems this history has been lost. Some new millers look at whole wheat flour on the grocery store shelf produced by others, with a shelf life of 1-2 years and seem not to realize that it has been produced in this complex process to heat stabilize, dry and regrind the separated germ and bran. They think again when their own recombined flour from wet grain turns rancid really fast, even if most of the bran and germ are removed.            A far more efficient way to produce dry whole grain flour with fine bran and germ particles, as well as fine endosperm, is to start with well dried grain and to use a modern high speed air swept impact mill, in a single step grind. Stone mills can also be used of course, but they need to be well-managed and output is generally lower than from impact mills. Whole wheat flour produced from dry grain in a single action this way, has a shelf life measured in months; still not so long as when produced via the Stoney Smith method.           So, we learn yet again that it is far more expedient for whole grain flour production, to store grain and mill it on demand locally, than it is to attempt to store whole grain flour.           ***What if,*** we could have a subsidy for efficient air swept impact mills and appropriate stone mills for whole grain flour production? ***What if***we could have these mills localized near local grain storage, and have them milling fresh, fine whole grain flours on demand for local bakers, pasta makers, pastry chefs and grocery store shoppers? The idea has already stood the test of time, and covid, so why not? |

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| ***Heritage wheat seed maintenance***A PowerPoint ***Heritage Wheat Seed Maintenance***presentation from the California Seed Summit 2021, can be downloaded from [www.wholegrainconnection.org](http://r20.rs6.net/tn.jsp?f=001hEPj7QXbKa4jlX1T7Od5lc8lOKy3ge7Plpj1iELGlD5mbv-6qEQGpUgAKqVfdS1Zo7mC8JnVGIsUkiMJQVq8K6ufmU5ZMnCT-CkGwciK9arOLHRhFvPYf8CFFvngZ0DtPJJ1kP2LwL9MhsSu0MnDtmEJpdIIRt3NCtrv_6Am3dU=&c=g71FNlOJa3Csafb9eCWDA9AC7ix2K0HRJ2KmQBqiDajJXR5WD1AQ5g==&ch=RGrkYiaMIqUp9h9egociCaQ5JehN4CxNxZqNcwqDbQohVLAEqbLevw==&jrc=1). The work of keeping heritage seed pure and at peak performance is mostly about starting with known good seed and taking every precaution to prevent mixing in any other varieties or weed seeds. Third party quality assurance gives confidence to buyers of heritage wheat seed and crops. |

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| ***New Recipes for sweeter softer whole wheat bread****– whole wheat sourdough malt breads*           With the idea of making sweeter and softer whole grain bread: they can be made with a porridge, sweetened with enzyme-active malt.            New recipes, posted at [www.wholegrainconnection.org](http://r20.rs6.net/tn.jsp?f=001hEPj7QXbKa4jlX1T7Od5lc8lOKy3ge7Plpj1iELGlD5mbv-6qEQGpcSXr3QsjpsRPNPZ1Kb-yU5wHk7eX0lgnz4NMXl2rWNNCTJXnXjTZYUD-MguTRKNKwQSJeFrdWIX2bs15092ZhBLebHs8FOb2LDzitXTCfnlUv7smf8z8Ow=&c=g71FNlOJa3Csafb9eCWDA9AC7ix2K0HRJ2KmQBqiDajJXR5WD1AQ5g==&ch=RGrkYiaMIqUp9h9egociCaQ5JehN4CxNxZqNcwqDbQohVLAEqbLevw==&jrc=1)use only whole wheat and malt flours, water and salt, together with a sourdough starter with the same ingredients (minus salt). These recipes are basic and can be used with other ingredients such as olive oil, milk, or whey to increase softness still more, egg (added after first rise!), butter, dried fruit, nuts, seeds and spices. |

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